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The relationship between official development assistance and Donor's exports: The case of the European Union and Southern Africa[1]

Lenka Fojtíková[a] & Petra Doleželová[b]

[a] *Department of International Economic Relations, VSB-Technical University of Ostrava, Czech Republic*
E-mail: lenka.fojtikova@vsb.cz
[b] *Department of International Economic Relations, VSB-Technical University of Ostrava, Czech Republic*
E-mail: petra.dolzelova@vsb.cz

Abstract

Official Development Assistance (ODA) is a way how developed countries promote the economic development and welfare of developing countries. The European Union (EU) and its member countries share in ODA by more than 55 per cent. This paper focuses on the ODA of selected EU countries granted to four least developed countries in Southern Africa and examines the relations, in terms of correlation and causality, between ODA and the donor's export. In most cases, the results of Pearson´s correlation coefficient showed a positive correlation. The strongest association was identified between exports and the ODA in Germany. The Johansen cointegration test and the Granger causality test confirmed a stronger causal relationship in the direction from ODA to exports than for the relationship in the opposite direction. Besides a social issue, ODA also has economic implications. Policymakers on both sides should cooperate in order to increase ODA, and to support trade.

Keywords: Official Development Assistance, export; European Union, least developed countries, Southern Africa

Jel Codes: F13, O24, O55

1. Introduction

The issue of the support of less developed countries to increase their living standard has been the subject of a serious political discussion in the world since the middle of the twentieth century. This discussion formally arose under newly created international organisations and committees. The first forum for discussing development aid issues on the international level was the Development Assistance Committee (DAC), originally known as the Development Assistance Group, established in 1960 under the auspices of the Organisation for European Economic Co-operation, the forerunner of the Organisation for Economic Co-operation and Development (OECD). In order to increase the transparency of reporting on development aid flows and to unify its form, in 1969 the DAC defined the Official Development Assistance (ODA) as a standard for development assistance and a key measure for the assessments of aid flows. In this spirit, the activities of the DAC, which are carried out via ODA, have contributed to the fulfilment of development goals, such as the Millennium Development Goals (MDGs) or the Sustainable Development Goals (SDGs), which focus, among other things, on poverty reduction and the improvement of living standards in developing countries (OECD 2020a).

The DAC currently unifies thirty donor countries that provide 85% of the total world development assistance (OECD 2020b). The European Union (EU) participates in the DAC with its 19 member countries and the EU also acts as a full member of the DAC on its own.[2] With respect to the fact that the EU, together with its member countries, represents more than a half of all DAC members, the EU has been the biggest ODA donor in the world for several years as well. In 2019 alone, the EU and its members collectively provided € 75.2 billion representing 55.2% of ODA provided globally (European Commission 2020).

Although ODA has a long history and the total amount of ODA provided by the governments of the donor countries had gradually increased from USD 1,953 million (in current prices) in 1950 to USD 147,373 million (in current prices) in 2019 (OECD, 2020c), the reality is that there are still almost five tens of countries in the world that are considered as the least developed countries (LDCs) according to the criteria and indicators of the United Nations

(UN).[3] Five of these countries are also located in Southern Africa, i.e. Angola, Lesotho, Malawi, Mozambique and Zambia. As the effects of providing ODA to the donor countries have been often controversial (Cohen 2013; McGillivray et al. 2006), ODA has been the subject of international discussion and several improvements recorded in strategic documents, such as the Shaping the 21st Century: The Contribution of Development Cooperation (OECD 1996).

In reality, the activities of the development cooperation are closely connected with other areas, namely trade policy. This means that the development policy of ODA's individual donor countries is one part of their foreign policy, which is formulated in compliance with trade policy objectives. This idea is also supported by the fact that the granting of ODA has very often been conditioned by the buying of goods and services only from firms of the donor's country, so the development assistance has had the character of the so-called "tied" aid. According to the OECD (2020d), "tied" aid can increase the cost of the development project by about 15–30%. Thus, while the main motive for providing ODA should be the social responsibility and goodwill of developed countries, doubts have arisen about the hidden motives for its provision.

In the context of the official purpose of ODA, i.e. to promote the economic development and welfare of developing countries (OECD 2020e), many empirical studies focus on the impact of ODA on economic growth (Dalgaard et al. 2004; Minoiu and Reddy 2008; Phiri 2017). It is empirically proven that in connection with achieving a higher economic growth international trade plays an important role (Singh 2010). Due to its significance for economic growth many authors focus on links between ODA and international trade, especially exports. Besides economic growth, other studies examining the effects of ODA focus, for example, on the impacts on poverty (Woldekidan 2015; Abduvaliev and Bustillo 2020), income inequality (Herzer and Nunnenkamp 2012), decentralisation (Galvin and Habib 2003), or development policies (Kamwengo 2017). All studies we mentioned above have one thing in common and that is the focus on the effects of ODA on the recipient country.

While the majority of studies dealing with ODA focus, in general, on recipient countries, in empirical literature very little attention is dedicated to the effects that ODA can also bring to its providers. In this spirit, some previous studies explored the relationship between the donor's exports and ODA using Germany (Nowak-Lehmann et al. 2009) or Canada (Bhushan and Siauw-Soegiarto 2017) as an example. Otor and Dornan (2017) explored the relationship between ODA and Australian exports to Asian countries. The analyses in all these studies were carried out through gravity models, thus, besides ODA also other factors were taken into account when analysing the impact on the development of the donor's export. As there are few studies that address the impact of ODA on donor exports, there is not enough empirical evidence yet to develop a theoretical framework that would explain the principle of this relationship clearly.

Our intention is to contribute to narrowing the gap in empirical literature dealing with the causality between ODA and donor´s exports. The main aim of this article is to find out if there is a relationship between donor´s exports and ODA on the sample of selected EU countries and the LDCs in the Southern Africa region in the period from 1985 to 2018. In order to achieve this aim, exploration will be carried out through the correlation analysis, the Granger causality test and cointegration test. This methodology will enable us to determine different relations that can occur between export and ODA in the monitored countries and to debate the possible impacts of these relationships.

For this purpose, the remaining part of the article is organised as follows: Section 2 introduces the methods and data for exploring the association and causality between ODA and exports on selected groups of countries. Section 3 firstly presents the development of ODA between monitored donors and recipients, and then the results of the correlation, cointegration and causality tests are presented. Secondly, Section 4 develops the discussion about our results in comparison with the previous studies. The conclusion brings some policy recommendations for increasing awareness about the relationship between ODA and export, which can be advantageous to both sides.

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[3] The LDCs criteria include: the level of the Gross National Income (GNI) per capita, Human Assets and Economic and Environmental Vulnerability. These criteria are measured using key indicators that are available at https://www.un.org/development/desa/dpad/least-developed-country-category/ldc-criteria.html (UN 2020a).

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2. Data and Methods

The article examines the relationship between ODA provided to the group of the LDCs situated in Southern Africa by selected EU member countries and the exports of these countries to the LDCs.

The LDCs group currently includes 47 of the world's poorest countries (UN, 2020b); five of them are located in Southern Africa, namely Angola, Lesotho, Malawi, Mozambique and Zambia. However, due to the lack of data on Lesotho, we were forced to exclude the country and continue working with only four countries (Angola, Malawi, Mozambique and Zambia). In terms of the second group of examined countries, i.e. the EU, although we would like to include in the study all nineteen EU members that are DAC donors and, thus, provide a comprehensive empirical evidence on the existence of the relationship between donor´s exports and ODA, the limited availability of data did not allow us to do so. Due to the unavailability of some data related to either exports or ODA, especially of the younger EU member states, we were forced to work with a sample of only ten EU countries, i.e. Austria, Denmark, Finland, France, Germany, Ireland, Italy, Netherlands, Spain, and Sweden. However, this allowed us to make sure that all our time series are comprised of uninterrupted observations and we are able to avoid applying special treatment to the missing data. As we study the relationship between the export flows and ODA flows of the ten EU member states and four Southern African LDCs, we work with a total of 80 time series. Thus, we examine the 40 possible relationships between selected donors and different recipient countries.

The Official Development Aid data were obtained from the World Bank database on the World Development Indicators. Since we´re interested in the amount of ODA which the LDCs actually received in a given year, we consider net ODA disbursements in US dollars instead of aid commitments. The bilateral exports of the EU members to the LDCs are expressed in millions of USD and were extracted from the International Monetary Fund database on export. All the data we used in this analysis are annual data covering the period from 1985 to 2018.

Our main goal is to determine whether there is a relationship in terms of association and causality between exports and ODA within our sample of countries. In order to achieve this goal, we first determine the existence of a link between ODA and donor´s exports and measure the strength of the association between these two variables. Second, we test whether the ODA provided to the group of the LDCs by the individual EU member states has an influence on their exports to the LDCs or whether the ODA provided is influenced by these exports. There is, of course, also the possibility of causality running in both directions simultaneously.

There are several synchrony metrics and measurement techniques that can help us to study the relationship of the two variables. The Pearson correlation and time-lagged cross correlations (including the Granger causality test) belong among these synchrony methods.

We examine the existence of a relationship between the variables and its strength with the help of the correlation analysis, specifically Pearson´s correlation coefficient. Pearson´s correlation coefficient measures both the direction and the strength of this tendency to vary together. A correlation coefficient is calculated as:

$$r = \frac{N \sum xy - \sum x \sum y}{\sqrt{(N \sum x^2 - (\sum x)^2)(N \sum y^2 - (\sum y)^2)}} \quad (1)$$

While the value of ± 1 indicates a perfect degree of association, the value of 0 indicates no correlation between the variables. This means the higher the absolute value of the coefficient, the stronger the correlation. A positive value of the coefficient suggests positive correlation, meaning that the values tend to move in the same direction. On the contrary, a negative value means that as one variable increases the other variable tends to decrease.

However, even if a significant association between the variables is identified by the correlation analysis, correlation does not imply causation. As we cannot use the correlation results as proof of the existence of a causal relationship, we next employ a cointegration test and a causality test. To determine the existence of causality we perform the Johansen cointegration test and the Granger causality test on the export and ODA provided to the LDCs separately for every EU member country.

To test time series on cointegration is one of the ways how to determine whether there is a long-run relationship between the variables or not. The concept of cointegration is based on the idea that two or more variables have a long-run relationship with each other even if they are not individually stationary but their difference is stationary (Ramos 2001). When the variables are cointegrated it means that the time series move together in the long run. On the contrary, a lack of cointegration suggests that there is no link between the variables in the long run. The Johansen cointegration test is based on a vector autoregression of order *p* given by:

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$$y_t = \mu + A_1 y_{t-1} + \cdots + A_p y_{t-p} + B x_t + \epsilon_t \qquad (2)$$

There are two different test statistics for cointegration under the Johansen method: the Maximum Eigenvalue Test and the Trace Test. Both are likelihood-ratio tests. For both test statistics a null hypothesis of no cointegration (the long-run relationship) is set up against the alternative hypothesis of cointegration. For the Maximum Eigenvalue Test the test statistic takes the form of:

$$LR_{max}(r|r+1 = -T \log(1 - \lambda_{r+1}) \qquad (3)$$

with the null hypothesis that the cointegration rank is equal to *r* against the alternative that the cointegration rank is equal to *r+1*. For the Trace Test the test statistics is computed as:

$$LR_{tr}(r|k) = -T \sum_{i=r+1}^{k} \log(1 - \lambda_i) \qquad (4)$$

with the null hypothesis that the cointegration rank is equal to *r* against the alternative that the cointegration rank is *k*.

To investigate the existence of a short-run relationship between export and ODA we employed the Granger causality test. The Granger causality (Granger 1969) is based on the idea of improving the prediction of one time series by incorporating the knowledge of a second series into the model. If the prediction is improved thanks to the added time series, the casual influence of the latter series on the first is proven. Specifically, two auto-regressive models are fitted to the time series. One is a model without the additional series and the latter is with the additional series. The improvement of the prediction model is measured by the ratio of the variance of the error terms (Guo, Ladroue and Feng, 2010). The Granger causality test is based on the following regressions:

$$Y_t = a + \sum_{k=1}^{K} b_k Y_{t-k} + \sum_{l=1}^{L} c_l X_{t-l} + u_t \quad (5)$$

$$X_t = d + \sum_{m=1}^{M} e_m X_{t-m} + \sum_{n=1}^{N} f_n Y_{t-n} + u_t \quad (6)$$

We set up the null hypotheses for each of the equations as:

H0: Y_t does not Granger-cause X_t, if c_l=0.

For the first equation, and for the second equation as:

H0: X_t does not Granger-cause Y_t, if f_n=0.

To confirm the Granger causality, c_l and f_n need to be statistically significant. While the statistical significance of c_l proves *X* to be Granger-causing *Y*, the significance of f_n means that *Y* Granger causes *X*. There is always the possibility of bidirectional causality in the case that both c_l and f_n are statistically significant. The statistical significance of the parameters is determined by the F-test. The reported F-statistics are the Wald statistics able to determine whether the variables in a model are significant. If the variables are considered significant, they add something to the model. Conversely, if they are not, they can be excluded without significantly affecting the model. The two main conditions for the Granger causality to be valid are the stationarity of the time series and the absence of cointegration between the variables. If these conditions are not observed, there is a risk of spurious regression.

2.1. Preliminary analysis

All the time series were tested for the presence of a unit root in order to check for the stationarity of the variables. For this purpose, the Phillips and Perron tests (Phillips and Perron 1988) and the Augmented Dickey Fuller tests (Dickey and Fuller 1979) were employed for the individual time series and their first differences. In addition, we also used the correlograms for the series both in levels and in first-differenced to detect the stationarity and non-stationarity graphically. According to the results, all series are non-stationary in their levels, but stationary in their first differences. Since all the variables are integrated of order one, i.e. I (1), the next step is the examination of the time series for cointegration.

An important prerequisite for employing the Johansen test is the non-stationarity of the variables, therefore we work with the time series at levels. To carry out the test we also need to make an assumption regarding the trends underlying our data. Then we can choose the trend specifications for the Johansen tests according to the presence (or absence) of trends and intercepts in our time series. One of the key aspects that has to be determined before conducting the Johansen cointegration tests and the Granger causality test are the optimal lag lengths. Since the Johansen cointegration test is sensitive to lag length, we determine the optimal lag length based on several criteria. First, a vector autoregression (VAR) model is fitted to the time series data in order to find an appropriate lag

structure. We choose namely the Schwarz Information Criterion, the Akaike Information Criterion and the Hannan-Quinn Information Criterion.

Next, we follow up by examining a short-run relationship with the help of the Granger causality test. Since the Granger causality test requires the stationarity of the tested time series, compared to the Johansen test, for the Granger test we work with differenced series. The lag lengths were decided based on the same criteria as for the cointegration tests.

3. Results

In the context of the development of ODA in the period from 1985 to 2018, the individual time series for every pair of donor country and recipient country were explored. The results show the fact that for more than a half of the EU donors of ODA provided to the individual LDCs in Southern Africa has grown on average over the years, although in some cases at a considerably low rate (Table 1). Despite the tough decade experienced by the Irish economy, the ODA provided by Ireland grew the most of all donor countries. There were also several cases where the ODA received by the individual LDCs had decreased on average. The largest reduction in ODA to the four selected countries was recorded for the Netherlands. This declining trend in the total Dutch ODA was also acknowledged by OECD (OECD 2020f). Out of the selected LDCs, the most significant decrease from the individual EU donors was recorded in Angola (Table 1). One of the reasons why most donors gradually reduced ODA for Angola may be the fact that for several years Angola has already been scheduled to graduate from the LDCs group and will officially graduate in 2021.

Table 1. Correlation Coefficients and Average growth rates of exports and ODA during 1985-2018

	LDC	Austria	Denmark	Finland	France	Germany	Ireland	Italy	Netherlands	Spain	Sweden	Total
Correlation Coefficient	**Angola**	-0.3	0.6	-0.3	0.3	0.7	0.4	-0.4	-0.3	0.5	0.6	/
	Malawi	0.3	-0.2	0.4	0.5	0.7	0.4	0.6	-0.3	0.7	0.6	/
	Mozambique	0.3	0.7	0.8	-0.3	0.8	0.3	0.7	0.4	0.6	-0.3	/
	Zambia	0.3	-0.1	0.2	0.2	0.8	0.6	0.4	-0.3	0.7	0.4	/
Average growth rate of ODA (%)	**Angola**	-13.9	3.5	-0.1	4.8	1.6	1.6	-4.9	-10.3	5.0	-8.5	-2.1
	Malawi	6.1	-11.8	11.7	-8.7	4.9	23.7	8.8	-15.5	10.2	8.3	3.8
	Mozambique	2.8	5.2	4.6	-2.6	8.5	22.5	0.6	1.6	9.5	2.4	5.5
	Zambia	0.6	-6.5	-1.8	7.7	2.3	3.3	-0.4	-16.6	9.8	2.7	0.1
	Total	-1.1	-2.4	3.6	0.3	4.3	12.8	1.0	-10.2	8.6	1.3	1.8
Average growth rate of exports (%)	**Angola**	5.2	1.0	8.8	2.6	2.4	11.1	3.4	2.2	1.1	-3.6	3.4
	Malawi	7.4	0.2	0.7	2.5	1.3	9.7	2.7	6.5	5.1	2.9	3.9
	Mozambique	12.0	0.4	8.1	-0.4	7.5	6.6	5.0	5.1	10.0	-0.2	5.4
	Zambia	4.1	-1.8	5.3	2.5	2.4	5.2	3.0	4.4	8.0	7.0	4.0
	Total	7.2	0.0	5.7	1.8	3.4	8.1	3.5	4.5	6.1	1.5	4.2

Source: own creation

The results of the correlation analysis, examining the association between donor´s exports and ODA, presented in Table 1, show a positive correlation in most of the cases. All the correlation coefficients can be considered statistically significant. There were some cases where the correlation coefficient was negative and, thus, expressed an inverse correlation between exports and ODA. According to the results, in thirteen cases out of forty the

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correlation can be described as strong or very strong because the value of the correlation coefficient reaches a higher value than 0.6. The strongest association was identified between exports and ODA in Germany.

In cases where a correlation was identified between donor´s exports and ODA but no causal relationship was found, it means that although associations were established between ODA and exports and their values tended to move together, we cannot say that one variable affected the development of another variable. In other words, since the inclusion of the second variable into the model could not improve the prediction of the development of the first variable, we rejected the hypothesis of the presence of causality.

The results of the cointegration tests for all researched variables are very uniform. The null hypothesis of no cointegration cannot be rejected at both the 5 per cent and 10 per cent level of significance for any of the variables researched. This applies in all cases for the results of the maximum eigenvalue test, but also for the results of the Trace Test. We can say that the Johansen tests clearly indicate that there is no cointegration between the variables researched and therefore there are no long-run relationships identified between the exports of the EU member countries to the LDCs and the ODA provided.

The results related to the presence of the Granger causal relationships between the exports of the individual EU countries destined for the LDCs and the ODA provided by these selected countries to the group of the LDCs are shown in Appendix 1. The causal relationship between ODA and donor exports was identified in a total of twenty-one cases out of forty.

The evidence suggesting a causal relationship in the direction from ODA to exports is significantly stronger than for the relationship in the opposite direction. The causality running from ODA to exports was identified in eighteen cases and was most pronounced in Germany, Finland, and the Netherlands. Regarding Germany, the impact of ODA on German exports was found for all selected recipient countries. As for Finland and the Netherlands, the existence of the effect of ODA on exports was found in three out of four relationships with the selected LDCs. Thus, the empirical results show that in the case of several EU members, their exports to one or more of the selected LDCs are indeed influenced by the amount of ODA they provide to these countries.

The unidirectional causality running from exports to ODA was detected only for flows between Ireland and Malawi, Denmark and Mozambique, and France and Mozambique. A bidirectional relationship between exports and ODA for any donors was not found.

4. Discussion

Through this paper we tried to contribute to the narrowing the gap in empirical literature dealing with the relationship between ODA and donor's exports. However, unlike most studies that focus on the impact of ODA on donor´s exports, we also focus on the possibility of a relationship in the opposite direction, in which exports could affect the amount of ODA. By including ten EU countries, the article also has a geographically broader focus than is usual for impact studies.

Using a sample of ten EU donors and four least developed countries situated in Southern Africa, we examined the relationship between the ODA and exports of donor countries. We consider the four Southern African LDCs as a sufficient sample of recipient countries. All these countries are members of the Southern African Development Community, and while Angola is a LDC with a higher GDP per capita and receives a lower ODA than the LDCs average, Malawi, Mozambique and Zambia receive some of the highest amounts of ODA in the LDCs group and have a lower GDP per capita than the LDCs average. In this way, we provided the ability to compare the results for the diverse recipients within the group of LDCs.

The findings presented in our article show the existence of a relationship between ODA and donor´s exports within the selected sample of countries. In several cases, this relationship was proven to be causal and mostly unidirectional, running from ODA to donor´s exports. Some of our findings regarding the individual donors are consistent with the findings in the previous study by Nowak-Lehmann et al. (2009), and Martínez-Zarzoso et al. (2016). Although these two studies take a different approach and apply different methods than we do, they also examine the relationship between ODA and donor´s exports while focusing on a different sample of recipient countries than ours. The study by Nowak-Lehmann et al. (2009) focuses on Germany and concludes that German aid causes German exports from the recipient countries, but not vice versa. In our study, in the case of Germany, we also came to this conclusion. Another of the selected donors in our study was the Netherlands, for which we confirmed the existence of the effect of ODA on Dutch exports in the case of three of the four selected LDCs.

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Similarly, Martínez-Zarzoso et al. (2016) confirm the existence of this impact of ODA on Dutch exports but do not focus on a relationship in the opposite direction for which we did not find any evidence.

In this spirit, Gurljani and Calleja (2019) point to trends shifting the donor motivations more to advancing national interests. According to Gulrjani and Calleja, populism in the world and with it the pressure to promote national interests is growing and calls for a mutual benefit of ODA for both the recipients and donors are becoming more frequent. However, if the focus is shifted from the official goal of promoting development in poor countries to benefits for the donor country, it can significantly jeopardise the effectiveness of development aid. Also, Girod (2008) points out the fact that selfish motives result in suboptimal allocations of aid, as it is directed to poorly chosen areas and countries only to increase the return of ODA. The effectiveness of ODA is weakened not only when it is used to obtain economic benefits for the donor country but also when it is used to advance geopolitical interests (Dreher, 2016).

For the period from 1985 to 2018 we found the existence of the effect of ODA on the EU donor´s export to four recipient countries almost in half of the cases. However, if the trend towards benefiting from aid funds provided abroad continues and there is indeed a shift to ODA as a tool to promote donor interests in the future, this may change. We mentioned that exports are direct transmission channels, thus, if ODA were to be used to generate profits for the donor country, this would be reflected first and foremost in the increase in donor exports.

Regarding the other side of the relationship, the results presented in our article do not confirm the existence of a causal relationship in the direction from exports to ODA, as the number of cases where this causality was demonstrated in our sample of countries is negligible. We view this finding as positive, since we consider proving the effect of ODA on exports to be more suitable than proving the effect of export on ODA would be. The impact of increasing exports may seem like an understandable consequence caused by ODA contributing to increasing the wealth of the recipient country. However, if the amount of ODA provided is affected by the amount of donor´s exports to the recipient countries, it would make exports one of the factors for determining the amount of ODA provided. In such a case, the donor countries would, among other factors, determine the amount of ODA also on the basis of the importance of the recipient country as an export market for them.

There are several ways how the amount of exports can serve as a basis for determining the amount of ODA. If the donor´s exports to the recipient country are low or declining, the donor may seek to encourage these exports by increasing wealth in the recipient countries and strengthening relationships with the help of increasing ODA. However, there can also be a situation when the exports to the recipient country are low, but the donor considers the recipient country an unimportant export market, and that may negatively affect ODA. On the other hand, if the exports to the recipient countries are high and growing, the donor country might increase ODA to maintain these relations. There is of course the possibility of the donor country reducing ODA because it considers the trade relations with the recipient country to be quite strong. Determining the amount of ODA in this way can significantly reduce objectivity and fairness in the distribution of ODA among different recipient countries.

However, even in cases where a causal relationship was not found, we found out that ODA and exports tend to move together and in the same direction. This means that an increase in ODA is accompanied by an increase in exports and vice versa. This fact offers the possibility that there are other given factors that affect both ODA and exports. The question also arises as to whether these are common factors for ODA and exports and to what extent they affect them. However, this area can be the subject of the next study based on a new methodology and data.

5. Conclusion and policy recommendation

There are several reasons for exploring the relationship between ODA and donor's exports. Besides the fact that ODA is an instrument how to promote the economic development and welfare of developing countries, we should look at ODA in another way. The results of our correlation analysis confirmed the same movement of ODA and exports, i.e. when ODA increases, the donor's export will increase too, and vice versa, when ODA decreases, the donor's export will decrease as well. Thus, ODA is a way how to increase the awareness about a given donor's country and, among other things, contribute to the increase of their exports.

The causality between ODA and export may run in two directions, in which the motivation for granting ODA can play a different role. In the case of the EU, the results of our tests showed only a limited number of cases in which the effect of exports on ODA was proven. This applies namely for Ireland, Denmark and France where there is a possibility of the dependence of granted ODA to Malawi and Mozambique on their exports to these countries.

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Eight out of the ten EU donors have shown a causal relationship in the direction from ODA to exports in at least one of the four possible relationships with either Angola, Malawi, Mozambique, or Zambia. This complementary relationship, in which ODA is accompanied by the donor's export, can bring economic welfare to both sides, i.e. the recipients as well as donors. If ODA opens the door for donor's exports, it will have a positive impact on their economic growth and national budget, from which ODA is also financed.

In this spirit, in order to fulfil the ODA goals, cooperation among countries on both sides is important. The governments of the ODA recipient countries should especially remove barriers to trade and enable exporters free access to their markets. The creation of a trustworthy environment with a functioning legal background for business is also very important. On the other hand, the governments of the donor countries should create suitable conditions for their exporters and inform them about the ODA recipient countries.

Although the importance of development assistance has been discussed for many years, in the time of the covid-19 pandemic solidarity among countries around the world plays the most important role, and also a better understanding of the motives to grant ODA from the side of the important donors, such as the EU and its member countries, can contribute to keep track on solidarity precisely in the time of the world health crisis.

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Improving social performance of a resource cooperation model - Science Education Business Power-based on "Smart Specialization" principle

Venelin Terziev[a] & Viladimir Klimuk[b]

[a] *University of Rousse, Rousse, Bulgaria & Kaneff University Hospital, Rousse, Bulgaria*
E-mail: vkterziev@gmail.com
[b] *Baranavichy State University, Baranovichi, Republic of Belarus*
E-mail: klimuk-vv@yandex.ru

Abstract

The article presents the cooperation model -Science_Education_Business_Power- based on "Smart specialization" principle emphasizing the possibilities for its application and implementation. The successful functioning model of an organization, especially in the current situation, is partnerships based on the principles of smart specialization. The collaboration aimed at increasing innovation potential should be implemented by components – the educational and research sector, the real sector, the business sector, the government sector and the public sector.

Keywords: science, education, business, organization, development

Jel Codes: P00, I20

1. Introduction

Essential steps to an effective strategy implementation of an organization, region or state include improving socio-economic parameters that influence residents` life standard, improving working conditions and quality of life, which ensures the development of intellectual potential. The successful functioning model of an organization, especially in the current situation, is partnerships based on the principles of smart specialization. The collaboration aimed at increasing innovation potential should be implemented by components – the educational and research sector, the real sector, the business sector, the government sector and the public sector.

2. Improving social performance of a resource cooperation model -Science Education Business Power- based on "Smart specialization" principle

In order to find partners to create such partnerships, temporary or permanent (relatively permanent), it is necessary to analyse the regional market, customer requests, predicted development indicators, trends in the economy and society, to define the competitive advantages of potential partners (for the mutually beneficial cooperation of all members of the partnership using the most of the potential of each of them – to define the level of "smart specialization"). The process of searching for potential partners and their subsequent selection for the functioning of the future partnership follows the process of goal-setting and determination of a number of operational and strategic objectives. Only by setting a specific goal and objectives, i.e., having a clear idea of the necessary activities, possible formats and mechanisms, benefits for each participant (partner), it is possible to build a successful model of cooperation – an ecosystem.

 The main goal of the state is to ensure high quality of life for its citizens defined by prosperity, good education, healthcare system, healthy environment, safety, i.e., to increase social performance indicators. Undoubtedly, the social performance depends on economic performance that is a predictor (dominant) for creating strategies and tactics of socio-economic development.

However, it is impossible to create a unique product (item, work, service) on your own that would satisfy the demand of the society (customers, consumers). The process of its development should include certain specialized entities. This will allow achieving best possible result at each stage of the interconnected process "initiative-creation-approval-implementation-usage-feedback".

In order to achieve the set goal and objectives for increasing social performance of the state it is necessary to engage partners representing educational and research sectors, manufacturers and business entities, governmental and public organizations. This will help consider interests and provide benefits (both economic and social) for each member of the partnership (Fig. 1).

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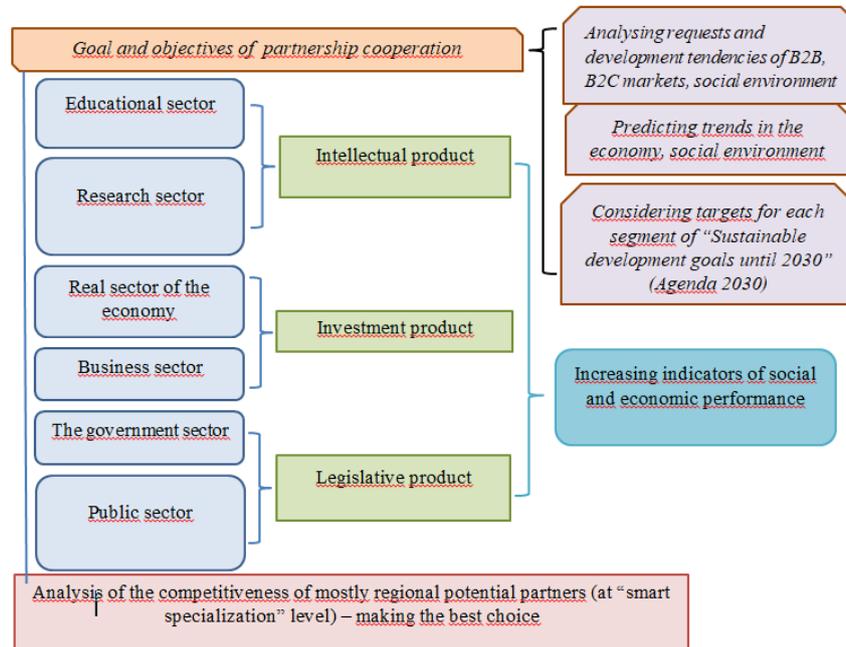
Figure 1. Model of a successful partnership cooperation based on „smart specialization" principle

Source: Authors

As a result of partnership cooperation the following products are created:

- intellectual product, created as a result of research within certain problematic area (current topic) and generated scientific and technical innovative developments;

- investment product, created as a result of decision-making by business entities interested in the production of an innovative product; credit and financial institutions that plan to make profit from their initial investments; individual entities interested in receiving dividends;

- legislative product, created as a result of favourable conditions for research and educational organizations, manufacturers, investors (taxation system, preferential tariffs, use of resources, etc.).

Combining these products would help improve social performance indicators that ensure prosperity and the quality of life of the population. In particular, such indicators include:

- Quality-of-life index.

This indicator is used as an integral indicator calculated with the help of 9 key quantity parameters (according to The Economist Intelligence Unit): health, family life, community life, material wellbeing, political stability and security, climate and geography, job security, political freedom, gender equality.

As of December 2020 Denmark is ranked 1st (192,67 points), Switzerland is ranked 2nd (192,01) and Finland is ranked 3rd (190,22). Belarus is ranked 39th (134,83), Bulgaria – 43rd (129,80) out of 80 ranked countries, which is above the average (Fig. 2).
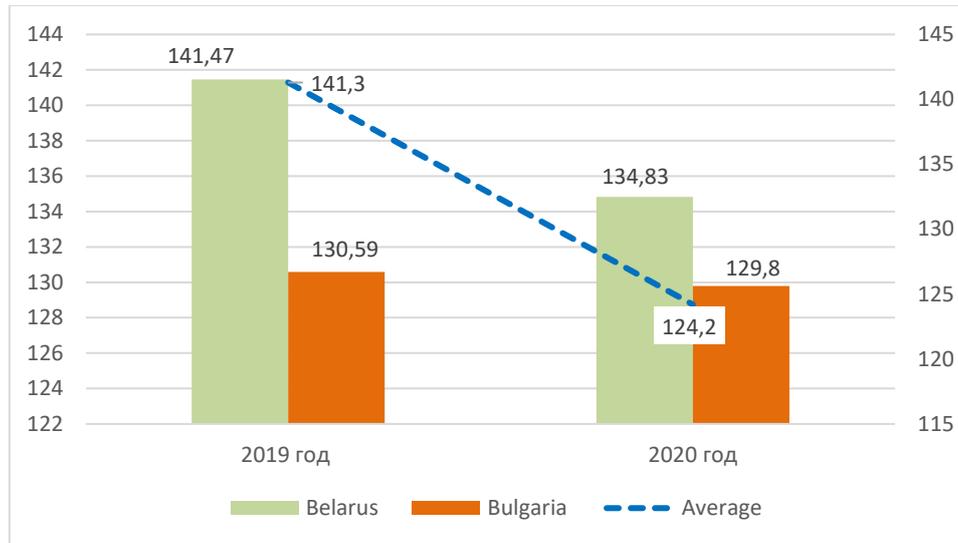
Figure 2. Dynamics of the quality-of-life index according to The Economist Intelligence Unit for 2019-2020, (2021a)

Source: Authors

- Sustainable development goals index.

Defined as an integral indicator it combines indicators that correspond to individual sustainable development goals (Agenda 2030) (poverty and hunger eradication, good health and well-being, quality education, gender equality, clean water and sanitation, affordable and clean energy, decent job and economic growth, industrialization, innovation and infrastructure, reduction of inequality, sustainable cities and settlements, responsible consumption and production, fighting climate change, marine ecosystems preservation, preservation of terrestrial ecosystems, peace, justice and efficient institutions, partnerships for sustainable development).

For each of the 17 goals the government set certain objectives to be met before 2030 and which should be addressed on a regular basis. Each objective contains a number of quantitative indicators.

The data is collected on the official website of UN statistics (https://unstats.un.org/home/) (2021b) and on the websites of national statistical agencies (for the Republic of Belarus – http://sdgs.by) (2021c).

Based on the indicators of these two extensive indexes (quality of life and sustainable development goals) we can develop a system of indicators that can be used for assessment.

Social performance should be assessed by the following levels: national (regional) social performance; social performance of an organization (branch, enterprise) and social performance of an event (project) (Table 1).

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Table 1. System of indicators for assessment of social performance of a country, an organization and a project (based on a System of global indicators for the sustainable development goals and the objectives of the 2030 Agenda for sustainable development)

Indicators for assessment of social performance of:		
A country (region)	**An organization (branch)**	**A project (event)**
− average wage growth rate; annual growth rate of real GDP per capita; − percentage of the rural population who live within 2 km of an all-seasoned road; − share of expenditures on research and development activities in GDP; − total expenditure per capita on the preservation and protection of the entire cultural and natural population; − total resource costs and resource costs per capita as a percentage of GDP; − total annual greenhouse gas emissions; − percentage of fish stocks that are within biologically sustainable levels; − percentage of land and freshwater areas, which are important for biological diversity, divided by types of ecosystems; − percentage of the population satisfied with the most recent use of public services; − the amount (USA dollars), allocated to state and private partnerships in infrastructure; − percentage of the population with income below the official poverty line; − number of healthcare personnel per capita and their distribution; − percentage of population with completed education (primary, incomplete and complete secondary education); − percentage of women in managerial positions; − percentage of the population using water supply services provided in accordance with safety requirements; − energy intensity, calculated as the ration of primary energy consumption to GDP;	− number of vacancies (for the analysed period) − number of employees who have completed trainings (training courses, short-term programmes, workshops, intensive trainings, etc.) − wage (income) growth rate; − Employee satisfaction index; − Workplace safety index; − employee turnover index; − others.	− number of participants in the event; percentage of foreign participants in the total number; − number of vacancies additionally created (for the project) − share of innovative products expected to be produced in the total planned production volume (for projects); − volume of harmful emissions (environmental pollution) (for projects); − share of external financial resources for the event (project) in the total funding; − profitability index (for the project); − others.

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−   percentage of manufactured innovative products in the total volume;
−   share of expenditures on basic services (education, healthcare, social protection) in the total volume of state expenditures;
−   share of agricultural land using productive and sustainable agriculture practices;
−   the proportion of the population receiving education (with complete education) in the total population of the state (region);
−   number of patients per one healthcare worker;
−   unemployment rate;
−   volume of emissions of air pollutants to the atmosphere;
−   safety index (based on surveys).

Source: Authors

The best way to calculate social performance is with the help of an index method with the implementation of weighting factors:

$$I_{soc.perf.} = \sum_{i=1}^{n} I_i \times K_i,$$

where $I_{soc.perf.}$ is an integral index of social performance;

I_i is the value of the 'i' index that affects social performance (defined as the rate of change of the actual value of the indicator in terms of the previous one);

K_i is the value of the weighting coefficient (significance coefficient) of the 'i' index (defined by the expert method or the method of hierarchies).

Such method of assessment and selection of necessary indicators out of the proposed set can also be applied for assessment of social performance of events or social projects.

In order to create an effective partnership model – an ecosystem – it is vital to follow the principle of smart resource management. The difference between the smart resource management and the resource sharing is that the former combines competitive (unique) resources of the representatives of each sector (partners) and not all resources (total resource management). Resource sharing (not smart resource management) may even have negative consequences (reduced productivity, functional disorientation, innovation and technological regression, decrease in capitalization, emotional and moral decline, etc.), which preempts forming a partnership based on the principle of smart specialization (Terziev, Klimuk, 2021d; 2021e; 2021f; 2021g).

3. Conclusion

For this reason, when selecting potential partners certain „scarce" business entities should be identified that are able to provide a unique resource to the supply chain. Once the partners are selected, the next step is to create a development strategy and tactics ("road map") of a partnership highlighting their functional activities (based on the unique resources of partners – their advantages). The partnership strategy based on the „smart specialization" principle (functional distribution of unique resources) helps each partner of a cooperative model achieve a synergistic social and economic effect, since the partner with significant and most efficient resources contributes the most to such partnership, whereas the rest of his resources are secondary (potential development tactics).

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Analysis of policies that ensure transition to a green economy in SME's activity in Republic of North Macedonia

Katerina Hadzi Naumova-Mihajlovska [a] & Neda Petroska –Angelovska [b]

[a] *Associate professor, Institute of economics, Ss. Cyril and Methodius University in Skopje, Republic of North Macedonia*
E-mail: katerina@ek-inst.ukim.edu.mk
[b] *Full-time professor, Institute of economics, Ss. Cyril and Methodius University in Skopje, Republic of North Macedonia*
E-mail: neda@ek-inst.ukim.edu.mk

Abstract

Green economy in SMEs in the Republic of North Macedonia is a new concept in the modern society and aims SMEs in its basic policy to recognize the impact of the business activity on the environment. Therefore, on that basis to adopt environmental elements and also independently create policies to protect the environment. The purpose of the paper is by analyzing all documents and programs relating to sustainable development, specifically, the policies that indirectly encourage and / or stimulate the development of the concept of green economy in the operation and functioning of SMEs, to see the institutional support for promotion and development of the concept of green economy in the Republic of North Macedonia. Namely, there is a general agreement that the concept of green economy is closely related to sustainable development. Specifically, the areas of operation of the green economy are economics and ecology, and the three pillars of sustainability are economy, ecology and society. Hence, given that in the Republic of North Macedonia, the green economy is a relatively new concept and there is no single document - strategy or program for development of the green economy, the analysis uses documents and programs related to sustainable development policies. The analysis has determined that there are certain documents that have given special attention to supporting the adoption of environmentally-friendly business practices, but a special document is needed that will clearly determine the policies for the development of this concept and will concisely align them with the growth and development of SMEs in the Republic of Northern Macedonia, more precisely, the policies for development of the concept of green economy to be incorporated in the activities of SMEs. The results of the analysis are the basis for summarizing certain recommendations and measures to improve the institutional and regulatory framework for the development and application of the concept of green economy in SMEs and the creation of conditions for their successful implementation.

Keywords: green economy, SME's development, environmental policy, Republic of North Macedonia

Jel Codes: Q58, Q56

1. Introduction

The main goal of the green economy is to find ways and methods that will ensure the most efficient use of resources to meet human needs and thereby preserve the environment unchanged. The concept of green economy is perceived through implementation of social responsibility in form of so-called corporate responsibility. Hence, it's best to determine the possible effects of the implementation of the concept to be perceived at the enterprise level. Considering that micro, small and medium enterprises are flexible tend to pursue innovative and risky ventures and more easily adapt to the dynamic changes in the environment, they should take advantage of the current environmental situation, while recognizing the degree of operational success. That means the company to change the way it operates, in the way procurement is carried out and manufactures, and the way it provides services - a way that creates a positive impact on the environment.

SMEs play a significant role in the national economy in the Republic of North Macedonia, and they should use the opportunities offered by the concept of green economy in order to improve the environmental activity and energy efficiency of the company, reduce costs, new approach to operation and access to market. It is indisputable that the health crisis caused by the corona virus left deep consequences in the economy of the Republic of North Macedonia, due to the limitations in the functioning of almost all sectors and the negative results of the operation of key sectors in it. Therefore, a new approach is needed in the functioning of SMEs that will stimulate economic growth and development, while ensuring that nature continues to provide resources and services in the environment on which the well-being of national economies depends. The concept of green economy offers a new approach to work dedicated to the principles of environmental sustainability, especially minimizing the negative impact on the environment and the use of renewable energy sources.

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The Republic of North Macedonia has ratified international conventions in the field of environmental protection and climate change in order to harmonize policies and strategies aimed, inter alia, towards sustainable development. In recent decades, special attention has been paid to policies that promote sustainable development and support the concept of a green economy. Some of the set goals are to increase the percentage of renewable energy in the final energy consumption by 20% and to increase the energy efficiency by 20%.

Green economy in SMEs in Republic of North Macedonia is a new concept in the modern society and aims SMEs in its basic policy to recognize the impact of the business activity on the environment. Therefore, on that basis to adopt environmental elements and also independently create policies to protect the environment. The purpose of the paper is by analyzing all documents and programs relating to sustainable development, specifically, the policies that indirectly encourage and / or stimulate the development of the concept of green economy in the operation and functioning of SMEs to see the institutional support for the promotion and development of the concept of green economy in the Republic of North Macedonia.

In the country there is no single document - a strategy or program development for green economy. Given that there is general agreement that the concept green economy is closely linked to sustainable development, the analysis uses documents and programs related to sustainable development policies. So, it comes to analyzing the Strategy for Sustainable Development, Strategy for Energy Development, Medium-term Strategy for Social Responsibility, National Strategy for SMEs, Industrial strategy, Strategy for use of renewable energy sources, Strategy for Agriculture and Rural Development, National Plan for Organic Production and Environmental Law which covers common issues regulated by sectorial laws such as the Law on Waters, Law on Waste Management, Law on nature protection and Law on Ambient Air Quality.

2. The role of SMEs in the national economy in the Republic of North Macedonia

The existence and functioning of SMEs in the Republic of Northern Macedonia undoubtedly arises as an issue of high importance for the overall economy. This stems from the importance that these companies continuously receive, and which stems from the fact that SMEs are the main source of income for a large number of citizens.

SME development in the country is one of the key factors for achieving accelerated economic growth, increasing employment and growth in production. They represent 99% of the total number of active companies, which is an important indicator for participation in the national economy. (State Statistical Office, 2020) Research related to the country's development opportunities, experience and practice of market-oriented countries confirms the great importance of small and medium enterprises for the development of the national economy.

Micro, small and medium enterprises have a dominant place in the economy of the Republic of North Macedonia (Chart 1). According to the latest data from the State Statistical Office, the structure of enterprises is dominated by micro enterprises (68%), while 31% of Macedonian enterprises are in the category of SMEs. The high participation rate of micro-companies is a potential limitation to growth, as these companies are unlikely to grow into small or medium-sized enterprises and create a significant number of jobs. Hence, it is very important to create favorable conditions for these companies to grow and create formal jobs.

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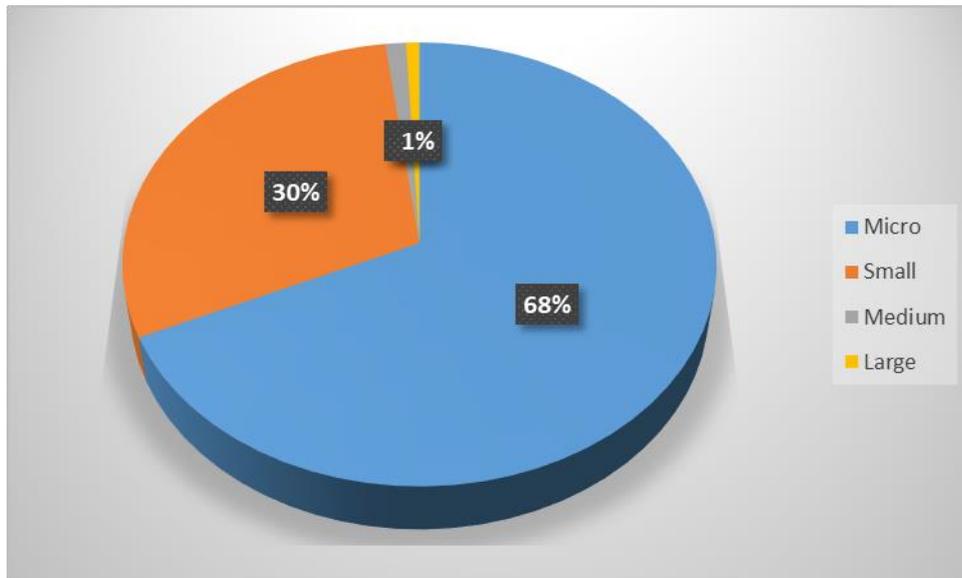
Graph 1. Percentage share of companies in the Republic of North Macedonia by size, 2020

Source: State Statistical Office, Active Enterprises, https://www.stat.gov.mk/pdf/2021/6.1.21.15_mk.pdf,
(Access: march 2021)

In the last decade it was implemented a number of reforms aimed at creating a more favorable business environment, which indirectly would have influenced the creation of new, quality jobs in the formal economy. The basic principles of the implemented economic reforms are: relaxing the conditions for doing business in the country, establishing a high degree of economic freedom and equal working conditions for economic entities, supporting entrepreneurship and increasing the competitiveness and innovation of the Macedonian economy.

3. Analysis of policies that indirectly encourage and / or stimulate the development of the concept of green economy in the functioning of SMEs

With the accession, Republic of North Macedonia is committed to harmonize national legislation with that of the EU - to ensure the integration of environmental protection, rational use of resources and energy efficiency in all sectors of the national economy and life. Republic of North Macedonia has no specific policy document for green economy, but there are strategic documents that state the goals of sustainable development that ensure the transition to a green economy. In order to perceive the institutional support for the promotion and development of the concept of green economy in the country, the following documents are analyzed:

The Strategy for Sustainable Development clearly indicates that in order to achieve sustainable development in the Republic of North Macedonia, it's necessary to integrate tourism, forestry, agriculture and industrial sector with the support of the energy sector, infrastructure and transport sector under the "umbrella" of the environment sector. Based on this, seven (7) strategic commitments are proposed for achieving sustainable development in the country, as follows (National Strategy for Sustainable Development, p.25):

1) Ensuring EU membership and compliance with the EU Sustainable Development Strategy;

2) Increasing awareness and commitment to sustainable development, covering all spheres of life in the country;

3) Introduction of E-governance as a strong tool for support and implementation of sustainable development;

4) Directing the public sector through organizational development and institutional strengthening, based on the concepts and principles of sustainable development, as well as cross-sectorial and integrated strategic and participatory work;

5) Directing the banking and financial sector to provide funds for financing projects and activities for sustainable development;

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6) Streamlining the private sector to development that is based on the principles of sustainable development;

7) Realization of demonstration and pilot projects in the early phase of implementation of the Strategy (NSSD).

The Strategy for Sustainable Development states that the basic precondition for changes in a country and society towards sustainable development is the understanding and acceptance of the concept and principles of sustainable development.

The Energy Development Strategy in Republic of North Macedonia integrates the climatic and environmental aspects of the energy sector, at the same time proposing available, safe and sustainable energy for the future. The strategy adopts three scenarios: Reference, Moderate Transition and Green which reflect the different dynamics of the energy transition and provide flexibility of the Macedonian response to the relevant EU policies for a modern, competitive and climate neutral economy by 2050. In line with the five-dimensional framework of the EU Energy Union, the Strategy defines six strategic goals for Macedonia, mapped into five (5) energy pillars (Energy Development Strategy, p. 5):

1) Energy efficiency - a pillar for which the Strategy recommends maximizing policies and measures for energy efficiency in the sectors, reducing coal consumption and improving electricity in energy production which would contribute most primary energy savings in the scenario of a moderate transition and green scenario; continuous reduction of losses in the distribution network and improvement of the efficiency of the central heating systems as well as monitoring of the planned electricity measures and greater stimulation of those that have the greatest impact on energy consumption.

2) Integration and security of energy markets - a pillar that recommends a policy of continuous investment in the transmission and distribution network for greater integration of sustainable energy sources (RES) for electricity production, especially from wind and solar and enabling the producer-consumer mechanism ("prosumer"), greater penetration of electric vehicles, meeting the increased demand for electricity in the region. It is also recommended to establish an organized market a day in advance in the country and to participate in the initiatives for the establishment of a regional market.

3) Decarbonization - a pillar that envisages policies related to promoting the use of RES in a way that ensures sustainable development, a share of 35-45% in the total final energy consumption in 2040. For that purpose, preferential tariffs and premiums are proposed through auctions, electrification of the heating and cooling sector by using more efficient heat pumps and central heating systems from thermal power plants-heating of natural gas and biomass (including waste biomass), combined hot water system using central heating, electricity and solar thermal systems. Also, strengthening the role of municipalities and the City of Skopje in energy planning in order to better convey national goals at the local level and increase the share of biofuels by 10% in 2030 year and an increased share of electric vehicles.

4) Research, innovation and competitiveness - these policies recommend the inclusion of energy transition technologies in the national priorities for research and development and stimulate the cooperation of research centers (institutes, universities, development departments, etc.) with policy makers, industry, utilities, municipalities and associations. It is also recommended to stimulate new services and jobs, especially for small and medium enterprises (SMEs) in the field of RES and EE.

5) Legal and regulatory aspects - emphasize the need for full compliance with the Energy Community acquis (EnC acquis). Therefore it is recommended: Adoption of the Energy Efficiency Act and all laws derived from it, Implementing Regulation monitoring mechanism, incorporating commitments related to climate change in relevant sectors, integrated national energy and climate plans, and setting targets for 2030 and Implementation of the Energy Community Environmental acquis. This includes the implementation in practice of the Large Combustion Plants Directive and the adoption of the Law on Industrial Emissions Control, as well as the transposition and implementation of the relevant requirements of the Industrial Emissions Directive (deadline 1 January 2028 for existing plants).

The Medium Term Strategy for Social Responsibility follows and affirms the recommendations of the European Commission from the renewed strategy for social responsibility of 2011-2014, as well as the complementary activities for promotion of sustainable development and integration of social responsibility in the process of achieving Sustainable Development Goals, adopted by by the United Nations. In the chapter, policy framework of corporate social responsibility, special attention is paid to the environment and climate change or the role of businesses in this area. (Medium-term Strategy for Social Responsibility p. 53) It is concluded that it is necessary

to involve the business community in achieving the Sustainable Development Goals. In that regard, the coordination of the initiatives for sustainable development and social responsibility should be by the Economic and Social Council and the National Council for Sustainable Development.

The SME National Strategy in Republic of Macedonia recommends SME policies to become more productive and competitive participants in European and other international markets, to introduce development services and development practices through mentoring, training, financial, expert and technical support, and to improve access to financial services, especially development within the green economy. (National Strategy for SMEs, p.25). This includes national policy reforms, such as designing support instruments and services to provide incentives and support to "green SMEs" within markets related to the environment, as well as to support the adoption of environmentally friendly business practices. This is in line with national industrial policy, where one of the key objectives is to support environmentally friendly products and services. This also builds on a joint program of the government and the World Bank for competitive industry and innovation.

Industrial Strategy of Republic of North Macedonia aims to promote the industralizaion by stimulating the growth and development of the processing industry in order to increase productivity, creating good jobs, increasing incomes and strengthening human capital, while addressing the challenges of circular economy. This strategy focuses specifically on SMEs in the processing industry in eight (8) main ways in which the processing industry will be catalyzed to support green industry, namely (Industrial Strategy, p.52):

-   Introduction and implementation of Green regulatory reform, by initiating policy debates to raise awareness among business associations and businesses regarding the various policy options for the manufacturing industry, such as Polluter pays principle, extended producer responsibility and application of EU directives (e.g. energy efficiency). Green regulatory reform will focus on energy, including the new Energy Law (general framework) and the Energy Efficiency Law, as well as the legal basis for establishing the Energy Efficiency Fund to ease the financial costs of renovating or purchasing new equipment.

-   Introduction of green public procurement as an important tool that can play a key role in the transition to a circular economy, because it can increase the demand for resource / energy-efficient, durable, recyclable, correctable products and to promote new business models based on offering functionalities and services instead of selling products. Green public procurement also allows local and state governments to set examples and standards that businesses, industries should follow. The new Public Procurement Law will be revised to incorporate rules that allow for sustainable / environmental / green development factors, including the necessary manuals and capacity building for contracting. . The new draft Law on Energy Efficiency will also introduce a mandatory obligation in relation to public procurement requirements, especially in relation to energy efficiency.

-   Helping businesses incorporate sustainability into their business plans, including voluntarily setting environmental standards. The strategy envisages that with this measure businesses can develop a competitive advantage by integrating environmental and social aspects (for example, corporate social responsibility) into their business models or activities, which will lead to better business results to drive innovation and improve economic performance. Green recycling can lead to lower raw material costs, benefits of increased productivity, lower costs of environmental protection and protection at work, little or no waste or pollution, reduced energy consumption and an improved corporate image. This measure will help integrate sustainability into key SME business strategies through co-financing (e.g. the measure to support fast-growing SMEs called gazelles).

-   Support of green initiatives in the processing industry led by the industry, i.e. greening of value chains through certification. This measure will support processors, especially SMEs that want to export, through co-financed consulting services, certification costs, grants, know-how and the like., directly by the Ministry of Economy, the Ministry of Environment and Physical Planning, the Energy Agency and other institutions to promote efficiency and environmental improvements.

-   Industrial Green Zone Development (IPZ) with a focus on the processing industry. IPHs try to attract investments in the green industry / processing, which leads to products that acquire green eco-labels, ecological production, etc. There's distinction between industrial zones, which mainly focus on light industry and green zones, which apply much stricter rules in accordance with the Law on Environmental Protection (each processor is obliged to provide a plan for environmental protection in accordance with this law), with a focus on renewable production, organic production, etc., to minimize environmental

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pollution and to apply energy savings and / or less polluting technologies. In cooperation with USAID consultants, the Ministry of Economy visited 21 municipalities in 8 planning regions to assess the scope for establishing IPH. Almost all local government spatial planning plans include the possibility of creating green zones. Several municipalities have managed to meet environmental protection requirements to create Green Zones. No green zone has been established and this measure is envisaged to try to reform and direct the Law on Industrial Green Zones and to work on the feasibility of green zones, which would lead to the creation of at least one Green Zone as a pilot project.

- Stimulating resource and energy efficiency and low carbon efficiency in the processing industry and improved resource use, pollution reduction, waste minimization and zero waste strategies; closed-loop systems and industrial symbiosis. This measure will support mechanisms in the processing industry to improve resource and energy efficiency and cleaner production through technical assistance, access to finance and capacity building. Capacities will be strengthened by training Integrated Pollution Prevention and Control permit issuers to review future plans. This includes developing a methodology for Energy Efficiency Plans and capacity building through training of the processing industry to prepare Energy Efficiency Plans. In addition, UNIDO / Regional Environmental Center will implement energy efficiency projects in industry and manufacturing to determine their sustainability and cost-effectiveness, as well as training and qualification of private consultants and managers / engineers / technicians in industry-leading enterprises for the implementation of energy management systems in accordance with ISO 50001, which will enable them to provide their services directly to companies to build sustainable internal energy management expertise in day-to-day production and business ventures.

- Support to SMEs in re-production, i.e. assistance in the process of bringing used products and individual production components into functional "as new" condition, by returning a significant part of the resources embedded in the used product in its original produced condition with low additional costs, thus the price of the newly obtained product is reduced. This measure will study the TIDZs and their potential to support reprocessing activities (the main obstacle is that strategies for extending the usability of manufactured products depend on cooperation with original equipment manufacturers, but there are incentives for them to incorporate obsolescence and replacement in their business model) leading to policy recommendations to be implemented in the future, such as support for start-ups and co-financing of equipment.

- Support to SMEs in additive production or 3D printing. This is part of the "digitalization of production" and is a relatively new production process that could lead to greening of international supply chains. This relatively new production process has the potential to significantly affect traditional production models by reducing or eliminating production lines and supply chains, as "final" products are produced in a single process. While this could potentially lead to job losses in manufacturing, digitalisation of manufacturing is expected to increase the demand for professional services from designers, engineers, technicians, developers and other professions. This diversion of the manufacturing industry to "professional services" has the potential to diverse certain manufacturing processes back to transition economies, requiring countries to partially refocus their manufacturing industries on service delivery and improve the education of skilled workers. This measure will support SMEs in 3D printing / production, especially start-ups, through grants and co-financing.

Strategy for utilization of renewable energy sources recommends paying special attention to the rational utilization of the existing and planned potential of hydropower and biomass. Hence, promotional activities should include incentives for both consumers and producers. It is recommended to introduce a mechanism for regular subsidies (fund for support of solar heating systems) and appropriate tax incentives to make more mass purchases and installations of these systems. Biomass combustion policies are mainly aimed at: (Strategy for Utilization of Renewable Energy Sources, p. 13)

- Stimulating programs for small and medium industries for the production of biomass combustion devices with high efficiency;

- Subsidies to replace old and purchase new efficient combustion devices, particularly vulnerable population;

- Measures to reduce logging losses;

- Measures to reduce unregistered consumption;

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- Technical support and assistance in finding creditors and investors for the first pilot plant TE-TO of waste biomass and the first pilot plant TE-TO in one of the companies for wood processing and production of wood products.

The National Strategy for Agriculture and Rural Development emphasizes the model of sustainable agriculture that takes into account the protection of the environment and biodiversity. Special attention is paid to organic agriculture which is promoted as the best way that leads to sustainable development, directly contributes to the stabilization of ecosystems, conservation of natural resources and development of rural areas. In order to meet the goal, the Action Plan for Organic Agriculture proposes the following measures (National Plan of Organic Production, p.39):

- Identification and support of significant organic products;

- Improving the availability of raw materials allowed in organic agriculture;

- Diversification of the sectors of the processing industry involved in the processing of organic products;

- Market research on the demand for organic products as well as the dissemination of information among stakeholders and consumers of organic products;

- Support in organizing green markets in major consumer centers;

- Continuous updating and harmonization of the legal regulations in the field of organic production with the EU;

- Strengthening the capacities of state administration and improved advisory services;

- Development of models for appropriate distribution of state financial support in organic production and

- Increasing investment projects in organic production for sustainable development in rural areas.

The Law of Environment is based on meeting the requirements contained in the Directives of the EU and maintaining traditional values in environmental protection and ensuring sustainable development. The Law is based on the principles "the user pays" and "the polluter pays", which integrally regulates the financial instruments for environmental protection. (Environmental Law, Official Gazette no. 53 of 5.07.2005). These principles are introduced fees to be used as sources of funds for undertaking measures and activities directly aimed at protecting and improving the environment and nature. Additional funds are obtained from the issuance of environmentally integrated permits based on the concept of BAT (Best Available Technics) which sets out the rules and deadlines for achieving the conditions as required by Directive 96/61 and according to experience of the member states of the European Union. For the green economy, especially important principles contained in the Law are: The principle of sustainable development which obliges to take care of the rational and sustainable use of natural resources, meeting the social and economic needs of current and future generations; The principle of prevention that undertakes measures and actions to be taken before the occurrence of adverse effects and The principle of cleaner production that aims to reduce the risks to life and health of people and the environment, as well as to increase economic and environmental efficiency by supporting the implementation of a comprehensive strategy for the protection of the environment in terms of raw materials , production processes, products and services.

Despite the Government's commitment to promote the concept of green economy in Republic of North Macedonia through the multidimensionality of sustainable development, it can be concluded that the concept of green economy involving SMEs is insufficiently defined and the offered activities and measures are not sufficiently coordinated between the institutions and the business community. Significant attention to promote the concept of green economy in SMEs is dedicated to industrial strategy where particular strategic qualifications is dedicated, and the remaining four strategic objectives are focused on developing the green economy in Republic of North Macedonia. Accordingly, the National SME Development Strategy outlines national policy reforms, as well as designing support instruments and services to provide incentives and support to "green SMEs" within related environmental markets, as well as to support the adoption of environmentally friendly business practices. In the Medium-Term Strategy for Corporate Social Responsibility, special attention is paid to the impact of enterprises on the environment, with a recommendation that they be included in the process of protection and renewal of the environment in a way that will manage the natural cycle of resources with efficient use of natural resources, eco-innovations, raw materials, their use in production, resource consumption and quality waste management.

In this regard, the Strategy for Development of Renewable Energy Sources and the Strategy for Energy Development are a platform for the overall modernization and transformation of the energy sector in line with EU

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energy trends, contributing to increased access, integration and availability of energy services, reducing local and global pollution, and increased participation of the private sector, taking into account the development potential of the Republic of North Macedonia and domestic specifics. Also, the National Strategy for Agricultural Development, especially the plan for organic production, emphasizes the model of sustainable agriculture that takes into account the protection of the environment and biodiversity and recommends that farmers should implement the concept of "green" agriculture as a logical and natural way to carry out their agricultural activities. Thus, in the acceptance and implementation of the agro-ecological approach in the agricultural activity of the holdings, they will be supported by the state agricultural policies through the measures of the agricultural policies.

The concept of green economy is present in all mentioned documents, but a special document is needed that will clearly determine the policies for development of these concepts and will concisely harmonize them with the growth and development of SMEs in Republic of North Macedonia, i.e. SME activities to be incorporated in the policies for development of the concept of green economy. Basically, adopting the concept of green economy enterprises are open to the achievement of business goals while protecting the environment, enhancing natural capital and energy resource efficiency. In that context, the green economy and green businesses should be a specific part of the long-term sustainability strategy in the Republic of North Macedonia.

4. Recommendations for improving the institutional and regulatory framework for development and application of the concept of green economy in SMEs and improving the conditions for their more successful implementation

Republic of North Macedonia doesn't have a special document for green economy policy, but the mention strategic documents state the goals of sustainable development that ensure the transition to a green economy. Despite the Government's commitment through these documents, to promote sustainable development and thus the green economy in the Republic of North Macedonia, it can be concluded that the specific activities and measures that can improve the environmental performance of SMEs aren't coordinated and explicitly included in these documents, strategies and programs.

The Macedonian Government is making significant efforts to support the SME sector, with a particular emphasis on reducing the administrative burden on small businesses and increasing their competitiveness, but there is an obvious lack of proactive dissemination of regulatory information to SMEs. Namely, the website of the Ministry of Environment and Physical Planning is one of the main official sources of information on environmental regulations and they are poorly designed. The Ministry organizes press conferences and publishes press releases on specific environmental issues, but doesn't promote environmental compliance and good practices. The State Environmental Inspectorate of the Ministry of Environment and Physical Planning has no formal responsibilities for conducting compliance promotion activities, although the Ministry sometimes participates in relevant activities organized mostly by NGOs. There are organizations that are trying to promote environmental compliance among enterprises through publications, workshops, seminars and roundtables. However, these are usually short-term initiatives and don't bring lasting results. In addition, there is no strong cooperation between companies and environmental authorities on this issue.

In order to realize the oportunities of the existing environmental policies, it is recommended:

- Complete implementation of environmental protection policies in relation to achieving the principles of green economy;

- Development of long-term policy frameworks with binding goals, starting from the way of using natural resources in a way that will stimulate and direct coherent activities in most spheres of society;

- Utilizing diplomatic and economic influence to promote the adoption of ambitious international agreements in areas such as biodiversity and resource use;

- Promoting innovations that can trigger new ways of thinking and living;

- Increase investment by making full use of public funds to support innovation and environmental solutions, sustainable procurement and support for affected sectors and areas. It also includes engaging the financial sector in sustainable investments by implementing and building an Sustainable Financing Action Plan. This especially is considering in the sectors of agriculture, construction, energy, tourism, transport, water and waste management;

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- Understanding the systems that drive environmental pressures, the path to sustainability, initiatives and barriers to change;

- Further capacity building, investment in education and skills (Know how) is very important for effective management in a world that is rapidly changing;

- Creating a regulatory framework for a green economy in the country by bringing clear and appropriate documents with specific activities and measures, harmonized with EU standards, which SMEs should adhere to when applying the concept of green economy;

- Strengthening the relationship between government institutions, ministries responsible for this issue, with the business community in order to directly introduce the need to meet certain standards for environmental protection in the operation of enterprises;

- Increasing the awareness among SMEs about the need to implement higher environmental standards and in general the concept of green economy in order to improve competitiveness;

- Increasing the level of awareness for available funds and loans from banks for SMEs oriented to the green concept;

Basically, the acceptance of these and similar recommendations in order to promote the implementation of the green economy concept in SMEs in the country, will give an opportunity to achieve business goals while protecting the environment, strengthening natural capital and energy efficiency of resources. In that context, green businesses should be a significant part of long-term strategy for sustainability in the Republic of North Macedonia.

5. Conclusion

The analysis shows that mention strategic documents state the goals of sustainable development that ensure the transition to a green economy. These documents promote sustainable development and thus the green economy in the Republic of North Macedonia. The proposed policies show interest among the companies, but there is not enough utilization i.e. there is not enough coordination between the institutions and the business community. Specifically, there is a lack of a place where all interested will be properly informed that green economy is more applicable for SME's because they are flexible tend to pursue innovative and risky ventures and more easily adapt to the dynamic changes in the environment. Ministry of Environment and Physical Planning and the Ministry for Economy should be coordinated and to be the main responsible entities, implementing higher environmental standards among the enterprises. Also, all opportunities offered by the concept of green economy should be emphasized and pointed out to the business community in order to improve the environmental activity and energy efficiency of the company, reduce costs, and implement a new approach to operation and access to market. Therefore, it is necessary to increase the investment in support of innovation and environmental solutions, sustainable procurement and support for affected sectors and areas, especially in the sectors of agriculture, construction, energy, tourism, transport, water and waste management.

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Research macronutrients intake from cadets in tactical classes

Ivan Ivanov [a] & Krasimir Koynakov[b] & Simeon Simeonov[c]

[a] *Kaneff University Hospital, Ruse, Bulgaria*
E-mail: isivan@abv.bg
[b] *National Military University „Vasil Levski"- Veliko Turnovo, Bulgaria*
E-mail: krasi.koynakov@gmail.com
[c] *Kaneff University Hospital, Ruse, Bulgaria*
E-mail: sansiood@abv.bg

Abstract

The intake of a sufficient amount of nutrients by the servicemen, in particular the cadets from the Vasil Levski National Military University, is an essential part of their daily lives. When placed in a specific environment, field training in winter conditions with high energy consumption, an important part of keeping them in good condition to perform their tasks is food intake. The object of the present study is precisely the intake of essential nutrients by cadets in tactical classes in summer condtions.

Keywords: military education, training, cadets

Jel Codes: O10, P00, I20

1. Introduction

Macronutrients - these are nutrients that are needed to maintain important functions of the human body. These include the proteins (proteins), fats and carbohydrates. Growth and development depend on the increase in the number of cells in the body. The main role in this important process is protein. They are involved in building and increasing the number of cells in the body. Proteins are made from amino acids, which are the main building blocks in the body. Carbohydrates provide most of the energy needed for body function. Fat is a concentrated form of energy and a form in which a large part of the body's energy reserves are stored. Fats are important for building the cell membrane and are also involved in the absorption and utilization of certain vitamins (Gyorgev, 2008).

The physical capacity of cadets in the field is directly dependent on the intake of these macronutrients.The feeding of the personnel of the Bulgarian Armed Forces is organized in accordance with the terms and conditions for granting food, announced in a normative act of the Minister of Defense. The main regulatory document of 02.04.2015 is Ordinance № H-5 on the conditions, procedure and norms for providing free food and refreshments to servicemen and civilians of the Ministry of Defense, the structures under the direct authority of the Minister of Defense and the Bulgarian Army and to cadets in higher military schools in peacetime. The ordinance specifies energy and material standards for a balanced diet for one meal, where the values for intake of macronutrients for field activities are as follows: protein - 150-170 grams, fat - 160-175 grams and carbohydrates - 510-560 grams.

For those categories of servicemen who work in the conditions of great physical and nervous tension or are exposed to the influence of unfavorable factors, the rations are additionally required - to influence the normalization of the disturbed physiological condition and help to increase the body's resistance to the corresponding adverse influences (Glushkov, 2017).

2. Physiological norms of nutrition

With Ordinance № 1 of January 22, 2018, the physiological norms for nutrition of the population in Bulgaria were adopted.These norms are used in determining the national nutrition policy, assessment of individual food intake and nutrition of groups of the population, development of recommendations for healthy nutrition of individuals and groups of the population, planning and control of organized nutrition of groups of population. Physiological dietary norms of the population include recommended values for food intake and recommended intervals for food intake. In this sense, these norms are the starting point for determining the composition of the daily ration of food for servicemen, as no other modern specialized study of the Bulgarian Army is known (Glushkov, 2014; Glushkov, Simeonov, and   Georgiev, 2018).

The ordinance specifies recommended intervals for intake of total protein, total fats, fatty acids and total carbohydrates as a relative share of the energy value of food (E%). The values for the age group from 19 to 65

years for the intake of these nutrients are the following: total protein - 10-20 (E%), total fat - 20-35 (E%) and total carbohydrates - 45-60 (E%). Nutrition is one of the most important factors determining the health of servicemen. Healthy eating - this diet that is adequate to the metabolic needs of the body and provides good health (Popov, 2021).

Proper nutrition ensures the normal development of servicemen, promotes disease prevention, prolongs life, improves efficiency and creates conditions for adequate adaptation to the environment. An important stage in streamlining decisions related to the intake of nutrients and energy by cadets is the study of energy intake and nutrition. status of students at the National Military University (Nichev, 2018a; Terziev and Nichev, 2017a; 2017b; 2017c; 2017d; 2017e; 2017f; 2017g).

3. Nature of the study

The survey was conducted among cadets from the Vasil Levski National High School, majoring in Motorized Infantry and Tank Troops, during their participation in a tactical exercise in summer conditions. A total of 13 (thirteen) cadets were studied, of which 11 (eleven) men and 2 (two) women. The average age of male cadets is 20 (twenty) years old, and for women is 20 (twenty) years old. The study period is 19.06.2019 to 21.06.2019.

The information about the content of macronutrients in the used food products is taken from tables for the composition of Bulgarian food products (Tashev and Shishkov, 1975), and for such food products for which there is no information in the above-cited source the data are taken from the manufacturer. The tools of the software product "Microsoft office" were used for the processing of the data from the present study.

4. Survey results

After data processing, the following results were obtained:

‒ for the period of training, the cadets were provided with food daily with the following average content of macronutrients - protein - 203 grams , fat - 188 grams and carbohydrates - 637 grams (Fig. 1).
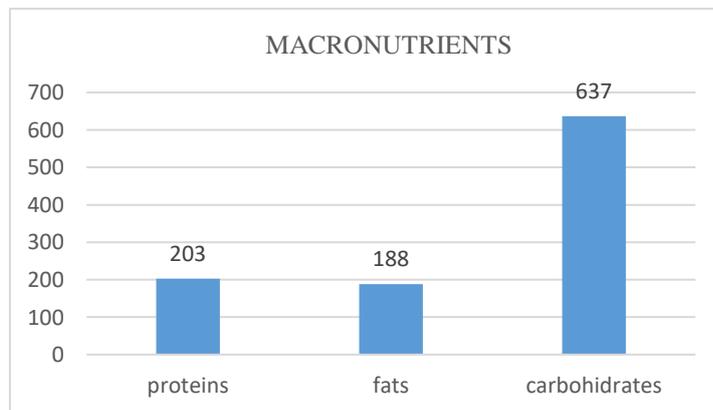
Figure 1. Macronutrient content in grams

Source: Authors

‒ for the studied period the macronutrients provided the cadets with the following energy on average through the food - proteins - 832 kcal., fats - 1750 kcal., carbohydrates - 2611 kcal. (Fig. 2).

The largest carriers of energy from the food products provided daily for food to the trainees are - bread - 1 775 kcal., Meat - approximately 440 kcal., Fish - approximately 308 kcal., Sausages - approximately 300 kcal.

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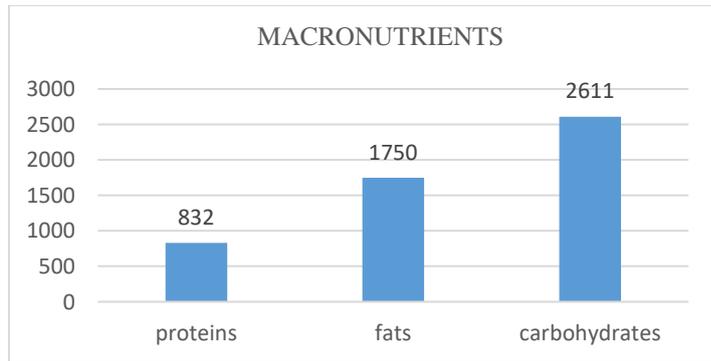
Figure 2. Energy provided by macronutrients in kcal.

Source: Authors
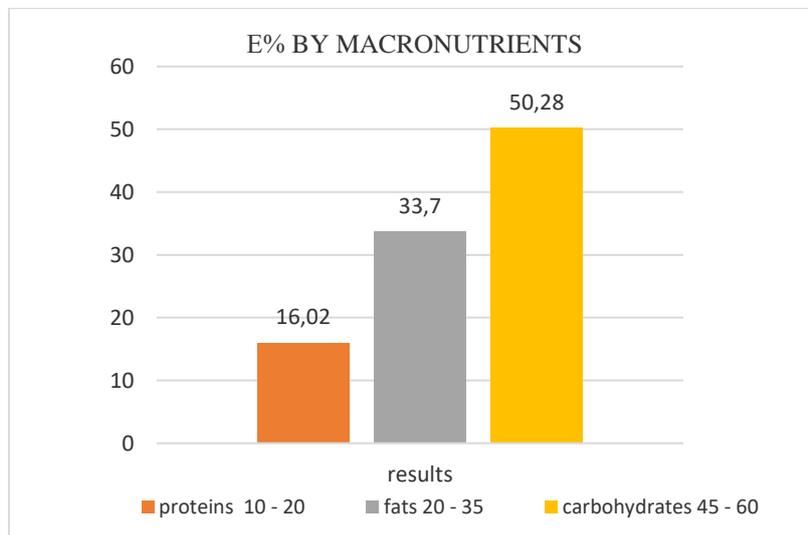
Figure 3: E% ratio of macronutrients

Source: Authors

After comparing the results obtained for intake of macronutrients by cadets for the study period with the recommended intervals for intake of total protein, total fats, fatty acids and total carbohydrates as a relative share of the energy value of food (E%) of Ordinance № 1 of 22 January 2018 for the physiological norms of nutrition of the population the following is obtained: the total protein from the food provided to the cadets is 16.02 % of the energy value, the fats are 33.7 % and the carbohydrates are 50.28 % (Fig. 3).

From the above results it is evident that the intake of macronutrients corresponds significantly to the physiological norms for nutrition of the population in Bulgaria.

5. Conclusion

In percentage terms, macronutrients meet the physiological norms for nutrition of the population, but when comparing their intake in grams, things are as follows (Table 1):

− for proteins - the recommended daily intake in grams for men is from 81.4 to 162.8, and for women is from 63.7 to 127.4. The amount provided to the cadets is 203 grams;

− for fat - the recommended norms in grams are from 72 to 126 for men and from 56.2 to 98.3 for women. The quantity provided is 188 grams;

− for carbohydrates - the recommended intake in grams is from 367.5 to 490 for men and from 286.7 to 382.2 for women. The amount provided to the students is 637 grams.

Table 1. Recommended intake and macronutrients provided

	Protein, grams	*Fat, grams*	*Carbohydrates, grams*
Recommended intake, men	81.4–162.8	72-126	367.5-490
Recommended intake, women	63.7-127.4	56.2-98.3	286.7-382.2
Provided macronutrients	203	188	637

Source: Authors

From the results obtained in this way it can be concluded that the nutrition of cadets in tactical classes in particular the intake of macronutrients is in extreme imbalance according to the norms of nutrition of the population in Bulgaria. In this situation, it is advisable to develop new norms for the nutrition of cadets in tactical classes adequate to the needs (Terziev and Solovev, 2020; 2020a).

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Selected factors influencing domestic investment in the European Union[1]

Sandra Clement [a] & Monica Violeta Achim [b]

[a] *Ph.D. Student Babeş-Bolyai University, Faculty of Economics and Business Administration, Romania*
E-mail: Sandra.clement@econ.ubbcluj.ro
[b] *Professor PhD. Dr habil., Babes-Bolyai University, Faculty of Economics and Business Administration, Romania*
E-mail: monica.achim@econ.ubbcluj.ro

Abstract

Domestic investment serves to expand and rehabilitate infrastructure, minimize the gap between rich and poor, and preserve jobs. This paper analyses the role of several determinants (such as corporate profit, inflation, tax determinants etc.) affecting domestic investment. For this purpose, we use data for 28 European Union member state over the period 2008 – 2018. The ordinary least squares method is used to investigate the influencing factors. The results show that for the tax variables, both corporate income tax and labor tax have a positive impact on domestic investment. The interest rate, in turn, is negatively related to domestic investment. Among the economic determinants, both the inflation rate and unemployment have a negative impact on the domestic investment rate, and profitability has a positive impact on the domestic investment rate. Based on our results, various influences on investment play an explanatory role. Circumstances for investment changes can be the economic crisis, but also tax reforms and economic recovery. The results represent important lessons for European governments, for companies, investors, but also for individuals.

Keywords: investment rate, influencing factors, Economic Determinants, Tax determinants, FMOLS

Jel Codes: E22, O16, H25

1. Introduction

A country's wealth results from investments of different types, different addressees and different backgrounds. The prosperity of a country determines whether the quality of its infrastructure, medical care, education system and the general quality of life of each individual citizen. If no investments are made in the country, the state has no means to invest. Many articles focus on foreign investment. The goal is often to make the country more attractive for foreign investment projects in order to attract as much as possible monetary resources to the country.

However, domestic investment is at least as important, if not more in post-crisis times. The goal is to make domestic investment so attractive that entrepreneurial decisions are aimed at investing domestically. If a country is in the post-crisis period, companies are in the process of reorganizing, regenerating, restructuring or liquidating. In most cases, there is no risk appetite to make costly investments during these times. And then the state is called upon to stimulate the economy in order to create prosperity. Stimulating the economy can be done in a variety of ways. In addition to fiscal leeway, such as corporate income tax, labor tax or interest rates, economic factors such as the inflation rate, profitability of a company or unemployment can also be used to stimulate the economy. For this reason, we have set ourselves the goal in this study to examine the influence of fiscal and economic stimulation options on their impact. The object of investigation are the 28 European Union (EU) countries in the period from 2008 to 2018.

The results obtained are intended to provide decision support for the government to stimulate or boost the economy with the right policy decisions. Also for investors and entrepreneurs the study can represent aids for business decisions.

The paper is divided into five sections. Section two starts with the summary of the literature. This is followed by the presentation of the methodology and data used. Then, the empirical analysis is described in more detail in section four, followed by a summary of the study in the last section.

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2. Literature Review

A summary of the relevant literature is presented in the following section. A distinction is made between studies with fiscal and economic determinants.

Al Khatib et al. (2012) examines economic variables such as growth rate and export for significance of domestic investment. And finds a positive relationship. The study is conducted using co-integration econometrics method and covers the country of Jordan in the period from 1980 to 2010.

Sohail et al. (2014) examines the relationship between export of goods and services and domestic investment. A positive relationship was found. The study uses the regression and correlation technique and covers the country of Pakistan during the period from 1973 to 2010.

Attarzadeh (2016) examines the relationship between the inflation rate, interest rate, trade openness, and domestic investment. The interest rate shows a negative significance with respect to domestic investment. Trade openness is positive significant with domestic investment and inflation rate can show both positive and negative relationship with domestic investment. The countries considered are Malaysia, Philippines, Singapore and Thailand over the period 1976 until 2013.

Ojong et al. (2018) focuses on the relationship of domestic investment with interest rate, inflation rate and the exchange rate. Results show that interest rates, inflation rate and the exchange rate with domestic investment has only a short-run but not a long-run relationship. The ARDL technique was used to study the country of Nigeria over the period 1983 to 2015.

Urooj et al. (2017) looked at the relationship between corporate profits and economic growth. Here, too, a positive significance can be found. The correlation with tax policy was also considered. The underlying mechanism is that fewer corporate profits will be

flow into domestic investment when the tax rate is relatively higher, leading to lower economic growth. Using a regression model, the country USA in the period from 1975 to 2013 has been chosen.

Nkem et al. (2019) examines the effect of taxation on domestic investment and found a positive relationship between corporate income tax and domestic investment. The ordinary least square method (OLS) was used to study the country of Nigeria in the year 1995 to 2017.

Cummins (1996) examines the relationship of tax reforms to investment. He found statistical correlations in 12 of 14 OECD countries. Using the estimation procedure, he examines the period 1981 to 1992.

Glykou (2013) dealt with the influence of corporate taxation on the domestic stabilization of economic growth and found no concrete relationship. Using the regression model for testing the statistical significance of the countries Bulgaria and Croatia from 1993 to 2009.

Djankov et al. (2010) looks at the effective corporate income tax and domestic investment. The corporate tax has a strong positive impact on investment. A cross-section of countries model is used to examine 85 countries in 2004.

Bakari et al. (2019) examines the empirical relationship between corporate taxation and domestic investment and found a positive significance on economic growth. The time-series data set covers Germany from 1972 to 2016, and it uses correlation analysis and an estimation model based on Sims.

Zellner et al. (2015) examine the relationship between corporate taxation and economic growth. If corporate profit tax rates are permanently reduced by 5 percentage points, the growth rate increases by 3.0 percentage points. In doing so, he looks at the Marshallian Macroeconomic Model (MMM) and the U.S. over the period from 2008 to 2009.

Dackehag et al. (2012) examined the relationship between the corporate tax rate, tax revenues and growth and found a negative correlation. He studied 25 OECD countries from 1975 to 2010 and applied the fixed effects regression model with panel data.

On the other hand, Cieślik (2020) empirically investigates the determinants of multinational activity of firms from the OECD member states in Poland during the period 1996 until 2015 by using panel data analysis. Moreover, Silva (2020) examines how the external debt affects the economic growth in Portugal for the period of 1999 until 2019.

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3. Methodology and data

In the present section, an overview of the study framework, the selected methodology, the data sources used, and the descriptive statistics are presented.

3.1. Data and descriptive statistics

The framework conditions of the study are explained in more detail below. The period under review is between 2008 and 2018 and the 28 EU countries are examined. The study refers to possible influences for stimulating economic growth in form of domestic investments by non-financial companies. In addition to fiscal factors such as corporate taxation, economic determinants such as the inflation rate, interest rates and unemployment are also considered. Especially, in the aftermath of crises, information on the links between fiscal and economic policy and the stimulation of economic growth is indispensable. Information on this can be crucial in determining whether a country recovers quickly, slowly or possibly not at all after crises.

The focus of the study is on investment data for non-financial companies, which are examined for influences and correlations. The development of the investments is made clear in Figure 1.
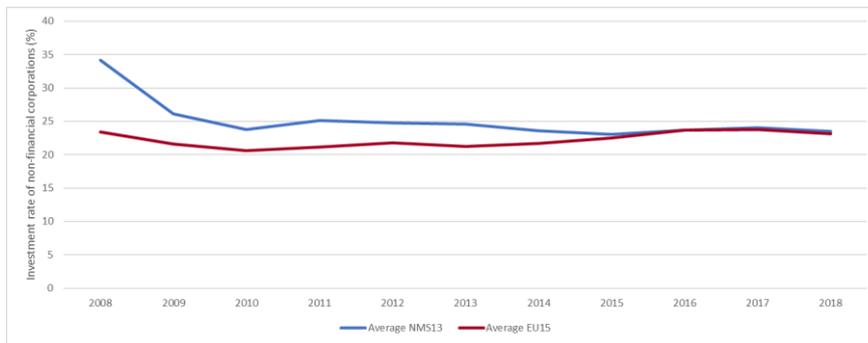
Figure 1. Invesment rate of non-financial corporation for EU15 and NMS13

Source: Author's own composition based on Eurostat database, 2021

The investment rate trend shown in Figure 1 is split into two graphs. The data represent an average from the year 2008 until 2018 and are presented as annual data. The first line represents the development of the 13 new member states (NMS13) and the second line represents the average of the 15 EU countries. It can be seen that the NMS13 have a significantly higher investment rate than the EU15 in 2008. With the financial and economic crisis 2008/2009, the investment rates have converged more and more until an almost uniform trend can be shown in 2015.
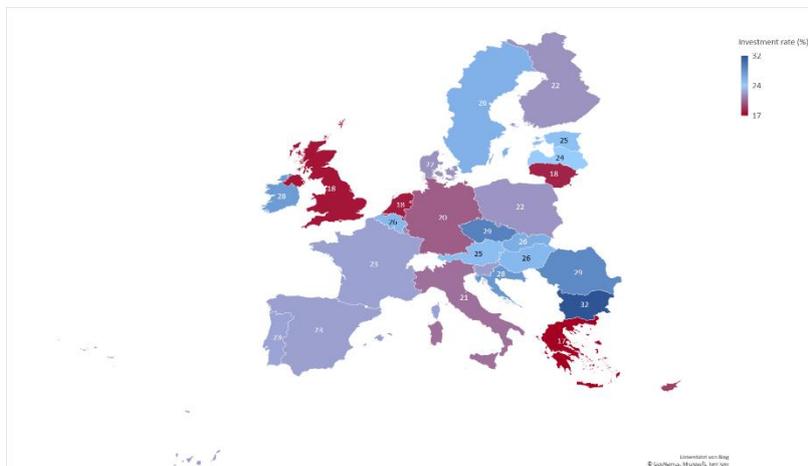
Figure 2. Invesment rate of non-financial corporation 28 EU countries

Source: Author's own composition based on Eurostat database, 2021

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Figure 2 shows the individual EU countries with the average investment rates in the period from 2008 to 2018. It is clear to see that especially in countries such as Bulgaria (32%), Czech Republic (29%), Romania (29%) and Ireland (28%) high average investment rates can be found. Countries like Greece (17%), United Kingdom (18%), Netherlands (18%), Lithuania (18%) and Cyprus (19%) are the countries with the lowest average investment rate between 2008 and 2018.
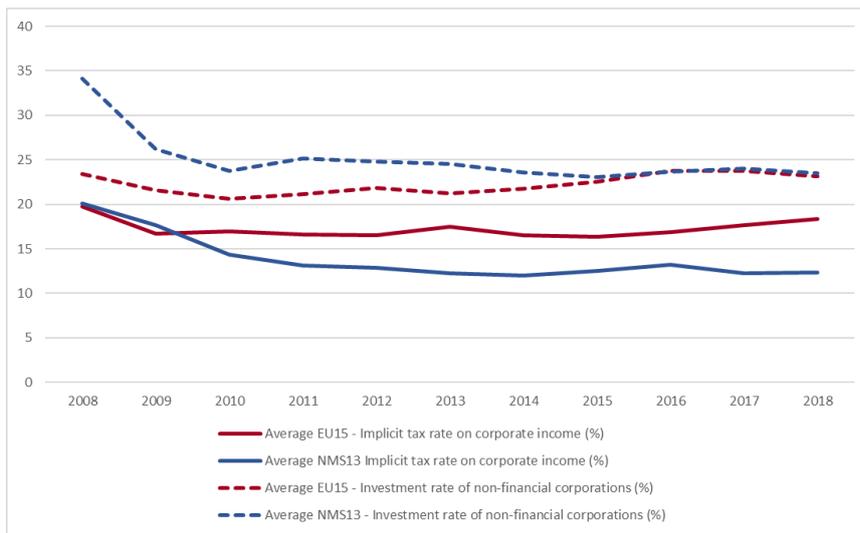
Figure 3. Comparison between invesment rate of non-financial corporation and implicit tax rate on corporate income

Source: Author's own composition based on Eurostat database, 2021

Figure 3 shows the development of the investment rate and the development of the implicit corporate tax rate broken down into NMS13 and EU15. The study uses the implicit corporate tax rate because it takes into account the different tax reliefs in the calculation of the corporate tax base. Within the EU15 countries, the investment rate runs almost parallel with the implicit corporate income tax. In the NMS13 the gap between the tax rate and the investment rate is wide. The development or trend of the two lines is roughly concurrent. Thus, descriptively, a relationship between the investment rate and the implicit corporate tax rate can be established. The economic policy side is now considered in Figure 4, the inflation rate as an expression of the level of money is used.
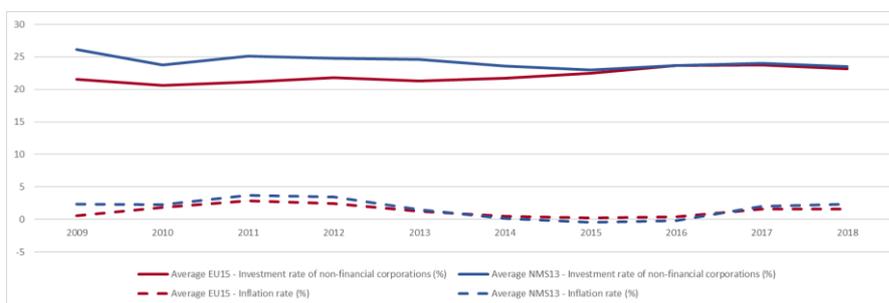
Figure 4. Comparison between invesment rate of non-financial corporation and inflation rate

Source: Author's own composition based on Eurostat database, 2021

Although the development of the EU15 and NMS13 lines do not run at the same percentage level, the increases and decreases are almost identical. Thus, descriptive correlations can also be found when comparing the investment rate and the inflation rate.

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The study aims to identify the factors influencing the stimulation of domestic growth. Panel data are used. In the following table (Table 1), the variables for the study are described in more detail.

Table 1. Dependent and independent variables

Variable	Explanation	Expected sign	Source
1. Dependent variable			
INVESTR	Investment rate of non-financial corporations (%)		Eurostat Database, 2021
2. Independent variable			
2.1 Fiscal variables			
INTERSTR	Interest rate - EMU Convergence Criterion for Bond Yields (%)	+	Eurostat Database, 2021
CORPINCT	Implicit tax rate on corporate income (traditional version) (%)	-	Eurostat Database, 2021
LABORT	Implicit tax rate on labor (%)	+	Eurostat Database, 2021
2.2 Economic variables			
INFLATR	Harmonized consumer price indices - Inflation rate (%)	-	Eurostat Database, 2021
PROFIT	Profit share of gross value added of non-financial corporations (%)	+	
UNEMOPL	Unemployment rate (%)	-	Eurostat Database, 2021

Source: Author's own composition

The descriptive statistics of variables are presented in the Table 2 from below:

Table 2. Descriptive statistics of variables

Variable	Observation	Arithm. mean	Minimum	Maximum
INFLATR	296	23,52	12,74	59,36
INVESTR	280	1,49	-1,70	6,10
INTERSTR	270	3,37	0,09	22,50
CORPINCT	290	15,87	2,67	38,17
LABORT	308	33,92	21,07	44,19
PROFIT	310	43,99	29,74	62,05
UNEMOPL	308	9,15	2,20	27,50

Source: Author's own composition

4. Empirical analysis

The idea of the study represents the investigation of the influence of selected tax and economic policy factors on the domestic investments. The selected objective of the study is interesting because every country wants to keep or increase its investment rate as high as possible in order to guarantee general prosperity and quality of life in the country. If a country does not invest, the government has no budget to invest in infrastructure, social services, public institutions or education. It can be stated that the level of tax revenues is one of the main source of financing public investments (Mara et al. 2009). If a country suffers from economic problems, for example after a financial

and economic crisis, a government is required to stimulate the economy with different possibilities so that prosperity is achieved and the standard of living is secured.

The study will focus on the influence of fiscal determinants such as implicit corporate income tax and labor tax in the context of domestic investment, and economic policy aspects such as inflation, unemployment and Profitability in the context of domestic investment.

In order to achieve the objective described above, the hypotheses were formulated, which are tested below.

Hypothesis 1: Tax determinants are negatively related to investment rate

After the financial and economic crisis of 2008/2009, various tax measures were taken to stimulate the economy.

Hypothesis 2: The inflation rate has a negative and the profitability of a company has a positive effect on investment rate

The inflation rate expresses the price level of a country. The price level is an expression of a country's economic situation. The inflation rate is closely related to the investment rate. Profitability also provides information about how much a company can invest. If it makes a lot of profit, it can invest more. Profit is reported after taxes and after the tax assessment margins and thus expresses, among other things, the result of fiscal policy.

Hypothesis 3: Unemployment is negatively related to investment rate

Unemployment, as a direct signal of entrepreneurial prosperity, also represents an important aspect. If many workers are employed, more can be done and thus more can be earned. If more is earned, more can be invested.

In order to test the described hypotheses, the generally formulated equation applies:

The model in this study will be presented in an estimation model, where i is the country, t the time, β the independet determinants and $\varepsilon_{i,t}$ an error term. In this study, fiscal determinants are understood as the interest rate, the implicit corporate tax rate, and the labor tax. Economic determinants include the variables, inflation rate, corporate profitability and unemployment.

$IR_{i,t} = \alpha + \beta$Fiscal variables $+ \varepsilon_{i,t}$

$IR_{i,t} = \alpha + \beta$Economic variables $+ \varepsilon_{i,t}$

Panel data are tested using the fully modified least square method (FMOLS). The FMOLS technique developed by Phillips and Hansen (1990), ensures optimal estimation of cointegrating regression. In agreement with Hamit-Haggar (2012), we consider FMOLS to be the most appropriate technique for our panel methodology involving heterogeneous cointegration.

Using the FMOLS technique, 4 estimating equations were established for each of the control determinants. All equations have a high coefficient (R^2), which ranges from 60.7% to 83.4%.

Table 3. Regression of investment rate depending on tax determinants based on FMOLS for EU28

Dependent variable Investment Rate	Equation (1)	Equation (2)	Equation (3)	Equation (4)
CORPINCT	0.1083* (0.056)	0.1035* (0.055)	0.1862*** (0.030)	
INTERSTR	-0.0604*** (0.046)	-0.6305*** (0.065)		-0.6467*** (0.047)
LABORT	0.0387** (0.041)		0.3697*** (0.038)	-0.0125 (0.064)
R-squared	0.657	0.659	0.607	0.716
Observations	135	135	135	249

Notes: Probability significance ***p<0.01, **p<0.05, *p<0.1

Source: Author's own composition

The results obtained in Table 3 are described in more detail below. Looking at the tax determinants, there is a positive relationship between the implicit corporate income tax and the investment rate. For the interest rate, in turn, there is a negative significance with the investment rate, and for the implicit labor tax there is a positive significance with investment rate.

Table 4. Regression of investment rate depending on economic determinants based on FMOLS for EU28

Dependent variable Investment Rate	Equation (1)	Equation (2)	Equation (3)	Equation (4)
INFLATR	-0.2028*** (0.056)	0.0784 (0.055)		-0.3725*** (0.055)
UNEMOPL	-0.5757*** (0.046)		-0.4457** (0.030)	-0.8653*** (0.047)
PROFIT	-0.0028 (0.041)	0.0409** (0.037)	0.0605* (0.038)	
R-squared	0.834	0.788	0.831	0.738
Observations	126	126	135	135

Notes: Probability significance ***p<0.01, **p<0.05, *p<0.1

Source: Author's own composition

A closer look at the economic determinants (Table 4) reveals a negative significance between the investment rate and the inflation rate. This means that if the inflation rate falls, the investment rate rises. A negative significance can also be observed for unemployment. Profitability, on the other hand, is positively significant. This means that if profits increase, the investment rate rises. The results obtained are reflected in the studies of Attarzadeh (2016), Nkem et al. (2019), Djankov et al. (2010) and Bakari et al. (2019).

5. Conclusion

The idea of the study represents the investigation of the influence or the connection of selected tax and economic policy factors with domestic investments. In order to pursue the objective, these were formulated into three hypotheses, which are now evaluated.

The first hypothesis deals with tax determinants which can only be partially confirmed. Not all three determinants have a negative impact on the investment rate. The corporate income tax has a positive impact on investment rate. Interest rates, confirm the first hypothesis and thus have a negative impact on the investment rate. The labor tax also shows a positive influence on the investment rate. These results state that if the corporate tax rate increases, the investment rate decreases. The result can be understood to the extent that if the profit to be invested is reduced due to the increased tax burden, fewer monetary resources remain that can be invested.

In the second hypothesis, the inflation rate and the profitability of companies were examined in more detail. The hypothesis can be confirmed in the way that the inflation rate is negatively related to investment rate and the profitability of companies is positively related to the investment rate.

The last hypothesis dealt with the negative significance between unemployment and investment rate. This hypothesis can also be confirmed. If the domestic investment rate decreases, the unemployment increases. This means that if more workers can be employed and thus a higher value added or production takes place, more can be generated and thus more can be invested.

Based on our results, some influences for stimulating domestic investment could be identified. Circumstances for investment changes can be manifold and sometimes require some stimulation. The results provide important lessons for European governments, for companies, investors, but also for individuals.

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Climate finance: Is Sub-Saharan Africa using it for greenhouse gas emission abatement?

Isaac Doku [a]

[a] Nelson Mandela University, South Africa
E-mail: isaacoberkoh27@gmail.com

Abstract

Sustainable Development Goal 13 postulates that by 2030 all countries should combat climate change and its impact, to realise this objective there is the need to reduce greenhouse gas emission. Hence, the main objective of this study is to find out whether Sub-Saharan Africa (SSA) countries are using climate funds for abating various greenhouse gases emission among 19 SSA countries, covering the period 2006 to 2017. This study employs system GMM robust standard errors and triangulates the result by using DOLS and FMOLS for robustness check. The findings show that climate finance is not reducing nitrous oxide, methane and total greenhouse gas emissions into the atmosphere, whereas carbon abatement is taking place. System GMM results further affirmed the existence of EKC and pollution haven hypothesis in SSA. Existence of pollution haven hypothesis shows that more hazardous and dirty investments are moving from developed countries to developing countries with less strict environmental rules. Therefore, i recommend African countries to strengthen their practice of rule of law and put in place more stringent rules to prevent environmentally unfriendly investments from coming in-to reduce greenhouse gas emission.

Keywords: carbon emission, greenhouse gas

Jel Codes: Q53, Q57

1. Introduction

Sustainable Development Goal 13a (SDG-13a) opined that all developed countries should implement the goal of jointly raising $100 billion annually by 2020; from all sources to address the needs of developing countries. In other to mitigate and adapt to climate change, the world must make concerted effort to reduce greenhouse gas emission (GHG) and rely on renewal energy sources. However, GHG emission is still on a rise at a rate of 1.5 per cent per annum in the erstwhile decade, it stabilised briefly between 2014 and 2016 (Christensen and Olhoff, 2019).

Integrated pollution prevention and control (IPPC) (2013) postulated that, all countries must reduce global warming to 2^oc and an atmospheric concentration GHG not above 450 ppm CO_2e to achieve SDG-13. In other to realise this target, Ryan et al. (2015) estimated an annual average per capita emission reduction between 2.1 to 2.6 tonnes CO_2 emission by all countries; in a world that will support a population of 9.2 billion by 2050. However, SSA current annual per capita emissions average 2.7 tonnes and 3.9 tonnes when land-use change and forestry are added. Although, SSA has played the least role in carbon emissions (CO2) in the world, the region still needs to join other countries globally to address climate change by reducing reliance on high emission energy sources.

For that matter, developed countries have pledged raising climate finance to support developing countries, including encouraging SSA governments to adopt technologies and practices to achieve sustainable development in a carbon constrained world (Ryan et al., 2015). However, Warren (2020) posited that the focus of climate finance (CF) has been on reduction of carbon emission from fossil fuel-intensive industries; including iron and steel, chemicals and petrochemicals, and cement companies. Much of the focus is on reduction in carbon emission at the neglect of the other GHGs. This study contributes to extant literature by examining the impact of CF on the emissions of three greenhouse gases; carbon (CO2), methane (CH4) and nitrous oxide (N20) in SSA using system GMM robust standard errors, dynamic ordinary least squares (DOLS) and fully modified ordinary least squares (FMOLS).

2. Brief Theoretical Literature

A careful scrutiny of extant literature gave rise to three main theoretical approaches. Foremost is the EKC, followed by the pollution haven hypothesis (PHH) and halo effect. EKC hypothesis postulates that the initial growth of a

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country's economic development leads to gradual deterioration of environmental conditions after reaching a particular threshold of development (Grossman & Krueger, 1995). PHH postulates the transfer of dirty energy-intensive and carbon intensive industries from higher income economies to poor and middle income economies or from stricter environmental regulations to countries with weak locales (Sarkodie & Strezov, 2019).

Halo effect hypothesis asserts that the effect of FDI on the environment can be inverted as FDI flows from developed economies to poorer economies (Zhu et al., 2016). These occur when low-carbon technologies are introduced by investors to reduce CO2 or investors focus much on the services industry instead of the industrial sector. Implying that as FDI moves from developed economies to poorer economies, there is an abatement of CO2. Zhu et al. (2016) found a significant negative impact of FDI on CO2 for ASEAN nations, including Indonesia, Malaysia, Phillipines, Singapore and Thailand, lending credence to the halo effect hypothesis.

3. Data and Methodology

3.1 Data

For the analysis, primary data was collected from 2006 to 2017 for all SSA countries that have complete data points for the study period. Three main GHGs were examined in this study: CO2, CH4 and N20 in addition to total GHG as explained variables. All data for the study were solicited from World Development Indicators (WDI), apart from CF data that is solicited from OECD Development Assistance Committee's (DAC's) climate-related aid (CRA) statistics (OECD, 2017). Governance readiness (GR) indicator is solicited from Notre-Dame Global Adaptation Index (ND-GAIN). After a careful scrutiny of the data, 19 SSA countries had all the data points to get a balanced panel; these are Angola, Benin, Botswana, Cameroon, Congo (Brazzaville), Congo (DRC), Ethiopia, Gabon, Ghana, Kenya, Mauritius, Mozambique, Namibia, Niger, Nigeria, Senegal, South Africa, Sudan, Tanzania and Togo.

From Table 1 CO2 on average is 1,217 with very high level of dispersion of 2,050. Mauritius was found to have on average the highest CO2 (3103.458) rate with Congo been the least (37.156). Sudan has proven to be the SSA country with the highest CH4 emission (average 100,053), N20 (89,164) and total GHG of 527,012. Mauritius was least in S2O, N20 and GHG emission.

Table 1: Summary Statistics

Country	Statistic	CO2	CF	ENC	GDP\P
Angola	Mean	1231.526	160.8843	511.6776	4095.071
	SD.	668.916	50.24278	33.11528	1051.433
Benin	Mean	544.645	221.8064	390.6746	802.899
	SD.	42.2484	36.94666	17.51942	98.3512
Botswana	Mean	2300.989	72.929	1084.71	6347.167
	SD	393.5521	84.18869	83.80737	905.6588
Cameroon	Mean	301.2394	326.5036	344.0702	1357.455
	SD	38.6396	180.4782	14.94808	145.9948
Congo(Brazz.)	Mean	467.0009	50.42822	432.9889	2669.042
	SD.	148.2955	34.48138	99.97708	428.3468
Ethiopia	Mean	87.2745	1132.199	488.2781	375.5795
	SD.	17.4776	515.0182	5.083303	121.2401
Gabon	Mean	2832.308	70.39533	2622.398	9089.832
	SD.	99.6031	67.25081	320.4184	1198.597
Ghana	Mean	435.7032	535.3734	304.1457	1470.215

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	SD.	73.1182	238.9273	27.33688	480.6471
Kenya	Mean	287.8751	1272.056	467.301	1005.237
	SD.	23.1396	667.0096	20.02615	200.2457
Mauritius	Mean	3103.458	76.83356	1046.848	8210.932
	SD.	136.1381	70.13966	39.9822	1492.689
Mozambique	Mean	136.2274	969.1293	412.4462	501.7738
	SD.	67.5187	268.0849	6.420946	85.45802
Namibia	Mean	1356.014	123.2198	705.6233	4846.789
	SD.	188.8031	52.88805	38.65434	778.687
Niger	Mean	75.9519	294.044	132.7609	356.0892
	SD.	25.3662	153.6184	13.04124	55.5192
Nigeria	Mean	594.3671	691.2917	760.6307	2382.808
	SD.	58.7717	428.4928	22.60552	534.0093
Senegal	Mean	515.5371	395.9444	275.7477	1279.349
	SD.	105.3861	141.8912	23.36273	1110.8265
South Africa	Mean	9204.948	726.4106	2713.827	6552.149
	SD.	419.2882	285.1704	107.5619	878.8393
Sudan	Mean	321.9248	670.4491	370.6694	1521.864
	SD.	21.6428	405.5465	12.43213	429.7384
Tanzania	Mean	169.3674	990.2972	454.69	728.4522
	SD.	34.6015	333.3744	15.71222	168.5749
Togo	Mean	337.1503	72.91833	448.7133	536.7507
	SD.	79.1591	37.24286	31.34378	74.50092
Panel	Mean	1217.034	484.9579	715.1043	2724.586
	SD.	2050.149	473.8808	697.6128	2801.104

Table 1. continued: Summary Statistics

Countries	Statistic	CH4	N20	GHG
Angola	Mean	17,830	3,449	38,762
	SD.	1023.7	(68.12)	(794.7)
Benin	Mean	6,448	4,508	35,976
	SD.	(378.7)	(308.6)	(1,029)
Botswana	Mean	4,149	2,104	58,745
	SD.	(98.71)	(42.95)	(10,227)
Cameroon	Mean	19,139	14,819	111,858
	SD.	(919.7)	(1,053)	(4,136)

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Congo (Brazzaville)	Mean	7,265	3,033	34,900
	SD.	(276.6)	(236.2)	(789.1)
Ethiopia	Mean	61,598	38,188	181,943
	SD.	(925.0)	(629.9)	(1,930)
Gabon	Mean	3,852	719.5	29,447
	SD.	(252.9)	(140.7)	(6,645)
Ghana	Mean	18,985	15,342	108,815
	SD.	(1,482)	(1,746)	(2,594)
Kenya	Mean	27,295	11,419	52,770
	SD.	(229.7)	(141.0)	(508.8)
Mauritius	Mean	296.6727	165.9818	
	SD.	12.13911	2.91478	
Mozambique	Mean	9,054	2,206	347,176
	SD.	(328.7)	(16.82)	(13,877)
Namibia	Mean	4,910	2,893	36,538
	SD.	(82.14)	(66.83)	(1,384)
Niger	Mean	6,482	2,077	10,884
	SD.	(120.6)	(45.56)	(185.3)
Nigeria	Mean	92,026	37,105	304,717
	SD.	(2,148)	(1,725)	(7,683)
Senegal	Mean	9,158	5,509	52,354
	SD.	(306.0)	(389.4)	(1,492)
South Africa	Mean	65,790	23,629	491,092
	SD.	(319.7)	(33.71)	(11,038)
Sudan	Mean	100,053	89,164	527,012
	SD.	(4,616)	(6,186)	(23,976)
Tanzania	Mean	26,500	12,601	215,264
	SD.	(481.8)	(192.3)	(9,815)
Togo	Mean	5,127	2,937	22,348
	SD.	(299.7)	(280.7)	(1,155)
Panel	Mean	25550.13	14,242.7	133,626.1
	SD.	30197.59	21302.29	148,426.1

Source: Author's own computation from WDI and ODA, SD represents standard deviation

Explanatory variables of the study consist of CF, ENC, GR and economic growth (measured as growth in GDP per capita). From the summary statistics in Table 1, Kenya has been found to be the country to get the largest CF whereas Benin had the least CF in the sub-region within the study period. ENC is measured as Kg of oil equivalent per capita, sourced from WDI. Results from the summary statistics show that South Africa is the largest consumer of energy in SSA with Niger being the least consumer. GDP per capita was computed by dividing GDP at constant 2010 USD by the population of the country, sourced from WDI. On the average GDP of SSA for the study period

averaged 2724.586, making SSA a lower middle-income sub-region with high dispersion of 2801.104. Gabon was found to have the highest GDP per capita for the study period of 9089.832, with Niger being the least with 132.7609. Lastly, was GR data, which was solicited from ND-GAIN. All the data analysis of this study was carried out using stata 13.

3.2 Model and Estimation Technique

This study seeks to find out the impact of CF on GHG emission in SSA and also test the EKC hypothesis. Primary GHG in the earth's atmosphere include CO2, CH4 and N20. Consequently, a model is built for each constituent of GHG and another model for total GHG, to sum up to 4 models. In this study, a dynamic panel regression model is used for estimation. Using the study by Selden and Song (1994), Danso-Mensa (2015) and Behera and Dash (2017), we specify a reduced form model for CO2, CH4, N20 and total GHG as follows:

$$Co2_{it} = \delta_1 + \delta_2 Co_{it-1} + \delta_3 (GDP/p)_{it} + \delta_4 (GDP/P)^2_{it} + \delta_5 CF_{it} + \delta_6 EnC_{it} + \delta_7 GR_{it} + \mu_{it}$$
(1)

$$CH4_{it} = \delta_1 + \delta_2 CH4_{it-1} + \delta_3 (GDP/p)_{it} + \delta_4 (GDP/P)^2_{it} + \delta_5 CF_{it} + \delta_6 EnC_{it} + \delta_7 GR_{it} + \mu_{it}$$
(2)

$$N_2 o_{it} = \delta_1 + \delta_2 N_2 o_{it-1} + \delta_3 (GDP/p)_{it} + \delta_4 (GDP/P)^2_{it} + \delta_5 CF_{it} + \delta_6 EnC_{it} + \delta_7 GR_{it} + \mu_{it}$$
(3)

$$\ln GHG_{it} = \delta_1 + \delta_2 GHG_{it-1} + \delta_3 (GDP/p)_{it} + \delta_4 (GDP/P)^2_{it} + \delta_5 CF_{it} + \delta_6 EnC_{it} + \delta_7 GR_{it} + \mu_{it}$$
(4)

Where

CO_{it} = Total carbon emission.

$CH4_{it}$ = Methane is measured as parts per million (ppm).

$N_2 o_{it}$ = Amount of methane concentration in the atmosphere.

GHG_{it} = Total greenhouse gas.

$\frac{GDP}{P}$= Per capita income which is a measure of economic growth.

CF= Natural logarithm of climate finance.

EnC = Energy consumption is measured as Kg of oil equivalent per capita.

GR = Governance readiness is measured using three main indicators; control of corruption, regulatory quality and rule of law.

$\delta_0, \delta_1, \delta_2, \delta_{,3}, \delta_4, \delta_5, \delta_6$ and δ_7 represent the coefficients of the predictor variables under study. $\mu_{it} = `\eta_i + \measuredangle_t + \varepsilon_{it}$ (5)

Where

μ_{it} represents the error term, η_i represents individual country effect, $\measuredangle_t$ represents time specific effect and ε_{it}= represents random disturbance term. Lagged dependent variable is included as a regressor to capture the persistence of the dependent variable. If $\delta_3 > 0$ and $\delta_4 < 0$, it affirms the EKC and an inverted U relationship between income and environmental degradation or GHG, a contrary sign will learn support the climfin effect. The per capita income turning point of the inverted U curve is computed as PCY = $-\frac{\delta_3}{2\delta_4.}$.

Models 1 to 4 are estimated, using system Generalized Method of Moments (SGMM) robust standard errors by Arellano and Bover (1995) and Blundell and Bond (1998). The relationship between the GHG variables and CF may be bidirectional, hence the problem of endogeneity. As countries receive more CF for mitigation and adaptation purposes that will cause GHG emission to reduce, hence a negative coefficient is expected between CF and GHG (Pao & Tsai, 2011; Ssali et al., 2019). However, countries faced with higher level of emission and concentration from GHG may attract larger CF. Secondly, The GHG variables have data which are highly persistent, so a dynamic panel specification to equations 1-4 seems plausible for the objectives of this study. Thirdly, Due to the existence of autocorrelation and heteroscedasticity between observation from the same country, and small time series observation of the study SGMM estimates (Blundell and Bond, 1998), appear to be most

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appropriate for estimating our specific panel data. Test of validity of the instruments is carried out using Arellano-Bond test.

3.3 Stationarity Test

Most time series variables have been found to exhibit non-stationary characteristic, which when not differenced poses some challenges to estimations. For that matter, we next tests stationarity of the data. However, Ssali et al. (2019) argued that if the panel time series of the data are cross-sectionally independent then first generation panel unit root tests will yield erroneous and inconsistent results. For that matter, a cross-sectional independent test is first carried out using Pesaran cross-sectional dependence test (CD). It is clear from table 2 that cross sectional dependence exists among the variables.

Table 2: Pesaran (2004) cross-sectional independence test result

	C20	CF	ENC	GDP\P
CD test	11.92***	16.47***	15.07***	35.000***
P–value	0.0000	0.0000	0.0000	0.0000
	CH4	N20	GHG	
CD test value	19.85***	19.78***	18.30***	
P – value	0.0000	0.0000	0.0000	

*** represents statistical significance at 1%. The Pesaran CD test is based on the null hypothesis of cross-sectional independence

On that backdrop, the study employed both first generation and second generation panel unit root test to check whether the variables employed in this study are stationary at I(0) or I(1). Both methods are employed because in the presence of cross-sectional independence in the panel time series, first-generation unit root tests have serious setbacks, which are normally corrected by second-generation unit root tests. Results from both the first generation and second-generation unit root tests as shown in Tables 3 and 4 indicate that, CF data has proven to be stationary at level for all panel unit root tests employed at level or first difference.

Table 3. First-Generation Unit root test

Variable	LLC		IPS		ADF-Fisher	
	Intercept	Intercept and trend	Intercept	Intercept and trend	Intercept	Intercept and trend
C_{02}	-0.4349	-5.0113	2.4505	-1.8929	1.6361	-1.1766
	(0.3318)	(0.0000)	(0.9929)	(0.0292)	(0.9491)	(0.1197)
CF	-3.8794	-4.5085	-2.8999	-3.3409	-4.2616	-3.0242
	(0.0001)	(0.0000)	(0.0019)	(0.0001)	(0.0000)	(0.0012)
ENC	-1.9561	-8.1773	2.3181	-2.3471	2.4348	0.3577
	(0.0252)	(0.0000)	(0.9898)	(0.0095)	(0.9926)	(0.6397)
GDP\P	-3.7433	-28.0047	-0.7996	-3.7742	-0.4391	-2.3374
	(0.0001)	(0.0000)	(0.2120)	(0.0001)	(0.3303)	(0.0097)
GDP\P^2	-3.7433	-28.0047	-0.7996	-3.7742	-0.4391	-2.3374
	(0.0001)	(0.0000)	(0.2120)	(0.0001)	(0.3303)	(0.0097)
ΔC_{02}	-3.9851	-6.1955	-3.7885	-3.8901	-8.0204	-5.1939
	(0.0000)	(0.0000)	(0.0001)	(0.0001)	(0.0000)	(0.0000)

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ΔCF	-5.8806	-15.1561	-4.8276	-4.6948	-11.1030	-7.3340
	(0.0000)	(0.0000)	(0.000)	(0.0000)	(0.0000)	(0.0000)
ΔENC	-8.9779	-9.8621	-3.5623	-3.0952	-6.4859	-3.1933
	(0.0000)	(0.0000)	(0.0002)	(0.0010)	(0.0000)	(0.0007)
ΔGDP\P	-27.9574	-22.7819	-4.2691	-4.2769	-7.2703	-2.8318
	(0.0000)	(0.0000)	(0.0000)	(0.000)	(0.3303)	(0.0023)
ΔGDP \P^2	-27.9574	-22.7819	-4.2691	-4.2769	-7.2703	-2.8318
	(0.0000)	(0.0000)	(0.0000)	(0.000)	(0.0000)	(0.0023)

Variable	HT		Breitung		Hadri	
	Intercept	Intercept and trend	Intercept	Intercept and trend	Intercept	Intercept and trend
C$_{02}$	0.8158	0.2683	1.8099	-0.1064	13.0987	5.0596
	(0.9570)	(0.2803)	(0.9648)	(0.4576)	(0.0000)	(0.0000)
CF	0.1836	-0.0983	-0.8650	-0.6961	5.0182	1.8324
	(0.0000)	(0.0000)	(0.1935)	(0.2432)	(0.0000)	(0.0334)
ENC	0.6910	0.1990	2.2093	-0.6055	11.7287	3.5205
	(0.4470)	(0.0823)	(0.9864)	(0.2724)	(0.0000)	(0.0002)
GDP\P	0.7292	-0.0109	3.6723	-3.1859	15.9619	0.4386
	(0.6676)	(0.0001)	(0.9999)	(0.0007)	(0.0000)	(0.3305)
GDP\P^2	0.7292	-0.0109	3.6723	-3.1859	15.9619	0.4386
	(0.6676)	(0.0001)	(0.9999)	(0.0007)	(0.0000)	(0.3305)
ΔC$_{02}$	-0.1873	-0.0689	-4.7427	-2.6744	0.5057	-0.4410
	(0.0000)	(0.0000)	(0.0000)	(0.0037)	(0.3065)	(0.6704)
ΔCF	-0.3538	-0.3490	-3.8255	-2.9571	-0.7858	-1.1153
	(0.0000)	(0.0000)	(0.0001)	(0.0016)	(0.7840)	(0.8676)
ΔENC	-0.1152	-0.0577	-4.5216	-1.7732	-1.2354	-0.0263
	(0.0000)	(0.0004)	(0.0000)	(0.0381)	(0.8917)	(0.5105)
ΔGDP\P	-0.2514	-0.1703	-5.5810	-6.0591	-2.1245	-1.5381
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.9832)	(0.9380)
ΔGDP\P^2	-0.2514	-0.1703	-5.5810	-6.0591	-2.1245	-1.5381
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.9832)	(0.9380)

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Table 4. Second Generation Unit Root Test

PES-CADF					
Variable	Constant	Constant and trend	Variable	Constant	Constant and trend
C_{02}	-0.656	0.012	ΔC_{02}	-3.754***	0.363
CF	-4.434***	-1.789**	ΔCF	-5.733***	-3.877***
ENC	1.059	1.059	ΔENC	-1.847**	-0.722
GDP\P	-0.908	0.842	ΔGDP Growth	-2.131**	-0.829
CIPS					
Variable	Constant	Constant and trend	Variable	Constant	Constant and trend
C_{02}	-1.887	-2.236	ΔC_{02}	-2.815	-2.112
CF	-3.408	-3.610	ΔCF	-3.019	-2.872
ENC	-1.758	-1.866	ΔENC	-2.243	-2.495
GDP\P	-1.962	-1.942	ΔGDP Growth	-2.243	-2.533

Notes: $H0$: homogeneous non-stationary; lag criterion decision: general to particular based on F joint test; critical values, CIPS with constant: 10% (–2.15), 5% (–2.29), 1% (–2.56); critical values CIPS with constant and trend: 10% (–2.82), 5% (-3.02), 1% (–3.46); ***,** indicate significance at 1% and 5% level respectively.

In order to test whether the pooling coefficients of the model are appropriate or not, a Hausman poolability test was undertaken. The null hypothesis of the Hausman poolability test asserts that pooling long-run coefficients are identical for all cross-sections.

4. Findings

This study sought to find the impact of climate finance on GHG emissions among 19 SSA countries for the period 2006 to 2017 using SGMM robust standard error estimator. The Wald Chi-squared test result for all four equations was significant, indicating that the regressors are jointly significant. Arellano-Bond AR (3) test of the existence of autocorrelation shows that there is no serial autocorrelation in the residuals.

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Table 5. Model Estimation Using the System GMM Estimator

VARIABLES	CO2	N$_2$O	CH$_4$	GHG
Lag of Dependent Variables	0.1050***	-0.0482**	-0.00508	-0.03065
	(0.00407)	(0.0240)	(0.0293)	(0.0605)
GDP\P	0.00024***	10.7927***	17.4135***	0 .000167***
	(0.000046)	(1.2455)	(1.9407)	(0.000048)
GDP\P^2	-5.62e-08***	-0.000813***	-0.00178***	-3.76e-08***
	(9.00e-09)	(0.000125)	(0.00025)	(9.85e-09)
CF	-0.00016*	21.3668***	34.7598***	0.00089***
	(0.000095)	(3.5044)	(5.0985)	(0.0001472)
ENC	0.0029***	-4.4661***	11.4652***	1.0857***
	(0.00020)	(0.9417)	(1.9913)	(0.0562)
GR	5.6543***	-122395.5***	-156997.8***	-.87466***
	(0.3010)	(10424.14)	(11374.08)	(0.5155)
Constant	-3.1654***	44313.37***	48554.97 ***	5.0980***
	(0.1328)	(3693.791)	(3516.35)	(0.6377)
Turning Points (USD)	2,135	6,637.58	4,891.43	2,220.744
Observations	162	126	126	102
Number of Countries	20	20	20	20
AR(1), *P-value*	0.0042	0.0116	0.0102	0.0436
AR(2), *P-value*	0.0037	0.0127	0.0512	0.4572
AR(3), *P-value*	0.1845	0.1390	0.2301	

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

ENC showed a significant positive impact on CO2, CH4 and GHG in harmony with prior studies. The findings show that a marginal increase in ENC will increase CO2 by 0.0029 and CH4 by 11.465, and negatively impacts N2O. A positive significant impact supports the existence of the PHH in SSA. This result supports the study by Sarkodie and Strezov (2019) for high emitting countries in the world, but contradicts the study by Zhu et al. (2016). This implies that due to weak law enforcement in SSA, developed countries and investors always move their dirty and more hazardous firms to Africa, to increase ENC and pollution in the sub-region. Such firms use a lot of energy, which causes a rise in GHG emissions and deteriorates our environment.

GR, which measures the willingness of governments of SSA to mitigate against climate change through control of corruption, promotion of rule of law and law enforcement, showed a significant negative impact on S2O, CH4 and total GHG emission. This indicates that most governments in the sub-region are very ready to receive the USD100 billion funding from 2020 to help mitigate against climate change. However, the findings show a worsening CO2 for GR. This may be due to worsening fossil energy use as SSA grows and fails to rely on renewable energy, which raises carbon levels. African governments should begin making more effort to reduce CO2 using the various carbon pricing models.

The World Bank classifies the world's economies under four income groups: high income, upper-middle income, lower-middle income and low or poor income countries. The World Bank Data Team as at July 1, 2019 brought up new figures for the classification; Low income countries (Per capita income < 1,025), lower-middle income

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(Per capita income ranging 1,026-3,995), upper-middle income (Per capita income ranging 3,996-12,375) and high income countries (Per capita income > 12,375).

4.1 Robustness Check

SGMM affirmed the existence of EKC for our model in the face of increasing CF. In order to undertake robustness check of our results, the study further employed Dynamic Ordinary Least Squares (DOLS) and Fully Modified Ordinary Least Squares (FMOLS) to triangulate the results. Ahmad et al. (2017) intimated that DOLS and FMOLS estimators do not suffer endogeneity and serial correlation problems and provide unbiased results in small sample. The findings gave coefficient of determination, ranging from 0.50 to 0.94, to show that more than 50 percent of the variability in the dependent variables (CO_2, CH_4, N_2O and total GHG) are explained by the independent variables.

Table 6. Results for DOLS and FMOLS

VARIABLES	(CO_2)	(CH_4)	(N_2O)	Log of GHG
GDP\P	1.0058***	0.0216	0.0808	-1.1433***
	(0.399)	(0.1088)	(0.0829)	(0.1423)
GDP\P^2	0.503***	0.0404	0.0108	-0.572***
	(0.0200)	(0.0415)	(0.0544)	(0.0712)
CF	0.0620***	0.5543 ***	0.4439***	0.0717
	(0.0228)	(0.0652)	(0.0497)	(0.0730)
ENC	0.5630***	1.0678***	0.4052***	2.1402***
	(0.0599)	(0.1624)	(0.1238)	(0.2391)
GR	0.5176*	-11.5014***	-10.4958***	5.3006***
	(0.2703)	(0.7282)	(0.5553)	(1.0286)
Observations	135	105	105	105
R-squared	0.9395	0.8269	0.8683	0.8580

FMOLS

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VARIABLES	(CO$_2$)	(CH4)	(N$_2$O)	Log of GHG
GDP\P	0.7418***	0.1849***	-0.0062	0.1594***
	(0.0286)	(0.0307)	(0.0273)	(0.0537)
GDP\P^2	0.371***	-0.000887	-0.0136	-0.00573
	(0.0147)	(0.689)	(0.0686)	(0.0584)
CF	-0.0148	0.7914 ***	0.6883***	0.6732***
	(0.0146)	(0.0175)	(0.01651)	(0.0303)
ENC	0.5191***	-0.0217	0.4884***	0.4076***
	(0.0386)	(0.0355)	(0.03160)	(0.0660)
GR	1.4098***	-3.4746***	-4.5536***	-1.1849***
	(0.1594)	(0.1426)	(0.1267)	(0.2643)
Observations	135	105	105	105
R-squared	0.8769	0.5631	0.5954	0.8580

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Most of the DOLS and FMOLS results are similar to that of the SGMM results, apart from economic growth and economic growth squared that failed to lend support to EKC. CF showed a significant positive impact on all the dependent variables in all three estimations apart from CO2 that showed a non-significant negative impact under FMOLS, but a negative significant impact for SGMM. ENC also indicated a significant positive impact on all the dependent variables for all estimators apart from N2O that showed a non-significant negative effect for FMOLS, but a significant negative effect for the SGMM estimator. GR result is consistent for all three estimators; it showed a significant positive impact on carbon emission and a negative significant impact on the other three variables.

5. Conclusion

The general objective of this study is to find the impact of CF on GHG emission among 19 SSA countries for the period 2006 to 2017, due to data availability. A SGMM with robust standard error was employed; analysis was triangulated using FMOLS and DOLS for robustness check. The findings from SGMM estimates indicate the existence of inverted U EKC for all four GHG variables. This implies that, CF so far is targeted toward the abatement of CO2 at the neglect of other GHG. N20 and CH4 emission are caused primarily by agricultural activities from pesticide and fertilizer applications, poor solid and liquid waste management and improper management of landfill sites. Based on that, it is recommended that, some climate funds should be geared toward the reduction in emission of other GHGs by proper management of agriculture, solid and liquid waste and landfill sites to reduce emissions. Energy consumption showed a significant positive impact on CO2, CH4 and total GHG emissions for all three estimators employed: System GMM, DOLS and FMOLS. This finding is consistent with prior studies in extant literature and lends support to the PHH, which argues that investors move their dirty and hazardous companies from countries with stricter law enforcement to countries with weak law enforcement countries like SSA.

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Performance analysis of the implementation of innovation policy in Belarus

Venelin Terziev[a] & Viladimir Klimuk[b]

[a] *University of Rousse, Rousse, Bulgaria & Kaneff University Hospital, Rousse, Bulgaria*
E-mail: vkterziev@gmail.com
[b] *Baranavichy State University, Baranovichi, Republic of Belarus*
E-mail: klimuk-vv@yandex.ru

Abstract

The Republic of Belarus, like any other developing country, pays special attention to the development of an effective and dynamic innovation infrastructure that creates favourable conditions for innovation start-ups, introducing the country on a global scale, increasing export potential, solving employment-related issues and increasing wages.

Keywords: innovation policy, development, economy, Belarus

Jel Codes: O10, M21

1. Introduction

Development of potential of the regions, increase of competitiveness of the country`s products on global markets is determined by the dynamic and successful national innovation infrastructure. The Republic of Belarus, like any other developing country, pays special attention to the development of an effective and dynamic innovation infrastructure that creates favourable conditions for innovation start-ups, introducing the country on a global scale, increasing export potential, solving employment-related issues and increasing wages.

2. Performance analysis of the implementation of innovation policy in Belarus

Each year the Council of Ministers of the Republic of Belarus accepts a number of measures for the country`s innovation infrastructure development aimed at the development of the national innovation system, defined in the State innovation development programme of the Republic of Belarus, set for a 5-year period, starting from 2007. Based on the analysis of the main focus areas of the implemented State innovation development programmes for 2021-2025, the key areas for each period are defined, which differ from other areas – determinants of innovation development (Fig. 1).

Thus, among the main focus areas of the State Innovation Development Programme for each period (2007-2010, 2011-2015, 2016-2020, 2021-2025), we shall emphasize those only relevant for each particular period, starting from the development of human resources and attracting investments to innovation projects, and to success of commercialization and development of innovation infrastructure. It is important to note the objectives for stimulating innovative entrepreneurship, youth start-ups, improving the mechanisms of financing innovation, developing international research and innovation cooperation for the near future with a prospect until 2025. The success of the implementation of these objectives would help increase the productivity of the innovation infrastructure entities, increase the share of the sold innovative products (works, services) in the total volume of production, expand the international cooperation of Belarusian organizations and their foreign partners (Terziev, Klimuk, 2021a; 2021b).

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2007-2010

2011-2015
- *Educating and training personnel*, who have organizational and management skills and production technologies competences;
- Developing institutional environment favourable for the accelerated innovation development;
- Attracting investments and implementing high technology projects.

2016-2020
- Providing *digital transformation* of the national economy;
- Increasing the efficiency of *commercialization* of the results of scientific and technological activities and developing a market for scientific and technological products;
- Developing scientific and technological and innovation *infrastructure*;
- Developing international scientific and technological and innovation partnerships;
- Developing export of high technology products.

2021-2025
- Stimulating *innovative entrepreneurship*;
- Stimulating the development of experimental and implementing structures;
- Stimulating *youth start-ups*;
- Improving a comprehensive system of preferential regimes and *mechanisms for financing innovation*;
- Developing a mutually beneficial *international* scientific and technological and innovation *cooperation*;
- Digital transformation of traditional sectors of the economy;
- Diversification of export destinations of high technology products.

Figure 1. Key areas of the State Innovation Development Programmes for 2007-2025

Source: Authors

The innovation financing mechanism is a key element for achieving the objectives set by the SIDP. It provides key areas of financing innovation projects and measures to develop innovation infrastructure. A decrease in funding may be due to the increased extra-budgetary funds from investor organizations (partners, in particular foreign organizations), improvement of the system of preferences for organizations involved in innovation and innovation infrastructure entities (indirect financing) (Fig. 2).
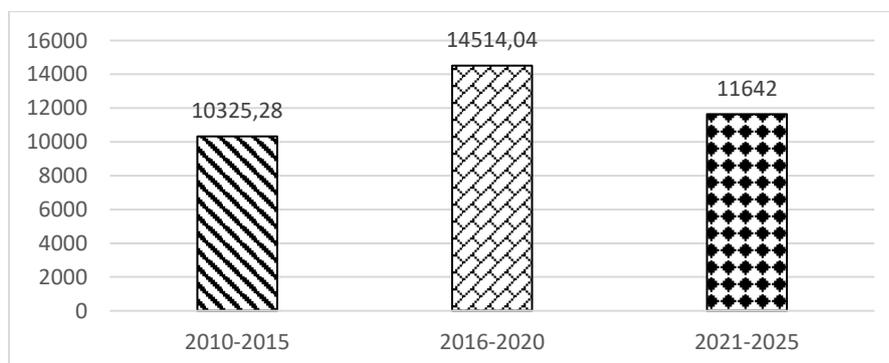
Figure 2. Dynamics of financing of innovative projects and measures for the development of innovation infrastructure within the SIDP, million rubles

Source: Authors

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Analysis of the objectives for the SIDP implementation shows a low level of utilization of the allocated funds of the republican and local innovation funds for the implementation of innovation projects and the development of innovation infrastructure (Fig. 3).
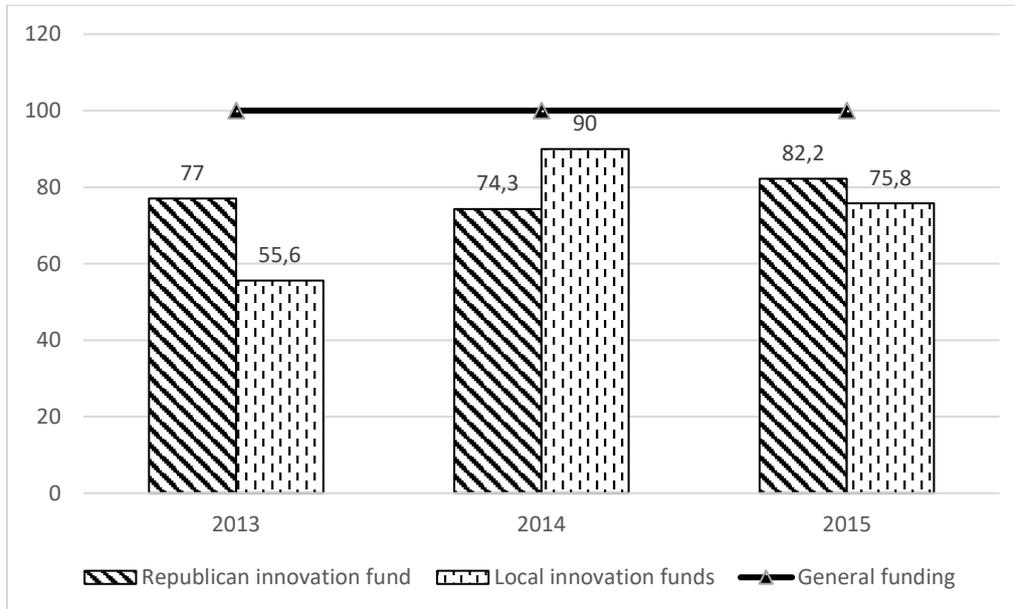
Figure 3: Share of the utilized funds from the republican and local innovation funds, %

Source: Authors

To solve the problems of the effectiveness of the costs allocated from innovation funds, centralization of the costs from innovation funds to the republican centralized innovation fund was implemented, and the expansion of the priority areas of innovation financing, in particular the development of industry laboratories, projects financed on a repayable basis through the Belarusian innovation fund and projects based on individual decrees of the Head of state (2020).
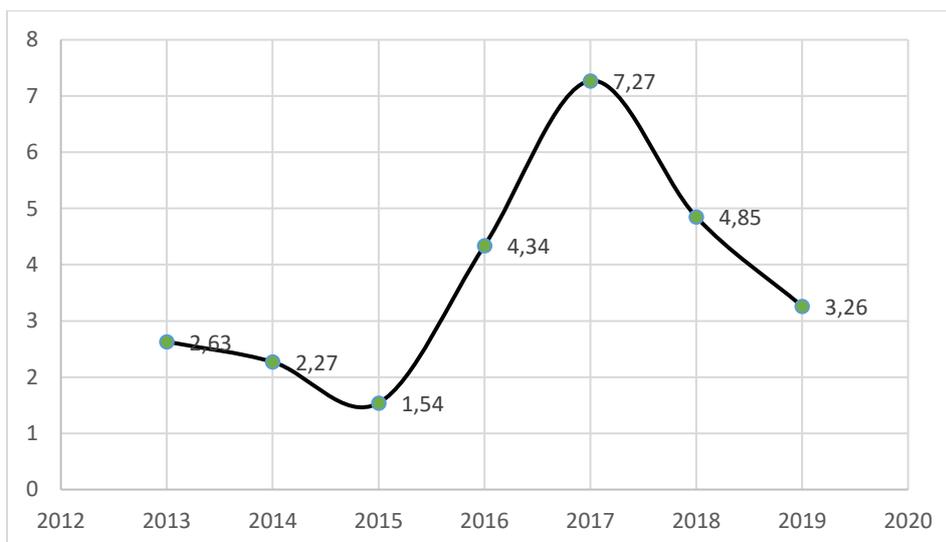
Figure 4: Volume of products released by tecnopark residents per 1 ruble allocated budget funds (investment return)

Source: Authors

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Special attention in the past five years and as one of the priorities for innovation stimulation in the country in the next five-year period is paid to the development of national innovation infrastructure and the increase of the performance of innovation infrastructure entities. Thus, the period 2018-2019 shows a downward tendency in terms of the calculated return on invested budgetary resources (the ratio of the volume of products released by technopark residents to the volume of budget financing) (Fig. 4) (2020).

Budget funds were mainly allocated on the development of material and technological infrastructure. The modernized material and technological base would enable an increase in the number of new residents, increase in the volumes of innovative products, at the same time increasing the return on budget funds which would be optimized in the next period (due to significant capital injections into construction, minor and major repairs, the purchase of modern equipment in previous years) (Terziev, Klimuk, 2021c; 2021d).

A significant role in the development of national innovation infrastructure is played by technology transfer centres (hereinafter referred to as TTC), which provide ways for the implementation of transfer of innovative solutions (including foreign ones) in practical fields of the economy and social sphere. One of the main criteria for evaluating the performance of TTC activity is the number of processed technological requests and developed technological proposals.
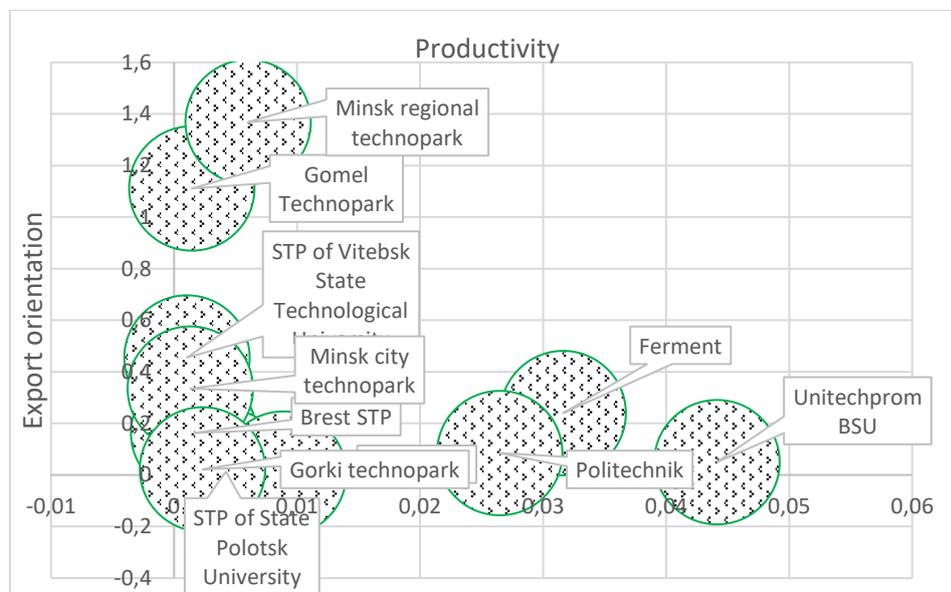
Figure 5. Performance matrix of the Belarusian STP activities in Belarus

Source: Authors

For the performance analysis of the activities of Belarusian TTC and technological parks we will use "performance matrix" developed by Klimuk B.B. The following will be used as a system of indicators:

- To evaluate STP performance:

✓ Workforce productivity in STP, rubles (Scope of work (services) by STP employees / Number of workplaces);

✓ Export orientation of STP, rubles (Export of products (works, services) by the STP residents / Number of residents).

- To evaluate TTC performance:

✓ Workforce productivity in TTC, rubles (Total number of processed technological requests and developed technological proposals/ Number of workplaces);

✓ Profitability of TTC, rubles (Total profit of the TTC/Number of workplaces).

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The following performance matrices will show the calculated indicators for the evaluation of the Belarusian STP and TTC activities for the entire period of their operation (Fig. 5-6).
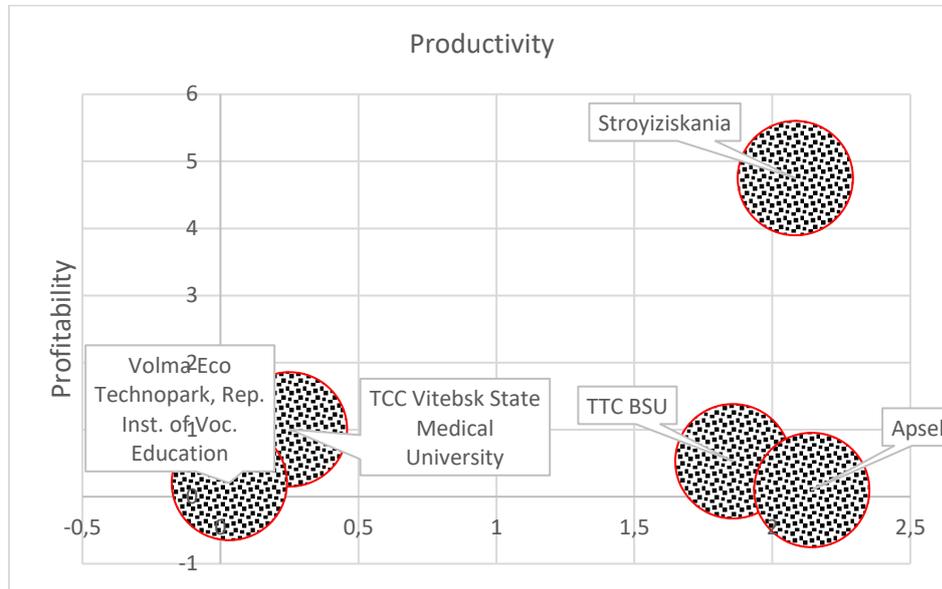
Figure 6. Performance matrix of the Belarusian TTC activities in Belarus

Source: Authors

3. Conclusion

The performance analysis of the STP and TTC activities shows a significant potential in terms of increasing the workforce productivity of the entities of innovation infrastructure. The economic indicators are increasing, the export of products (works, services) by residents is growing each year, as well as the annual profit of the entities (the evaluation points of STP and TTC performance move to the upper right quadrant, which is above the average indicators for all entities).

The following measures are proposed for growing the potential of innovation infrastructure entities: expanding the range of provided services (TTC should focus on scientific and technological services); stimulating international cooperation with the innovation infrastructure entities; developing youth start-up projects; developing tools for financing innovation projects.

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Analysis of China's economic growth factors: 1953-2017

Shide Feng[a] & Huimin Zhang [b]

[a] *Lomonosov Moscow State University / Moscow State Institute of International Relations under Ministry of Foreign Affair, Russia*
E-mail: *Shidefeng508@gmail.com*
[b] *Lomonosov Moscow State University / Moscow State Institute of International Relations under Ministry of Foreign Affair, Russia*
E-mail: *huiminzhang658@gmail.com*

Abstract

The paper analyzes China's economic growth from 1952 to 2017, using sophisticated mathematical models and empirical analysis to decompose economic growth, analyze and forecast it. The paper applies the relatively latest data, analyzes the situation in each stage in detail, and elaborates the intuition behind economic growth in different periods, these are the new contribution of the paper. The conclusion shows that the contribution of growth of total factor productivity and labor force growth to economic growth was relatively high before the economic reform. However, after the economic reform, capital growth and total factor productivity growth contributed the most. The forecast results indicate China's future economic growth will slow down by maintaining the current situation.

Keywords: China, economic growth

Jel Codes: O40, O42

1. Introduction

China's economic growth has been a miracle. China's economy has maintained economic growth for most of the 70 years, especially after the economic reforms, the economic growth rate is relatively high. China's economic growth has different characteristics in different periods. During these 70 years, many different factors have supported China's economy to maintain such kind of growth, like economic policies, population policies, education, capital stock, financial markets, labor, etc. these factors play different roles in different periods and support economic growth in different periods. There are different characteristics in different periods.

Main Contribution

Most scholars began to analyze China's economic growth after the economic reform, and there was no much literature concerning the economic growth analysis before the economic reform. I believe that the different periods of economic growth are interrelated in each other, so this paper begins with the establishment of he People's Republic of China, analyzes the economic growth in different periods. The paper in a way enriches the literature of economic growth before the economic reform. This Paper applies sophisticated mathematical models and modified models. I estimate the corresponding parameters and analyze the intuition behind the results. At the same time, I also applied the forecast models to forecast the future and the results of the forecast are analyzed.

2. Literature Review

Empirical Review

2.1. About The Total Factor Productivity

Fangzhi Peng, Songming Hu (2010) believes that rapid economic growth is difficult to just explain by the growth of capital, labor, and its quality, and it is also difficult to explain by scientific and technological achievements or its growth. The main reason for the growth should be the adjustment of Policies and industrial structures, including the inflow of a lot of rural laborers with low marginal output to cities with relatively high marginal output, new and further reforms, etc. But the adjustment of Policies and Economic Structures can easily lead to economic fluctuations. Solow (1957) proposed a total factor productivity analysis method. When "Technological Change and Total Production Function", and when using this method to test the neoclassical growth model, he found that the contribution of capital and labor to the total growth rate was approximately equal to that of technological progress. The contribution of the total growth rate is approximate. Based on this, Solow established the view that technological progress determines economic growth. Qin Cao (2016) has concluded that the endogenous economic

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growth theory is that the source of economic growth is to increase productivity, science, and technology play a key role, labor, and capital, and systems and policies also play an important role in economic growth. Bose, N., Haque, M.E. and Osborn, D.R. (2007) proves Government investment in education and total education expenditure are the only expenditures that are significantly related to growth. Doucouliagos, H. and Ulubaşoğlu, M.A. (2008) studied economic development and considered, Jianli Mao (2008) studied economic growth factors and invested in scientific research and development, TFP is the core factor of economic growth. Doucouliagos, H., and Ulubaşoğlu, M.A. (2008) believe that Democracies improve human capital. Fields, G.S.'s (2011) analysis results show that the economic growth level of developing countries is positively affected by economic and political globalization. Xinyi Shi (2015) pointed out that China's Rd has an average annual growth rate of 17.53% in recent years.

2.2. About the Labor

Becker (1962) defined the concept of human capital from the perspective of the formation of human capital. He pointed out that human capital is capital formed through human investment including Education and etc. Schultz (1971) believes that human capital is the human being because it is carried by people; it is also capital because it is the source of future satisfaction or future income or both. Human capital means "condensed in The knowledge, skills, and abilities of the workers", and he regards human capital as "the outcome of education". Shijun Yang (2009)believes that Initially, for an economy with a lower level of capital stock, the marginal output of human capital and R&D capital may be very low. Only when capital stock has accumulated to a certain level can human capital play a significant role. And R&D capital is going to play a significant role later after that human capital and enough capital stock start to contribute to economics. Shijun Yang (2009) High contribution rate of capital stock and the low contribution rate of technological progress (close to 0) are the salient characteristics of my country in the initial stage of economic development. Jingwen Li (1992) proves that the capital's contribution to economic growth accounted for 75.07% from 1953 to 1990 in China and labor's contribution to economic growth accounted for 19.47% and the contribution of productivity to economic growth accounted for 5.46%. Lin, JY, Fang, C., and Zhou, L. (1994) studied China's economic reforms. He used the theory of comparative advantage because China's large labor force and the development of labor-intensive industries can absorb a large amount of surplus labor in the early stage of economic reform. To promote labor transfer, support relatively low in the case of the high fertility rate, sufficient labor supply, and a large amount of accumulation of capital for development. Na Na(2010) believes that improve the quality of the labor force and increase the input of human capital will increase economic growth.

Hanushek, E.A.(2013) Human capital is the main driving force of the economy of developing countries. Improving the quality of teaching in schools will improve the economic performance of developing countries.

2.3. About the Capital

Shuai Wen (2011) studied the capital, labor, and institutional factors in China's economic growth. He believes that China's economy has relied on capital for a long time. After the economic reform, the huge production capacity brought by China's development cannot absorb the instability of exports. Xinyi Shi (2015) analyze the economic growth factors, the contribution rate of the Chinese government's fiscal expenditure on China's economic growth is 20%, which greatly promotes economic development. Jianli Mao (2008) studied economic growth factors and believed that the government relied excessively on infrastructure to keep the economy growing. Xiaomeng Zhang (2008) proves economic growth mainly relies on increasing capital and labor input. At the same time, the local government has kept increasing investment in infrastructure, especially infrastructure investment, which is also an important factor driving economic growth. Tang, S., Selvanathan, E. A., & Selvanathan, S. (2008) believe foreign direct investment did not crowd out domestic investment but complemented domestic investment. Therefore, foreign direct investment not only helps to overcome the shortage of funds but also stimulates economic growth by supplementing domestic investment in China. Different scholars have applied different methods to analyze economic growth. The following are some typical methods. Shuai Wen (2011) used econometric models and factor analysis to quantitatively analyze economic growth, Xinyi Shi (2015) used the VAR model, Na Na (2010) used the Solow Residual Value Method to analyze Gansu's economic growth factors.

3. Methodolgy

The methodologies of the paper will adopt are data analysis, empirical analysis, etc. The model is modified based on mature mathematical models, and the forecasting model is the ARIMA model. The Cobb-Douglas model is applied as the basic model to decompose the economic growth. Y is the gross domestic production, K is the capital stock, L is the quality of the labor.

$$Y(t) = K(t)^\alpha A(t)L(t)^{1-\alpha} \qquad (1)$$

I apply the total differential equation with the Cobb-Dauglas model. And we get the function (2).

$$\dot{Y}(t) = Y(t)\frac{\dot{A}(t)}{A(t)} + Y(t)a\frac{\dot{K}(t)}{K(t)} + Y(t)(1-\alpha)\frac{\dot{L}(t)}{L(t)} \qquad (2)$$

The $\frac{\dot{A}(t)}{A(t)}$, the $\frac{\dot{K}(t)}{K(t)}$, and the $\frac{\dot{L}(t)}{L(t)}$ are the growth rate of total factor productivity, capital stock, and labor.

$$\frac{\dot{Y}}{Y} = \frac{\dot{A}}{A} + a\frac{\dot{K}}{K} + (1-\alpha)\frac{\dot{L}}{L} \qquad (3)$$

Therefore, I construct the model based on function (5) to estimate the a

$$G_Y - G_L = SR + \alpha(G_k - G_L) \qquad (4)$$

G_Y is the growth rate of GDP, G_L is the growth rate of Labor quantity, G_L is the growth rate of capital stock, and SR are is the Solow Residual.

Function 8 the is regression model is applied to estimate the a.

$$G_Y - G_L = \beta_0 + \beta_1(G_k - G_L) \qquad (5)$$

I use several time intervals to estimate the a. The table as following shows estimated results α Value in different periods.

After applying the model to calculate α Value, we can further estimate the Solow Residuals. According to formula (5), Economic growth is decomposed into three parts, which are the Capital part, Labor part, and Total Factor Productivity.

$$\frac{\dot{Y}}{Y} = \frac{\dot{A}}{A} + a\frac{\dot{K}}{K} + (1-\alpha)\frac{\dot{L}}{L} \qquad (6)$$

$$G_Y = G_A + aG_K + (1-\alpha)G_L \qquad (7)$$

G_Y stands for economic growth, G_A stands for Total Factor Productivity growth, G_L stands for Labor growth, and G_K stands for Capital Stock growth.

Based on the ARIMA model, I constructed the economic growth forecast model, the labor force growth forecast model, and the capital stock growth model. The data uses GDP, total labor force, and capital stock data from 1952 to 2020.

Table 1. ARIMA Model

	ARIMA Model
GDP	(0,2,2)
Labor	(1,1,1)
Capital Stock	(1,2,1)

Source: Author's Estimation

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3.1. Estimated Result and Analysis

Table 2. α Value from 1952-2017

Year	α Value
1952-1968	0.47
1968-1980	0.47
1981-1990	0.54
1990-1995	0.47
1996-2000	0.47
2001-2005	0.41
2006-2010	0.41
2011-2017	0.42

Source: Author's Estimation

The period of 1952-1968 and 1968-1980 are 2 critical periods in Chinese history, based on data from 1952 to 1980, α Value is 0.47. After this period, China started economic reforms. From 1981 to 1990 was the early stage of China's economic reform. According to data from 1968 to 1980, the α Value rose to 0.54. From 1990 to 2000, based on data from 1980 to 2000, α Value dropped to 0.47.

By analyzing data from 1990 to 2010, China's α Value continued to drop to 0.41 from 2001 to 2010. According to data from 1990 to 2017, China's α Value rebounded slightly from 2011 to 2017, which is 0.42.

From 1952 to 1968, China applied a planned economy to build a new economic system with Soviet Union Aid, which increased the α Value 0.47. Between 1968 and 1980, China's economic growth was relatively slow, and China has completed the primitive capital accumulation, although there is no aid from foreign countries and the domestic investment continued year over year, and α Value remains relatively unchanged.

From 1980 to 1990, China starts economic reforms and allowed private capital to enter the market. During this period, α Value increased dramatically. Then China adopted export-oriented policies and a labor-intensive industrial structure.

From 1990 to 2000, α Value dropped to 0.47. in the 21st century, α Value continues to drop to 0.41. After the Financial Crisis, China continued to invest a lot of capital, and α Value increased to 0.42 from 2011 to 2017.

Total Factor Productivity may grow negatively, the growth of Capital Stock and Labor force will compensate for TFP contribution to the growth of total output because the growth of Capital Stock and labor generate uniternalized externalities.

The analysis of different periods is as follows.

As shown in the Graph, between 1952 and 1980, China's economy contained several fluctuations. After the People's Republic of China was established, China applied planned economic policies to allocate limited resources efficiently. The negative economic growth in 1954 was due to the excessive growth in the previous stage. After that, China completed its first five-year plan. The economy grew year over year. At the same time, China received Aid from the Soviet Union, which is why total factor productivity and capital growth contributed a lot to economic growth by then. At the same time, with the development of aid projects, the contribution of labor force growth is increasing.

Between 1958 and 1963, China's economy showed negative growth under the influence of poor economic policies and natural disasters. Between 1963 and 1967, China modified its economic policy. Without assistance from the Soviet Union, the economy continued to grow healthily, and the contribution proportion of total factor productivity was extremely high. From 1969 to 1979, under the influence of political movements, China's economy grew at a relatively low rate. Capital and labor contributed greatly to economic growth, and resource distribution was inefficient. At the end of 1978, China's economic reform began.

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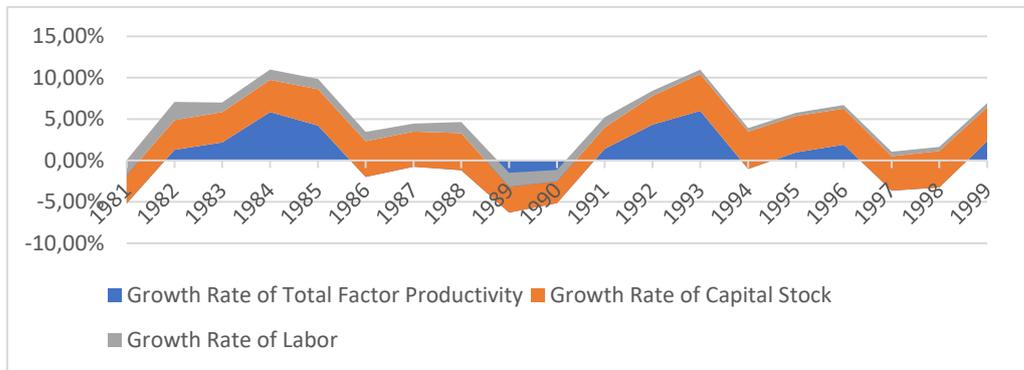
Graph 1. China's Economic Growth Structure (1981-1999)

Source: Author's Estimation
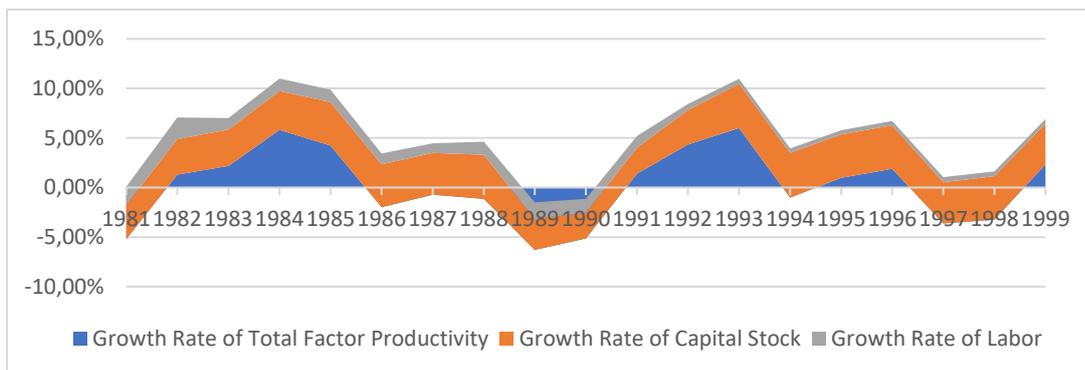
Graph 2. China's Economic Growth Structure (1981-1999)

Source: Author's Estimation

After the reform, China's economy grew rapidly. Due to the demographic dividend, China developed a labor-intensive and export-oriented economy mode in the early stages of economic reform. China began to allowed foreign advanced technology and capital. It was during the from 1982 to 1986 that total factor productivity accounted for a relatively large proportion of economic growth.

In 1985, the economy was overheated, which generated inflation, and over-expansion of credit. After 1985, the central government began to control the economic growth within an appropriate level, and the economy began to contract excessively. Factor productivity declines. After 1986, the growth rate of total factor productivity contributed to economic growth at a relatively low negative growth.

At the same time, the rapid economic growth before 1985 generated higher expectations for society, and China's education investment and policy reforms have led to an increase in labor productivity, a better economic environment, and an increase in infertility. These factors have increased due to the continuous entry of foreign capital and the change of the economic structure. The contribution of capital stock growth and labor force growth to economic growth. the growth of Capital Stock and Labor force overly compensate for the contribution of TFP.

The economic contraction and social instability after 1988 lead to two years of negative growth. In the early 1990s, the Chinese government strictly controlled inflation. In order to boost economic growth, the central government further reformed the state-owned enterprises and housing system. Some state-owned enterprises gradually transformed into private enterprises or mix-ownership enterprises, commercial housing are traded in the market.

At the same time, national taxation and state taxation will be re-adjusted to increase the central government's fiscal revenue, and then make the effective investment. These reform policies are reflected in the total factor productivity

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contribution from 1991 to 1994. Meanwhile, China started a birth control policy to alleviate the pressure on the rising population, and labor force growth has made less and less contribution to economic growth.

From 1993 to 1996, the government adjusted the interest rate seven times, and the loan interest rate fell from 12% to 6%. The central government has conducted 51 times bond repurchases since 1996, 4.3 billion yuan in total. At the same time, the central government has improved the construction of the financial market, which promotes investment. Therefore, the contribution of capital growth to economic growth gradually increased after 1996.

In 1994, the central government abandoned the separated exchange rate system, which led to fluctuations in economic growth.

The Asian financial crisis in 1997 severely affected China, because China is an export-oriented type economy, there was almost no growth in exports in 1998. the central government began to try to expand domestic demand. The measures the central government adapt are lower interest rates, credit expansion policies, the lower reserve ratio, and REPO to alleviate economic pressure.

The central government has issued a huge number of treasury bonds. In 1998, it issued 270 billion special treasury bonds, as well as 100 billion infrastructure construction treasury bonds. These infrastructure construction treasury bonds were used to build transportation (such as roads and railways), communication infrastructure, urban infrastructure, strategic reserve infrastructures (Grain and oil Reserve infrastructures).

In 1998, the central government's Commercial bank reserve ratio was adjusted from 13% to 8%. In 1999, the reserve ratio further dropped to 6%. In January 1998, the central government canceled the loan limit of state-owned commercial banks, and the risk assessment and liabilities to bank assets ratio became the control methods to govern state-owned commercial banks. Besides, the central government has adopted many policies to reduce taxes, such as reducing taxes, fixed asset investment taxes, and etc.

Therefore, between 1997 and 2000, although it was severely affected, the Chinese economy continued to grow in the contribution of capital investment growth.
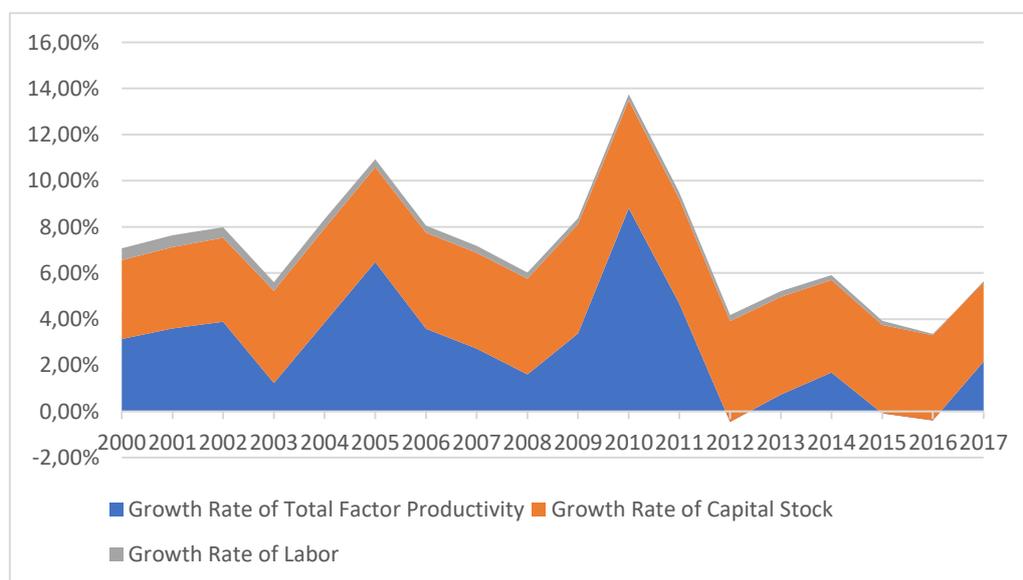
Graph 3. China's Economic Growth Structure (2000-2017)

Source: Author's Estimation

The crisis countermeasures from 1998 to 2000 received positive results. In the first few years of the new century, the growth rate of total factors reached nearly 4%. The period from 2000 to 2004 is a new growth cycle. China has applied the policy of domestic demand expansion to improve its economic growth. The dependence of economic growth on exports. During this period, China's accession to the WTO further increased its exports.

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Due to no loan restrictions on commercial banks, China's loan growth rate increased rapidly, total loan volume and fixed investment increased rapidly. Manufacturing, real estate, and infrastructure investment increased rapidly. Domestic demand increased and the Chinese market further opened to the world market, which helps the Manufacturing industry to grow rapidly. And the expansion of credit policies at the end of the last century promoted the construction of infrastructure. The expansion of credit policies have promoted consumption and local fiscal revenues from land trade have further promoted the prosperity of real estate. The slight economic downturn in 2003 was due to the SARS epidemic.The continuous economic growth brought relatively high inflation. The central bank once again increased the deposit reserve ratio from 6% to 7% in 2003, and another increase of 0.5% in 2004. At the same time, administrative measures are conducted to restrict excessive investment in industries such as real estate, steel, and cement. These administrative measures generally reduce or prohibit the development of related projects, strictly investigate illegal approvals, taxes, illegal loans, and illegal land development.

From 2000 to 2004, the proportion of capital stock growth's contribution to economic growth has declined, and the rate of population growth has been lower due to the birth policy and its contribution to economic growth is relatively low.

From 2005 to 2008, economic growth returned to a relatively normal level. The growth of fixed-asset investment is strong, the growth rates of manufacturing, real estate, and infrastructure are still high, and the overcapacity of manufacturing brought about by high-speed production may bring deflation. The central government once again applied contraction policies. central bank starts REPO from 2006 to 2008. The annual loan interest rate reached 8%, and the deposit reserve interest rate was adjusted from 7.5% to 17%. The exchange rate reform in 2005 prevented the RMB from maintaining a fixed exchange rate with the US dollar, and the RMB began to appreciate gradually. At the same time, the customs reduced export tax rebates to reduce economic growth. The government-controlled overcapacity of manufacture restricts investment (steel, electrolytic aluminum, calcium carbide, ferroalloy, automobiles), restrict personal credit, and increases taxes in the financial market. Because the government controls economic growth, the proportion of total factor productivity has fallen, and the proportion of capital instruments has risen, and population growth has further reduced.

 At the beginning of 2008, the central government set reducing economic fluctuations as the main task, preventing deflection from the overheated economy. The international financial market collapsed, world economic growth has decelerated significantly, the impact on China gradually reflects on the data. The policy of expanding domestic demand. However, the change in China's economic structure determines the relatively small impact on China compared to 1997. At the same time, the economic crisis has affected the domestic economic cycle and helped the domestic economic contraction policies. Since the previous contraction policies have taken effect, along with the impact of the economic crisis, the economic crisis has caused the domestic industrial value-added and price index to decline. Soon, the central government began to turn to expansion economic policies and the contribution of total factor productivity growth increased during this period.

To stimulate the economy, China has adopted transfer payment and tax reduction policies, such as increasing export tariff refund and subsidizing domestic products to domestic consumers, subsidies are for automobile, household appliances, rural machinery, and etc. In 2009, the Government launched a revitalization plan for ten major industries, while developing the financial industry and expanding credit to small and medium-sized enterprises, agricultural industry, and individuals. During this period, China invested 4 trillion yuan, and capital growth accounted for an increasing proportion of economic growth from 2009 to 2017. From 2014 to 2016, the global economic growth rate was slow. During this period, the contribution of capital stock growth economic growth was far greater than that of total factor productivity and labor. As the economic upward trend once again bought inflation and asset bubbles, the rapid expansion of credit at the same time would affect consumption growth in the next few years. At the same time, export growth has been restricted because of the decline in world demand after the old economic crisis, the aging has led to an increase in labor costs and the financial burden of the pension system. Real estate and infrastructure are the main factors in the Midwest to promote economic growth.

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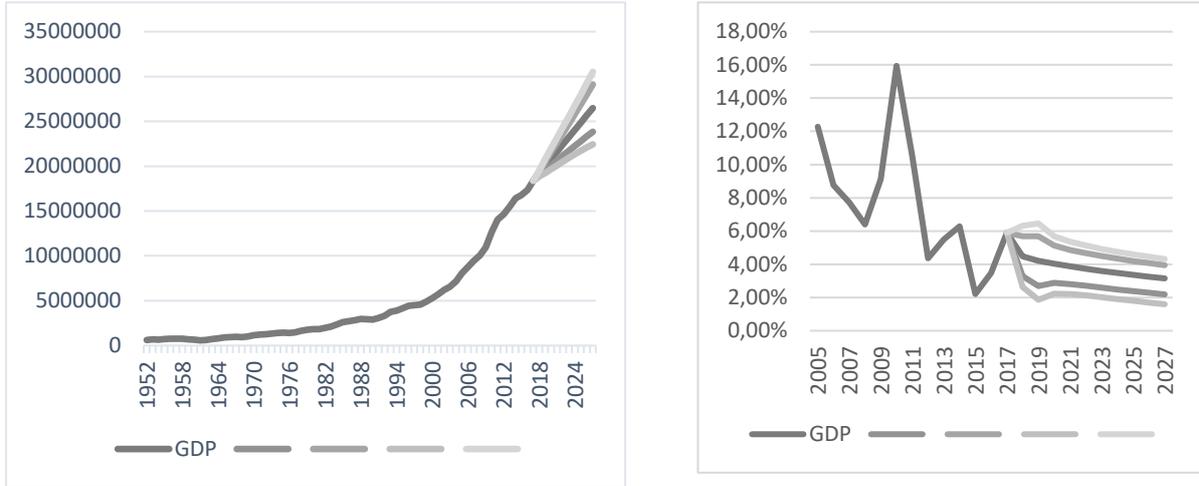
Graph 4. Forecasting Results and Forecasting Growth Rate of GDP

Source: Author's Estimation

The forecast results show that China's economic growth will still maintain a low growth rate, but the growth rate will become lower and lower.

Graph 5. Forecasting Results and Forecasting Growth Rate of Labor Quantity

Source: Author's Estimation

The growth of the labor force has almost stagnated and negative growth will show in the next few years.

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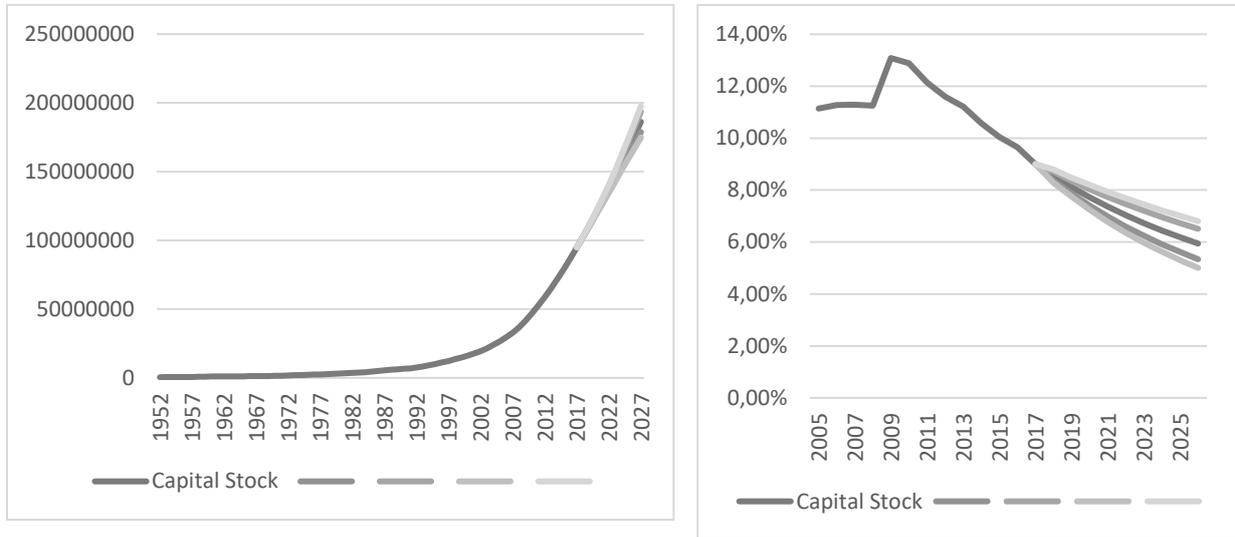
Graph 6. Forecasting Results and Forecasting Growth Rate of Capital Stock

Source: Author's Estimation

China's capital stock will continue to grow, but the growth rate will become lower and lower.
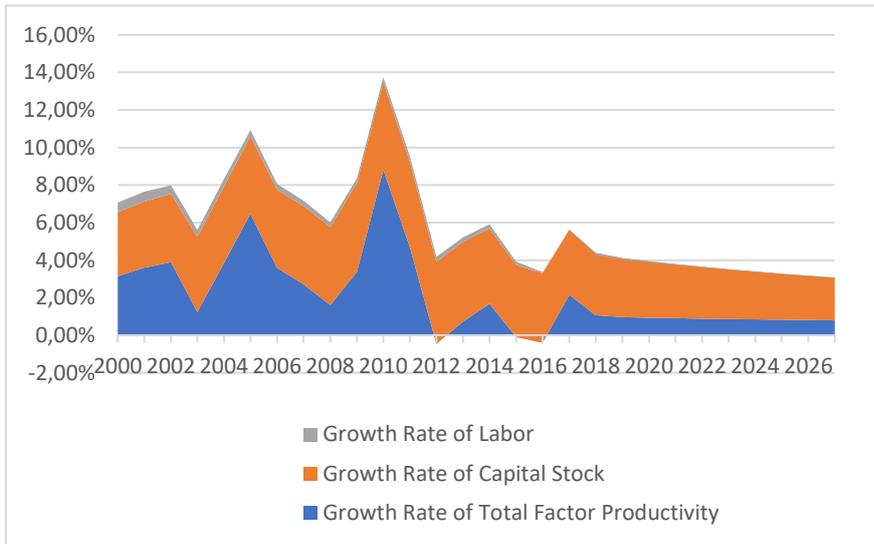
Graph 7. China's Economic Growth Structure (2017-2027)

Source: Author's Estimation

For a long period of time in the future, the proportion of capital stock in economic growth will become lower and lower, and the proportion of total factor productivity growth in economic growth will gradually increase. China's economy will maintain growth, but the growth rate will gradually decline. After the economic reform and the tax reform, some items of tax revenue income local government finances came to the central government. local finance is hard to be self-sufficient. Land development for real estate and the industry is an essential source of fiscal revenue, infrastructure construction is a major contribution to economic growth. Real estate development and early credit easing have restricted the consumption potential of residents. The aging issue has led to an increase in financial burdens, the stagnation of labor makes it difficult to make outstanding contributions to economic growth.

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At the same time, the central government has increased investment in technology and other industries, and at the same time, improved the financial market and helped the development of the real economy, which to a certain extent promoted the growth of total factor productivity.

4. Conclusion

As shown in the figure above, China's economy has maintained growth for most of the time. Before the economic reform (1952 to 1979), total factor and productivity and labor growth contributed relatively large to economic growth. After the economic reform, capital growth and total factor productivity are the largest contributions to growth. Because of the population aging issue, China's population control policy, and other causes, China's labor force has almost stopped growing, so its contribution to growth is relatively low. In the future, China's economic growth will continue, but how to maintain growth at a higher rate is a problem. Since China's population is already quite large and the investment of capital is restricted due to marginal effects, The total factor productivity is the main driving force to ensure future economic growth in the long run, which includes investment in technology and education, which can increase the productivity of the entire society. Transformation of economic growth mode and adjustment of the industrial structure have become profitable strategies for governments. Meanwhile, government and enterprise may increase the research and Education budget and funding.

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Corporate governance and earnings management: A bibliometric review[1]

Ioana Lavinia Safta[a] & Andrada-Ioana Sabau (Popa)[b] & Monica Violeta Achim[c]

[a] *PhD. candidate, Babes-Bolyai University, Faculty of Economics and Business Administration, Romania*
E-mail: lavinia_s15@yahoo.com , ioana.safta@econ.ubbcluj.ro
[b] *PhD. candidate,Babes-Bolyai University, Faculty of Economics and Business Administration, Romania*
E-mail: andradaa.ioana@yahoo.com
[c] *Professor PhD. Dr habil., Babes-Bolyai University, Faculty of Economics and Business Administration, Romania*
E-mail: monica.achim@econ.ubbcluj.ro

Abstract

The aim of this paper is to overview the publications between corporate governance and earnings management, using a bibliometric approach. Both topics are of great interest for the economic environment and a business wellbeing. Therefore, conducting a bibliometric analysis of the publications on corporate governance and earnings management can provide a direction for future research trends to cover the gaps in the literature. In order to conduct the study, we have constructed the sample using the Web of Science (WOS) database. In the specialized literature we have found research since 1992 until the present. We have identified a number of 2953 publications on the related topics. The results showed us that the most cited articles are contained in the top 10 magazines. A total of 503 papers are published in the WOS database. The most cited journal was Journal of Accounting & Economics, with 12,426 citations. From these we can conclude that both topics correlated together are of great interest. In future studies we intend to expand our research both on the literature and on the application of existing models. It is especially important to evaluate the quality of the many research papers published in the literature and to obtain valuable information.

Keywords: earning management, corporate governance, bibliometric

Jel Codes: M41, G32

1. Introduction

Over the years, the economic sector has struggled with diverse challenges. Even with regulation, rules, patterns of good conducts, the people with the intent of gaining outside the law, have always find a way to do so. The challenge is a permanent state of the rules makers; it is a need of constant improvement and control over the economic sector. Most of the time, because of a Short-Term way of thinking, or a well-established plan, the rule breakers find either loopholes in the legislation, or resort to law breaking. Either way, sooner or later the irregularities from the economic environment will come to light.

Man et al. (2013) outlines the fact that corporate governance is and will be a subject of great importance for companies, while earnings management is seen as a problematic issue. A good corporate governance is needed in order to ensure the stakeholders that the management have used the resources of a company in the best way possible. The role of corporate governance is to „*ensure compliance with generally accepted accounting principles (GAAP) and to maintain the credibility of corporate financial statements"* (Lin et al. 2010).

Dechow et al. (1996) have argued that attributes of corporate governance impact the reliability of earnings and are a signal for the shareholders in terms of earnings management behavior.

For the current study we have proposed a bibliometric analysis between the links of the two concepts: corporate governance and earning management. We have approached the links between the keywords, abstract and content of the paper. From the obtained results, it can be seen that the link between the two topics is very strong, and this is grounded by the high value of the link between both of them, illustrated with the help of VOSviewer program.

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Paper analysis is one of the most important methods in bibliometrics because it helps researchers understand research trends and intuitively see the structure and trend of a research field or journal (Cobo et al. 2011). For example, a general bibliometric analysis of the main scientific developments related to the relationship between the two concepts can help them in future research, by covering the existing gaps.

From our research so far, we have not identified any article in this regard, but this fact could change, due to the working papers which were not published up to this point

The outline of the papers is as follows: in section one a brief literature review of the two concepts was made, followed by methods developed in the literature for measuring the level of each concept. In section two the methodology used was presented. Section three was destined for presenting the results, followed by the conclusions.

2. Literature review

To better understand the background of the paper, a brief definition of the two concepts: "Corporate Governance" and "Earning Management" will be made. Then, the methods for identifying the level of compliance in case of Corporate Governance, and the methods for identifying the degree of earning management. In the end of this chapter, the results from other studies regarding the relationship between the two elements will be briefly presented.

Corporate governance

The first corporate governance dispute in the history took place in 1609 between the shareholders and directors of *"Dutch East India Company"* (Cheffins, 2012). The term itself, was first put in use in the '70, in the United States of America (Achim et al 2017). In the literature, the concept has various approaches when defining it. Shelifer & Vishny (1997) have made the briefed and concentrated definition of the concept as it follows: the way in which creditors assures themselves that they „*will just receive the benefits from the investments made"*.

The Organization for Economic Cooperation and Development-OECD has the following definition: „*corporate governance is the system by which companies are managed and controlled"* (Achim & Borlea, 2013).

The "father" of corporate governance, Tricker (1984) has stated that there is needed three elements by which a good corporate governance will occur: *"corporate strategy, executive management, responsibility and supervisory"* (Achim & Borlea, 2013).

Huynh (2020), states that "*a mechanism of outstanding corporate governance is extremely necessary to a firm"*. It is clearly why, due to the several scandals in the history such as: "Guinness 1986, Poly Peck International 1989, Maxwell 1991, BCCI 1991, Enron 2001, Allied Irish Bank 2002, WorldCom 2002, Xerox 2002, Merrill Lynch 2002, Parmalat 2003/2004, Andersen 2001/2002" (Achim et al, 2016).

Corporate governance is a mechanism which, with a conscious application, will ensure a good performance of a certain company and the fact that it was well managed. Also, the shareholders, investors will receive a transparent image regarding the company's activity, thus the confidence of the creditors will be built (Tutik, 2019).

To measure the degree by which a company has followed the Corporate Governance principles, a score which can measure the compliance for the good corporative practices, can be made using the "Comply-Explain" statement.

Preparing the "Comply or Explain" statement, can be voluntarily applied. In case of Romanian companies, it is mandatory for those listed on the main market, on the Bucharest Stock Exchange (BSE). For those who do apply and report the "Comply or Explain" statement, will be well seen by the potential investors and so on. The report itself, outlines the quality of a certain company.

Computing a corporate governance score, will also reveal the quality of a business. Several researchers have developed models for calculating the level of compliance in terms of the good conduct. Achim & Borlea (2020), has developed a index, starting from the Standard's & Poor methodology (Standard & Poor's, Credit Lyonnais Securities Asia-CLSA). For applying the score, the Comply or Explain statement is analyzed and interpreted as follows: if the company complies with each aspect from the conduct, then the answer will be „YES", translated in numbers marked with „1". The aspect which are not applied by the company in a certain year, are marked with „NO", and considered in terms of the score of having the value „0". The maximum score can be 40, and the minimum 0. The higher the score, the higher the corporate governance quality

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On the same note, Gompers et al. (2003) in the conducted study for US companies, has used 24 variables, in order to develop the corporate governance index, using a sample of 1500 businesses.

A similar study, conducted also on the USA companies, was performed by Larcker et al. (2007), on 2106 businesses. They have constructed a score, by using 39 criteria. Some of the criterias are: „*board characteristics, anti-takeover provisions, compensation characteristics, ownership, and capital structure characteristics*" (Achim & Borlea, 2013).

A study conducted in Europe, more specifically in Croatia had the overview on the listed companies in the country. Vitezic (2006) have used three qualitative variables: „*environment of emerging economy, board attributes and disclose level*" to analyze the current state of the businesses, he did not develop a score.

Khanchel (2007) has synthetize the quality indexes of corporate governance, in fours elements: "board of directors, the board committees, audit committee, and an overall or total index". The study developed was conducted on US companies, in the years 1994-2003. Using the multiple regression analysis, it was revealed that there is a statistically significant and positive relationship for each "governance index and company size, investment opportunities, intangible assets and directors". The interesting fact is that the opportunities of growth that may appear, and the performance level does not affect the governance quality (Khancel, 2007).

Taking into account the OECD principles (1999), Campos et al (2002) have develop a corporate governance rating index. It was composed by 15 factors. Three of them are related to corporate governance: ownership and shareholders protection, boards of directors and disclosure and transparency.

For identifying the corporate governance quality is considered to be a „subjective and controversial" process (Khanchel, 2007). It is a great interest in identifying the level for which a certain business complies with the corporate governance conduct. Thus, the developed methods, and the ones that are being developed are for a great use in order to establish the degree of compliance.

Earning management

The act of manipulation dates back since the first civilization, being expressed in various ways. The instinct of manipulation is more or less found in human nature, thus in terms of economic manipulation, it was and is present since early times. It it a topic of interest and has been studied by several researchers.

Schipper (1989) states that earnings management is an "*intentional intervention in the process of external financial reporting with the intention of making a personal gain*" (Safta & Achim, 2020). Vagner (et al 2021) compresses the meaning of the concept as it follows: "*Earnings management (or profit management) can be considered as the uses of various accounting techniques, the main purpose of which is to prepare financial statements in such a way that the business activity of a company, as well as its financial situation, is rendered in the most positive light.*"

Another view is displayed by Erickson & Wang (1999) approaching earning management from two perspectives: on one hand, from an opportunistic behavior and on the other hand from an informational perspective. When manifesting the concept in an opportunistic manner, can arise from avoiding situations that could alter the business's performance thus, to mislead the creditors from the actual situation. According to the information perspective, earning management is considered as a tool in predicting the performance of the company in the future.

Several scores were developed in the literature, in order to identify the presence/ absence of earning management. Some of the most known are: Beneish model (1999), Robu&Robu model (2013), Dechow-Dichev model (2011) and the model developed by Putman (2005).

The most known score is the one developed by Professr Messod Beneish (1999). It is the most used in identifying the presence of earning management. It was developed in 1999 and it is formed by eight variables: Days Sales in Receivables Index (DSRI), Gross Margin Index (GMI)**,** Asset Quality Index (AQI)**,** Sales Growth Index (SGI), Depreciation Index (DEPI), Sales General and Administrative Expenses Index (SGAI)**,** Leverage Index (LVGI), Total Accruals to Total Assets (TATA) (Beneish, 1999). The final equation is: M= -4,84 + 0,92* DSRI + 0,528*GMI + 0,404*AQI + 0,892*SGI + 0,115*DEPI – 0,172*SGAI + 341 4,679* TATA – 0,327* LVGI (Beneish, 1999) (1), where any value greater than -2.22 signals the presence of earning manipulation.

A similar approach in identifying the presence of revenue management, was developed based on the Romanian companies, by Robu&Robu (2013). The model was constructed following the Beneish model. 64 companies, in the interval 2011-2012 were selected for the sample. The final developed ecuation is: M-FraudRisk-Beneish = -

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0,383IICC + 0,039IMB -0,325ICA + 0,448IVV + 0,273ID + 0,915IVCA + 0,478IGI - 0,153IAA (2) , where any value contained in the interval [-2.841; -0.355] is considered to be free of risk; (-0.355; 0.313) – for any value found in the interval, is in the „gray zone", uncertainty, and [0.313; 2.453] signals the presence of financial fraud.

Another view on detecting the earning manipulation was detailed by Dechow & Dichev (2002). It was measured the degree of quality accumulations starting from the cash flow obtained from commitments. They outline the fact that a company with a low-quality accumulation, presents an increase level of commitments which are not related to cash flow.

On the same note, Putman et al. (2005), has developed a model in order to measure the earnings quality. He proposed a Q Test, using the financial statements reported by businesses. Each company analyzed is examined and compared in terms of changes for share prices. The intervals for including the company in the current state of its existence in terms of earnings management are results between 5.00-9.99 has an above the average quality of earnings, and above 10.00 signals a high earnings quality (Safta et al., 2020).

Further, we are going to present the links and relationship that were made in the literature between the two concepts: corporate governance and earning management.

Literature review on the links between Corporate Governance and Earnings Management

In the conducted study by Roodposhti (2011), was found a positive relationship between "*internal mechanism (ownership concentration, board independence, CEO dominance), external mechanism (institutional shareholders') and earnings management*". The sample was composed of 196 companies, selected from the listed companies on Tehran Stock Exchange (TSE), in the interval 2004-2008. Using the panel data, the authors showed on one hand that companies with a "*higher ownership concentration and board independence*" tend to less restore to earning management techniques, and on the other hand companies with "higher institutional holdings" restore to revenue management often.

Cornet et al. (2006) have demonstrated that a good corporate governance mechanism limits the use of earnings management techniques. Also, the impact of corporate governance components, impacts in a positive way the business performance, by eliminating the revenue management techniques.

Another related study has approached the same general topic. Gonzalez et al. (2014) proposed to measure the mechanism between the internal corporate governance mechanism and earnings management, through discretionary accruals. They have used non-listed companies in the interval of 2006-2009. The results have shown that in Latin American economy, the boards which have frequent meetings, have a higher control over monitoring the employees, so a reduced use in earnings management.

A different perspective was related by Riwayati et al. (2016). The results obtained showed that companies which are applying aggressive practices of accruals and earnings management tend to apply the corporate governance conduct. Thus, the relationship between the two is very strong and reciprocal.

A very complex approach regarding the topic, can be found in Shen et al. (2007). Four conclusions were made. The first states that companies with a good corporate governance tend to avoid earnings management. Second, they have found a size effect relationship. The larger the business, the higher the probability to restore applying revenue management techniques, but all this in case of the absence of a good corporate governance practice. Thirds, there is a direct relationship between the corporate governance and the leverage index. Forth, companies with a rapidly growth tend to restore to earnings management, only if they do not follow the good conduct of corporate governance.

Muda et al. (2017) have shown through panel data regression analysis on the companies from Indonesia Stock Exchange. The findings outlined the fact that a good corporate governance, simultaneously affects earnings management. Also, in the partial testing the results showed that the variable of "*Composition of Commissioners*" from the corporate governance conduct, has "*no effect on earnings management*", and the fact that the "*Audit Committee has no effect on Earnings Management*".

Liu et al. (2007) has aligned the results with other studies in the literature, analyzing the relationship between corporate governance and earnings management on the Chinese businesses. The results show that there is an indirect relationship between the two concepts: a good corporate governance, translated into a low earnings management practice.

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Companies which apply a qualitative governance conduct, have an internal audit department which is constructed followed by the law 120/2019. The mentioned law contains regulations regarded the prevention and combating money laundering and terrorist financing, as well as for amending and supplementing some normative acts, for the reporting entities supervised and controlled by the National Office for Prevention and Combating Money Laundering, from 22.01.2020. Businesses are required to provide an independent audit function for the purpose of testing rules, procedures, mechanisms and policies when, in the last financial year, they exceed at least two of the following criteria: total assets: 5,000,000 lei, total net turnover: 10,000,000 lei, average number of employees: 30.

So, in the literature, different researcher has approached the two topics. Both of them, correlated are of great interest. In the following chapter, we are going to conduct a bibliometric analysis using the VOSviewer regarding corporate governance and earnings management.

3. Materials and Methods

In order to conduct the study, articles from the Web of Science database were selected for the period 1992 to present. We have used the keywords "corporate governance and earnings management" to obtain the sample. Bibliometric analysis is based on data extracted from publications, citations, bibliographic references, and authors. Through this information we have the view to examine the historical developments between individual scientific fields and the discovery of relationships between disciplines (Safta and Achim, 2020). With the help of bibliometric analysis, we selected the information from a quantitative point of view, using mathematical statistical methods and descriptive statistical methods to obtain bibliometric results. The source of information for bibliometric analysis are the records found in databases such as Web of Science, which is an online database that provides access to the following citation indexes:

Science Citation Index Expanded (SCI-E);

Social Science Citation Index (SSCI);

Arts & Humanities Citation Index (AHCI);

Index Chemicus;

Current Chemical Reaction;

Conference Proceedings Citation Index -Science (CPCI-S);

Conference Proceedings Citation Index -Social Sciences & Humanities (CPCI-SSH).

Our contribution focuses on the descriptive statistics used, presenting the results with the help of figures. The search terms applied to identify the most appropriate publications included the keywords "earning management" "corporate governance" and "the influence of corporate governance on earnings management" on the Web of Sience platform, the analyzed period is 1992 to date, for documents that meet the requirements. They contained the year of publication, language, journal, title, author, affiliation, keywords, document type, abstract, and number of citations that were exported in txt format. The date of the database query was 01.04.2021. VOSviewer (version 1.6.16) was used to analyze co-authorization, co-occurrence, citation, bibliographic linking, co-citations, keywords, and themes. Two standard weight attributes apply, which are defined as "Link Attribute" and "Total Link Power Attribute".

4. Results

In the following, we will present the results of the bibliometric analysis.

Bibliometric analysis of publication output

In total, we identified 2953 publications on the chosen topic, respectively the relationship between earning managemet and corporate governance in the WOS database between 1992 and 2021, which included 2601 research articles, 181 procedural papers, 71 reviews, 9 books, 53 early access, 5 reprints, 9 retracted publications, 6 letters, 2 corrections, 8 editorial materials, 25 book chapters. (Figure 1)

From the total, 89 were published during the years 1992-2006. Most of them were published in the period 2007-2021, respectively, a number of 2864, which indicates an increased interest in research related to this topic. (Figure

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2). Almost all publications were written in English, respectively, 2614, followed by 150 publications in Chinese, the rest in other languages.
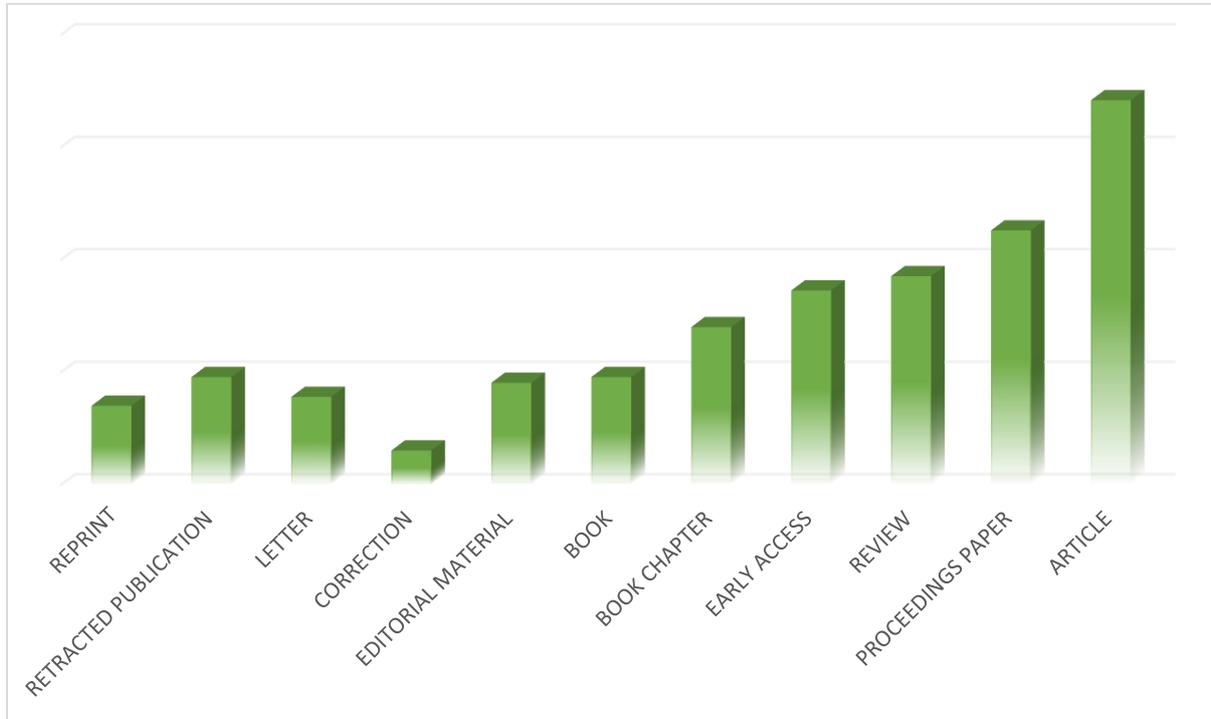
Figure 1. Classification of publications by document types according to the WOS classification

Source: Authors' processing

Figure 2. The evolution of the works on the topic of corporate governance and earning management, distributed by years

Source: Authors' processing

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Bibliometric analysis of the keywords

For the keywords analysis, we have selected and included the ones which had the frequency more than 30 times in the WOS database. From the total of 90,000 keywords, 16,326 reached the threshold. The most common keywords were "corporate governance" (total link strength 10,470) which had a strong link to "earning management" (total link strength 8438), "performance" and , "quality". Due to the fact that the links between "corporate governance" and "earning management" are very strong, a word cloud has been created to show the frequency of keywords that have appeared more than 30 times. It was indicated that "corporate governance" was most frequently correlated to "earning management", "performance" and "quality" (Figure 3). In figure three we can notice the map created with the help of the WordClouds program, in which we transposed the 16,326 words that have appeared more than 30 times. Font size is the frequency of occurrence.

Figure 3. The cloud of the keywords in the literature on the topic of corporate governance and earning management

Source: Custom processing using Word Clouds

Figure 4 is the scientific map of the keywords, consisting of several clusters in which keywords are found. Keyword analysis helps the author to obtain information about the influences related to the research topic. The size of the circle represents the weight, the larger the circle, the heavier it is. The color of the circles determines the cluster to which the keyword belongs. The correlation between the keyword and the other terms is reflected by the distance between the circles. The closer the keyword is to the term, the stronger the relationship. We can see that the group of keywords of revenue management also includes words such as "corporate governance", "quality", and "governance". There can be seen the strong link between corporate governance and earnings management. The two words are strongly interconnected. We can also observe that the size of the nodes of the two is large. The curves between the nodes suggest their appearance as a group of words very frequently.

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Figure 4. Bibliometric analysis of keywords from existing publications in the literature on corporate governance and earning management

Source: own processing using Vosviewer

Bibliometric analysis of citations and publications and organizations

The most cited articles can be found in top 10 magazines. A total of 503 papers were published in the first ten active journals, contained in the WOS database. The most cited journal was the JOURNAL OF ACCOUNTING & ECONOMICS, with 12,426 citations (Figure 5). The most articles were found in the JOURNAL OF CORPORATE FINANCE with 79 publications. Figure (6)

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Figure 5. The most quoted journals on the topics of corporate governance and earnings management

Source: own processing

Figure 6. Bibliometric map of journals in which there were the most published papers on the topic of corporate governance and earning management

Source: own processing using Vosviewer

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Figure 7. Bibliometric map of the Universities which have published the most on the topic of corporate governance and earnings management

Source: own processing using Vosviewer

In Figure 7 we can see, depending on the color of the dot, the organizations in which the frequency of citations is higher. It can be observed in figure 8, the countries where the most cited articles in the field: USA and China, then being followed by Egypt, Romania, Germany and Italy. Developing countries have a high interest in the topic due to the fact that the legislation is interpretable, loopholes can be found. This map shows us the growing interest in this topic.

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Figure 8. Bibliometric map of citations by country

Source: own processing using Vosviewer

From the bibliometric analysis we can see based on the clusters the increased interest for this topic. We have notice various universities that cooperate for research. The map illustrated in Figure 9 suggests the development of relationships between universities based on the collaboration when writing articles.

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Figure 9. Bibliometric map of the co-citations between the authors who studied the topic of corporate governance and earning management in university centers

Source: own processing using Vosviewer

5. Conclusions

In the conducted study, 2953 publications on corporate governance and earnings management were indexed in the WOS database. The most common keywords are "earning management" which has a strong connection with "corporate governance" and "performance". The USA has made the most remarkable contribution in this important area. Research continues to spread throughout the world. However, some limitations are still inevitable.

Through the bibliometric analysis we have concluded the current situation of this topic and how much has been researched since 1992. This indicates that these practices are by no means recent. This is indicated by the fact that the top most cited articles have published papers on earnings management. The most cited articles can be found in top 10 magazines. A total of 503 papers were published in the first ten active journals, publications from the WOS database. The most cited journal was Journal of Accounting & Economics, with 12,426 citations. Most articles were found in the journal Journal of Corporate Finance with 79 publications.

The literature review has also strengthened the existence of publication, and strong links between the two topics analyzed.

In future studies, we intend to expand our research both on the literature and on the application of existing models in the literature. It is especially important to evaluate the quality of such a large number of research papers and to obtain valuable information.

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*** Law no. 129 / 11.07.2019 for preventing and combating money laundering and terrorist financing, as well as for amending and supplementing some normative acts

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Bibliometric analysis of the performance of the use of European funds and their impact on rural development[1]

Remus Ionuț Ilieș[a] & Sorin Nicolae Borlea[b] & Ioana Lavinia Safta[c]

[a] *PhD. candidate, University of Oradea, Faculty of Economics, Oradea, Romania*
E-mail: ilies_remus@yahoo.com
[b] *Professor PhD. Dr habil, University of Oradea, Faculty of Economics, Oradea, Romania*
E-mail: snborlea@yahoo.com
[c] *Professor PhD. Dr habil., Babes-Bolyai University, Faculty of Economics and Business Administration, Romania*
E-mail: lavinia_s15@yahoo.com , ioana.safta@econ.ubbcluj.ro

Abstract

This paper aims to perform the bibliometric analysis of the literature on European funds. The structural funds are absorbed by the European Union, this absorption presents an opportunity to support economic growth and reduce the development gap, which, in the conditions of the global recession, becomes a new challenge for Romania. Growth, competitiveness, hard work, and improving the environment are the most important benefits of funding. Rural development is the main tool for bridging the gap between rural and urban areas. The implementation of European funds for rural development aims to meet the social, cultural, and economic needs of this environment. The literature has been exploiting this theme since 1900 to the present. The researchers' articles were selected from the international Web of Science database. Following a bibliometric analysis of these articles through the VOSviewer program. The biliometric analysis helps us to have an overview of the topic. With the help of the VOSviewer program we made scientific maps to show the field cooperation between countries, as well as a scientific map of keywords for publications, such as: "rural development", "European funds", "structural funds", "Common Agricultural Policy". The result obtained show that this topic is not even a typical one. The most cited journal is Regional Studies, with 984 citations, followed by Energy Policy. 7745 articles were identified in the WOS database between 1900 and 2021, which included 4895 research articles, 1850 proceedings paper, 116 reviews, 199 100 books, 594 early access. Of these, 4589 were published during the years 2010-2021, and the rest being published between 1975-2021. It is particularly important to evaluate the quality of such a large number of research papers and to obtain valuable information.

Keywords: European Union; European funds, economic growth; rural development

Jel Codes: G41, F42

1. Introduction

European funds have been created on the basis of the development of certain areas and of the country's member states to reach the highest standards in the world. These funds are non-refundable, if they are not reimbursed in the form of a loan and the money does not have to be reimbursed, but the real amount of money you have invested in your land is not the same. The absorption of European funds to develop the economy depends on many factors such as: efficiency of public governance, institutional quality, economic development, or socio-cultural factors (Achim & Borlea, 2015).

There are also structural funds that are specifically intended for less developed regions to recover these development gaps as soon as possible. Most funds are provided in rural areas. The priority sectors are agriculture, forestry, fisheries, and beekeeping. There are also future programs that have three main priorities: smart growth, sustainable growth and inclusive growth.

European funds are those financial instruments created by the European Union, for Romania and not only the private / or public segment, to develop certain areas and support member countries in achieving certain development standards, both economic and social or cultural. Grants are those financial aids that are granted

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without being refunded. There are no loans, no interest is charged for granting them, you do not have to repay even 1 euro.

The Structural Funds are financial instruments, managed by the European Commission, whose purpose is to provide support at the structural level. Financial support from the Structural Funds is intended mainly for less developed regions, in order to strengthen economic and social cohesion in the European Union. The Structural Funds contribute to 3 strategic objectives of the Economic and Social Cohesion Policy of the European Union:

Convergence or reduction of development gaps between regions. States may apply for funding for regions that are not eligible for the convergence objective.

European territorial cooperation. The thematic objective that supports the adaptation and modernization of policies and systems of education, training, and employment.

Structural instruments are financial instruments through which the European Union acts to eliminate economic and social disparities between regions, to achieve economic and social cohesion. For almost 10 years, Romania has been trying to learn the recipe for spending billions of euros that are made available to us annually from the budget of the European Union (EU).

We have a single accredited managing authority for the management of structural funds and cohesion out of the 10 required and only 20 conditionalities met 100% of the 36 required to be completed by October 31, 2017.

In total, since Romania's accession to the EU, in January 2007, and until the end of 2016, the latest official data provided by the European Commission, our country has contributed to the EU budget by 10.6 billion euros and received 33.6 billion euros, ie more than three times more than it contributed. Most of the European financial allocations for Romania represent funds made available for regional development investments, more precisely to those projects that allow us to reduce the development gap compared to other European countries.

The rest of the funds go mainly to agriculture to support Romanian farmers in order to remain competitive and profitable. For example, in 2015, subsidies directly allocated by the EU for agriculture in Romania amounted to 1.45 billion euros, to which were added another 1.5 billion euros for rural development projects.

All these are correct statistical data, which show us, without doubt, the advantages of our membership in the European Union. If we add free movement, access to the single market, and participation in other important European policies, the benefits of membership of the Union are certainly much greater. º

The rest of the paper is organized as follows: The "Literature Review" section analyzes and evaluates existing research. The "Research Methodology" section describes the techniques used, variables, and work data. The "Results and Discussions" section presents and comments on the results obtained. The "Conclusions" section highlights the main conclusions of the paper.

2. Brief review of the literature

We find the concept of rural development all more mentioned today. Although it seems to be a new concept, it has appeared in the literature since the 1980s. It could be defined as the module of maintaining rural areas by diversifying the rural economy, which leads to improved quality of life in rural areas. The objective of rural development would be to avoid the migration of the population from rural to urban areas and at the same time to try to use natural resources in other economic sectors.

The Common Agricultural Policy (CAP) is the EU's response to issues such as food security, sustainable use of natural resources and the balanced development of Europe's rural areas. Its aim is to help ensure a decent standard of living for farmers and agricultural workers in Europe, as well as a stable, varied, and secure food supply for citizens. It also contributes to EU priorities, such as job creation and growth, tackling climate change and encouraging sustainable development. The CAP has three interconnected components through which it contributes to the achievement of these objectives, namely: income support for farmers (so-called "direct payments"), market measures, for example, to counteract a sharp fall in prices, and rural development. (Bleahu, 2005),

Evolution and rural development in the European Union has had a continuous evolution of the rural space through which it has responded to the needs and new challenges that have emerged within the European community. In order to be able to have a continuous rural development and at the optimal parameters, the European Union has created and introduced the Common Agricultural Policy. The concept of the EU's Agricultural Policy (CAP) has

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been mentioned since 1957, in the Treaty of Rome, because the economies of the six states were predominantly agricultural, and food security was a priority both then and today. (Georgescu, 2014).

According to Profiroiu et al. (2008), the creation of the Agricultural Policy was based on the following arguments:

"Agricultural activity cannot be compared with other economic activities. The production in this domain comes from several sectors and depends on climatic influences. The difficulties encountered in trying to balance agricultural production, in collaboration with the constant demand for food, could lead to large price fluctuations within the Union, if it did not take measures to regulate the market. 50% of the EU's population lives in rural areas, which represents 80% of the territory of the community. " (Profiroiu, 2008)

Rural development policy is currently the second pillar of the PAC, and currently plays an essential role in solving the problems facing the "school". Strengthening rural development policy is a priority for the EU, as it seeks to stimulate job creation in rural areas, improve the quality of life in rural areas, and create rewards for sustainable development.

Since the last statement of PAC, in 1957, within the framework of the Treaty of Rome and until now, this policy of the European Union has undergone a series of changes and improvements. During this chapter we will see what was the evolution of this policy and what were the reforms applied to the PAC.

The evolution of the CAP has been a difficult process. Only six years after the entry into force of the CAP in 1968, Commissioner Sicco Mansholt draws attention to the need to introduce radical reforms. The commissioner's report drew attention to the rising costs of the common agricultural policy and overproduction. The Mansholt plan contained a set of proposals that should have changed the form of the CAP by 1980. The plan suggested an increase in the size of farms, their specialization, their modernization and the withdrawal of 5 million hectares of agricultural land for afforestation and recreational purposes, as well as a reduction in the number of people employed in EU agriculture (6) from 10 million. in 1968 to 5 million in 1980. This would have been achieved through a system of early retirement of older farmers and the retraining of others.

However, this reform was rejected by the Member States at the time, as it was considered far too radical. Despite the rejection of the Mansholt plan, the European Commission continued its aspirations to reform the CAP. These attempts, although on a less ambitious scale, were incorporated into various works in the period 1973-1985, which were much more analytical than the initial reform.

A good opportunity to change the CAP was immediately after the first wave of accession, in 1973, when the United Kingdom, Denmark and Ireland joined. In addition, enlargement has made the EU a major player in the world market for agricultural products. However, the CAP has remained virtually unchanged. As a result, self-sufficiency for most agricultural products led to a doubling of CAP expenditure between 1975 and 1985. Throughout the 1980s, the CAP was in a constant crisis. This was due not only to the growing surplus of all important agricultural products, but also to the rapid increase in expenditure. Aware of this problem, the EU implemented various measures in that decade, but these have only a very limited impact on mitigating the major problems of the CAP (costs and surpluses). The measures included coresponsibility fees. These taxes have been applied since the beginning of the CAP to sugar production. The purpose of these taxes was to make sugar producers bear part of the CAP's expenditure on this commodity, as well as to reduce sugar production. In practice, the burden of tax has shifted to consumers. Guaranteed threshold prices for cereals reduced support prices for the following year if production exceeded the agreed level. However, pre-production quotas were set at a relatively high level, so their real impact was quite limited. The experience with milk market shares was similar.

The MacSharry Plan (proposed by Commissioner Raymond Mac Sharry) in 1992 was the first real reform of the CAP. The changes were not as profound as some economists would have liked.

In essence, the MacSharry Reform proposed: "lowering the guaranteed price of agricultural goods, as the main instrument against overproduction and in favor of expanding the domestic market; the establishment of the land rest period in favor of the adjustment of cultivated areas and agricultural production capacities according to market demand; however, this is linked to a new system of specific aid, those to compensate for the consequences of falling prices on farmers' incomes; to these measures of economic-financial principle were added others aimed at rural development, with an emphasis on environmental protection."(Liviu, 2009)

In Jovanovic Miroslav's view, the MacSharry reform had to bring at least two types of gain to the EU budget. Firstly, a reduction in prices would reduce the incentives for overproduction, and secondly, a reduction in prices would eliminate part of the tax that is paid by consumers. The problem with this reform was that it benefited

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farmers who had below average yields, while those farmers who practiced efficient agriculture were discouraged. In fact, the reform sanctioned large and efficient farmers (Miroslav,2015). The reform was presented by the EU as an exclusively domestic matter. This was, however, a great concession granted by the Uruguay Round partners. Following extensive negotiations, the MacSharry reform was sufficient to achieve the Uruguay Round. Some of the negotiating partners, such as Japan, considered that the reform went too far, while others, such as the Cairns Group, considered that it offered too little.

The role of Agenda 2000 was also to contribute to the reform of the EU and at the same time to prepare it for enlargement to the east in 2004. Agenda 2000 refers to the European model that should be adopted for the 21st century. It covers the following three dimensions:

Economic: Agriculture needs to be competitive, and gradually it needs to be able to cope with global competition without excessive subsidies. The market balance needs to be improved.

Social: The farming community must have a stable income and a reasonable standard of living. This social dimension must provide a diversification of sources of income for households.

Environment: The production should be environmentally friendly (ecological). Agricultural products should be of high quality, safe, and to the taste of consumers (Miroslav, 2015).

In all EU countries, rural development is an economic, social and environmental priority. It is also present in non-EU countries, but this has not been an impediment to making rural development an economic and social priority. The importance of rural development in all countries of the world is reflected in terms of space and demographics, the extent and occupation of rural areas being significant in most countries of the world. Lately, rural development has been a strategy that has been based on preserving the heritage of the rural area and, at the same time, a development of it that aligns with world norms and that ensures a standard of living at high standards. qualitative and quantitative view (Alecu et al. 2011).

Financing Romania's rural development in the period 2014-2020

The National Rural Development Program 2014-2020 covers the entire territory of Romania. Romania is located in the South-Eastern part of Europe, at the intersection with the main North-South and East-West communication axes. The surface is of 238,391 km2 and includes: 61.3% agricultural land (approx. 14.6 million ha, of which 64.2% arable land, 32.9% natural pastures and hayfields and 2.7% tree plantations and life); 28.3% forests and other lands with forest vegetation; 10.4% of the built area of localities, waters, roads, railways and unproductive land.(Figure 1)
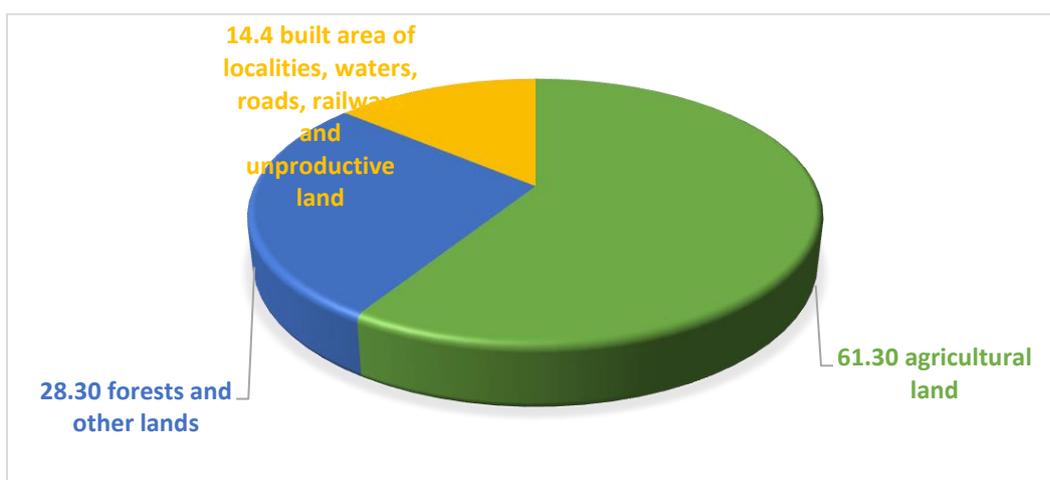
Figure 1. Distribution of agricultural areas by types of land

Source: authors' processing using Excel

In terms of its size, Romania is an average country in the EU 27 (5.41% of the EU 27 area). The Romanian territory includes 5 bio-geographical regions (steppe, Pontic, Pannonian, continental and alpine) out of the 11 of Europe.

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Of the total area of the country, about 87.1% represent the rural area (as defined in national legislation) consisting of communes, as territorial administrative units together with the component villages, and on this territory lived 45.0% of Romania's population in 2012.

The distribution by geographical areas is balanced: 33% the plain area (up to 300 m altitude), 37% the hilly area (300-1000 m) and 30% the mountain area (over 1000 m altitude).

Agriculture was one of the branches of the economy that directly benefited from the development, this being supported by the European Agricultural Fund for Rural Development (EAFRD). Thus, by allocating these funds for the period 2014-2020 for agriculture and rural development, it was taken into account that following the implementation of the projects, Member States should benefit from a significant rural development, which will have a positive impact from a social and economic point of view.

With a total budget of EUR 454 billion for the period 2014-2020, the European Structural and Investment Funds (ESI Funds) are the European Union's main investment policy instrument. The European Structural and Investment Funds (ESI Funds) are:

European Regional Development Fund (ERDF)

European Social Fund (ESF)

Cohesion Fund (CF)

European Agricultural Fund for Rural Development (EAFRD)

European Fisheries and Maritime Fund (EMFF)

Romania benefits in the period 2014-2020 from a financial allocation of EUR 30.84 billion from ESI funds. adding the national contribution of EUR 5.63 billion, Romania has a total budget of EUR 36.47 billion for investments in various fields. ESI funds are allocated as follows: EUR 10.73 billion through the ERDF; EUR 8.13 billion through the EAFRD; EUR 6.93 billion through CF; EUR 4.77 billion through the ESF;EUR 168 million through FEPAM;EUR 106 million through YEI

Figure 2. Fund categories

Source: Guide "European Structural and Investment Funds 2014-2020: official texts and comments" - November 2015 (published by the European Commission)

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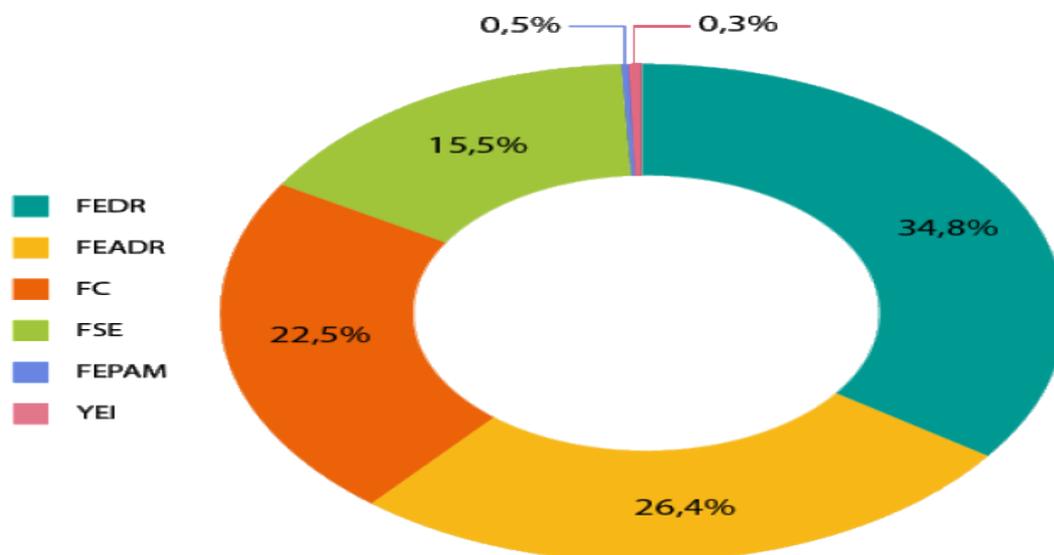19-20 May 2021, HCC. St. Moritz Hotel, Barcelona, Spain

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3. Bibliometric analysis, methods

In carrying out this part, the focus is on existing research both nationally and internationally, conducted by specialists. In this paper, through the bibliometric analysis on this topic, we sleep to add value to the specialized literature. Starting from the bibliometric analysis, we will move on to the detailed analysis of the specialized literature. At the same time, the information provided reveals a way in which we can visualize the results as clearly as possible in the form of scientific maps. Through this analysis, we test the quantitative aspects of the information. The literature on European funds published in the period 1900-2021 was selected from the Web of Science database. This analysis is based on data extracted from publications, bibliographic references, citations and authors, through this information we have the opportunity to examine the historical developments between individual scientific fields and the discovery of relationships between disciplines.

Bibliometric analysis allows us to select information from a quantitative point of view, using mathematical methods and descriptive statistical methods to obtain results. The source of information for bibliometric analysis is records found in databases such as the Web of Science, which is an online database that provides access to the following citation indexes: Extended Science Citation Index (SCI-E); Social Science Citation Index (SSCI).

Our contribution focuses on the descriptive statistics used. The presentation of the statistical methods used in the bibliometric analysis will be presented with the help of bibliometric maps. The search terms used to identify the nearest publication included keywords such as "European funds" on the Web of Science platform, the period analyzed being 1900-2021, for documents that meet the requirements of the year of publication, language, journal, title, author, affiliation, keywords, document type, abstract and number of citations that were exported in txt format. The query for the database was 01.03.2021.

4. Results

Bibliometric analysis of publication output

On the chosen topic, we identified 7745 articles in the WOS database between 1900 and 2021, which included 4895 research articles, 1850 proceedings papers, 116 reviews, 199 100 books, 594 early access. Of these, 4589 were published during the years 2010-2021, and the rest being published between 1975-2021. Almost all publications were written in English (5698), followed by 150 publications in Chinese, the rest in other languages.

Bibliometric analysis of the keywords

The keywords provided by the authors of the paper and which appeared more than 10 times in the basic WOS database were entered in the final analysis. Of the 50,000 keywords, 1658 reached the threshold. The most common keywords were "European funds" (total link strength 2,649) which were strongly linked to "structural funds", "performance" and "innovation". (Figure 3)

A word cloud was also created to show the frequency of keywords that appeared more than 15 times. It was indicated that "European funds" was most often followed by "structural funds", "governance" (Figure 4)

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Figure 3. Keyword map

Source: authors' processing using Vosviewer

Bibliometric analysis of keywords from "European funds" publications. Co-occurrence of keywords. The size of the nodes indicates the frequency of occurrence. The curves between the nodes represent their co-appearance in the same publication. The smaller the distance between two nodes, the greater the number of co-occurrences of the two keywords.

As we can see in Figure 4, there is a growing interest in the literature, related to the development of rolls and policies for the allocation of funds allocated to this sector.

One can see a very strong link between the words rural development and agriculture. The size and color of the bushes identify us how strong the connection is, and the distance between the dots suggests the connections between various words that are directly related to rural development.

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Figure 4. Bibliometric map of keywords related to rural development

Source: authors' processing using Vosviewer

Figure 5. Keyword cloud

Source: author processing using WordCloud

Word Cloud 256 keywords were entered that appeared over 15 times. Font size is the frequency of occurrence. Keywords such as "structural funds" and "governance" were identified and other words related to the topic studied but are rarer than those mentioned above.

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Bibliometric analysis of the citations and publications

Many journals have published papers with European funds and 14 of them have published more than 5 articles. The most cited journal was Regional Studies, with 984 citations, followed by Energy Policy (Figure 6 and 7)
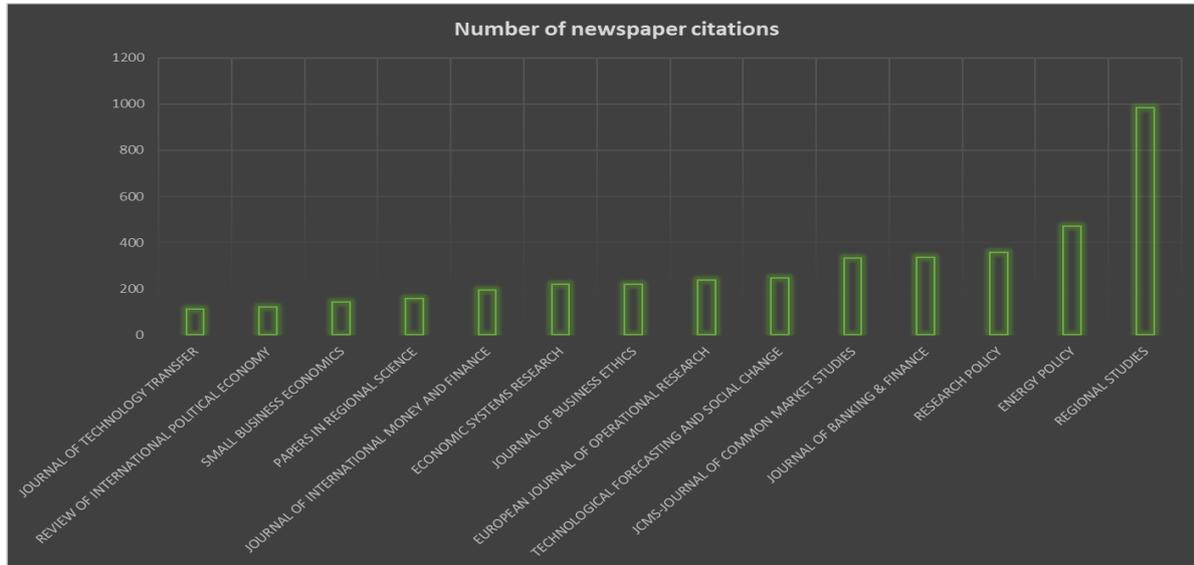

Figure 6. The most important 14 active journals using the topic European funds
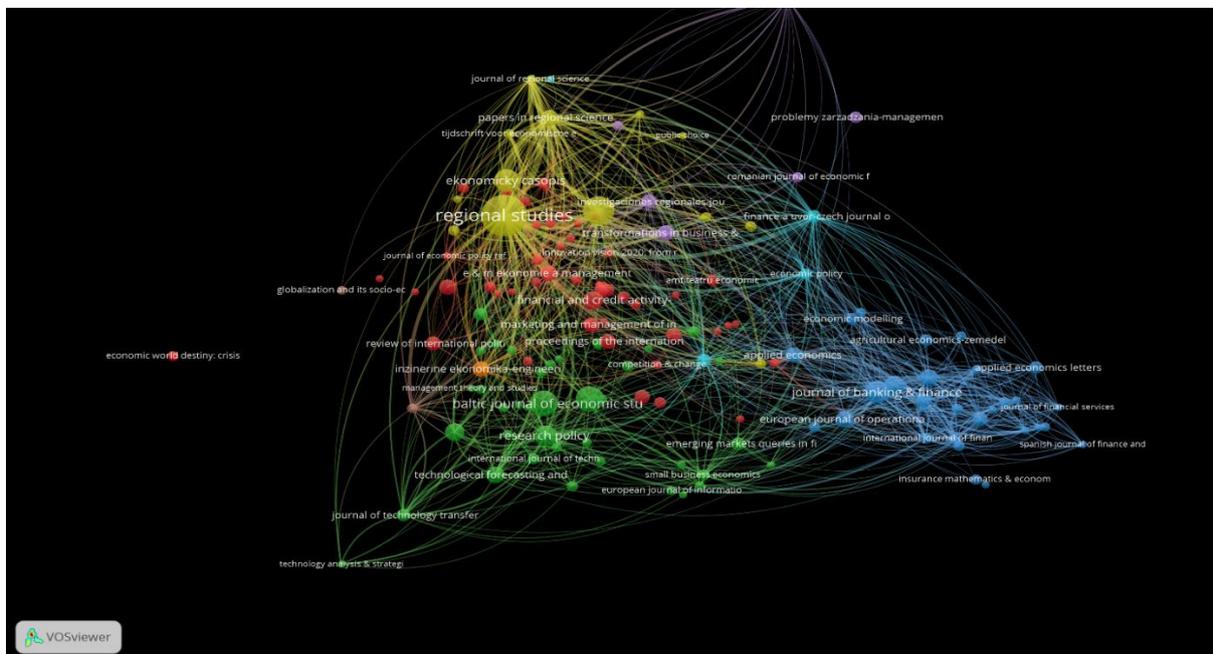
Source: authors' processing

Figure 7. Map of citation journals

Source: authors' processing through the VOSviewer program

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Figure 8. The countries where works with European funds were most frequently published

Source: authors' processing using Vosviewer

The size of the nodes indicates the frequency of occurrence. The curves between the nodes represent their co-appearance in the same publication. The smaller the distance between two nodes, the greater the number of co-occurrences of the two keywords.

5. Conclusion

European funds are those tool financial institutions created by the European Union, for Romania (and not only), Romania is not the only European state that benefits from these instruments, segments and / or with the aim of developing certain areas and supporting member countries in achieving certain standards of development, both economical and cultural. Most of the European financial allocations for Romania represent funds made available for investments in regional development, but it is important to make sure that it does not end up with a lack of development compared to other countries.

Rural development is the main tool for reducing the gaps between rural and urban areas. The implementation of European funds for rural development aims to meet the social, cultural, and economic needs of this environment. A first step in implementing a correct rural development and having an immediate impact was the establishment of the Common Agricultural Policy, which aimed at the following aspects related to the rural environment: increasing agricultural productivity by promoting technical progress and ensuring the optimal use of production factors, in especially the workforce; ensuring a fair standard of living for the agricultural population; stabilization of agricultural markets; ensuring security of supply; ensuring reasonable prices for consumers. The Common Agricultural Policy has undergone several changes over time, a first change being identified by the implementation of Agenda 2000, and then, in 2003, under the CAP, rural development has become a mainstay aimed at sustainable development agricultural. Romania benefits in the period 2014-2020 from a financial allocation of EUR 30.84 billion from ESI funds. adding the national contribution of EUR 5.63 billion, Romania has a total budget of EUR 36.47 billion for investments in various fields.

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Through bibliometric analysis we can see an increased interest in the study of this topic. Bibliometric analysis of keywords from "European funds" publications. Co-occurrence of keywords. The size of the nodes indicates the frequency of occurrence. The curves between the nodes represent their co-appearance in the same publication. The smaller the distance between two nodes, the greater the number of co-occurrences of the two keywords.

In future studies, we intend to expand our research both on the literature and on the application of existing models in the literature. It is especially important to evaluate the quality of such a large number of research papers and to obtain valuable information.

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Directions of the development of youth innovative start-ups in Belarus

Venelin Terziev[a] & Viladimir Klimuk[b]

[a] *University of Rousse, Rousse, Bulgaria & Kaneff University Hospital, Rousse, Bulgaria*
E-mail: vkterziev@gmail.com
[b] *Baranavichy State University, Baranovichi, Republic of Belarus*
E-mail: klimuk-vv@yandex.ru

Abstract

This article defines the importance of application of the cooperative resource model in the process of innovation implementation. It provides an algorithm for the development of innovative start-ups. The research describes the basic techniques for innovative ideas generation, basic models for innovation project development: Osterwalder business model, logical framework approach, as well as the "envelope" model designed by Klimuk V.V..

Keywords: start-up development, innovation, osterwalder business model

Jel Codes: P00, I20

1. Introduction

The development of innovation potential enables to increase the country`s competitiveness on global markets, creates currency flows, creates conditions for the modernization of economic and social sectors. Special attention should be paid to the development of potential of young people, who constitute an initiative and creative group of the society. The generated ideas, developed in consideration with technical and economic component, financed by investors, approved in real conditions, are transformed into start-ups, with an emphasis on innovation.

2. Directions of the development of youth innovative start-ups in Belarus

By copying the already existing business models in the region aimed at implementing certain economic activities (those that need minimum capital and ensure maximum profit), not classified as innovative, increase the competitiveness, but also distract from creating innovations. On the other hand, strong competition leads to the search of new technologies, improvement of products (works, services) in order to survive on the market and make an economic and social influence. New start-ups create new additional workplaces, which in turn increases the average wage rate, expanding nomenclature and range of innovative products (works, services) in the country (region) offered to buyers, develops export potential by attracting foreign customers, modernizes material and technological, social, financial and economic infrastructure. Therefore, in order for a new business to be competitive, it is vital to offer a unique product, an innovative approach, original solutions, which would make a newly created start-up more attractive and recognizable. For this reason, young people are the key to achieving this objective, taking into account their new way of thinking, lack of the fear of novelty, creative approach to solving the problems.

To implement the initiatives of its entrepreneurs, including the young people, the Republic of Belarus creates necessary conditions in terms of financial incentives, communication infrastructure and organizational matters. Thus, in the international "Doing Business" ranking (2021a) 2020 the Republic of Belarus ranked 49th with the result of 74,3 points (in 2019 - 74,4 points). To compare, Bulgaria ranked 72nd (71,8 points), Russia – 78,2 (77,4 points), China – 77,9 (74 points), Germany – 79,7 (79,3 points) (Fig. 1) (2021a).

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Figure 1. Measures of business regulations in the Republic of Belarus in 2020 by main indicators

Source: Authors

Since 2015, a number of micro-organizations, small and medium sized organizations in the Republic of Belarus began to grow: from 107441 in 2015 to 110777 in 2019, which is due to the development of state measures to stimulate the population to start their own business (Table 1) (Regions of the Republic of Belarus, 2020).

Table 1. Cases of particular public interest of Bulgaria's Public Prosecution Office

	2013	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
Republic of Belarus	111112	114208	107441	107382	109971	111214	110777
Brest region	11192	11086	10620	10432	10612	10720	10437
Vitebsk region	10067	10065	9058	8878	8717	8829	8838
Gomel region	10332	10470	10195	9860	9912	10000	9948
Grodno region	8936	8966	8467	8409	8483	8397	8364
Minsk city	40402	42547	40218	40709	42808	43853	43610
Minsk region	20884	21631	20220	20476	20891	20684	20922
Mogilev region	9299	9443	8663	8618	8548	8731	8658

Source: Authors

From 2014 to 2019 the micro-organizations, small and medium sized organizations of the Republic of Belarus marked a 14% average annual growth in the volume of production (Regions of the Republic of Belarus, 2020).

In the period from 2013 to 2019 the micro-organizations, small and medium sized organizations of the Republic of Belarus increased their volume of export, which is due to the diversification of the international trading and economic relations, the competitiveness of goods (in terms of their price, quality and uniqueness).

For the development of the start-up movement in the country, the Minister for economic affairs of the Republic of Belarus each year accepts a plan for holding start-up events with a monthly breakdown (since 2021 such plans are developed separately by each region).

The Republic of Belarus, like any other developing country, pays special attention to the development of an effective and dynamic innovation infrastructure that creates favourable conditions for innovation start-ups, introducing the country on a global scale, increasing export potential, solving employment-related issues and increasing wages. This approach is particularly relevant for initiative young people. In order to define main factors that influence stimulation of youth entrepreneurship, problematic issues in this field and necessary incentives, an

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international survey for young people was prepared with the help of "Google forms", named "Factors influencing youth entrepreneurship development" (2021b).

The following are some of the questions that were included in the survey (Terziev and Klimuk, 2021c; 2021d; 2021e; 2021f):

- Do you wish to start your own business?

- Is the planned business directly related to your profession?

- In which area do you plan to start your business?

- What type of activity does your planned business correspond to?

- What reasons (motives) influenced your decision to start your own business?

- Does (did) your programme of study in university include courses related to entrepreneurship?

- What knowledge (skills, competences) about starting and running your own business, on your opinion, is insufficient in your educational institution (in order to add them to the curriculum)?

- Do you have an experience of running your own business?

- What average monthly income do you think is optimal for your business?

- What issues did you face at the stage of opening and in the process of running your business (if you have such experience)?

- What motivation for starting your own business describes you the best?

The results of the international survey for young people showed that:

- 79,6% of the respondents wish to start their own business (answers "yes" and "rather yes");

- for 59,2% of the respondents the planned business is not related to their main profession;

- the priority areas for running business are trade (38,8%) and information technology (18,4%);

- as the most popular types of activities they chose advertising and information services (24,5%) and software development (16,3%);

- the major motivations for starting own business are insufficient income, insufficient knowledge and the inability to implement one`s initiative at the main place of work;

- young people do not receive enough knowledge of entrepreneurship in their educational institutions (49% of the respondents answered that their curriculum does not (did not) include courses that provide relevant knowledge and 32,7% of the respondents answered that they had only 1-2 such courses);

- 61,2% of the respondents shared that programmes of study lack activities to develop practical entrepreneurial skills, 57,1% of the respondents do not have appropriate knowledge (skills) to promote products (services), which is supported by their choice about the need to update the curriculum and introduce more courses that would develop such skills;

- for the young people who have already tried themselves as entrepreneurs the main issues while starting and then running own business included the lack of knowledge about the procedures for starting a business (30,6%), the availability of similar products on the market (30,6%), insufficient investments (28,6%);

- as the main motivations for starting their own business the respondents pointed out income growth (financial independence) (maximum score of 5) and implementation of their own innovative ideas (maximum score of 5); collaboration with creative teams and willingness to try something new (average score); improvement of the well-being of their region (minimum score);

- as the most valuable qualities in people the respondents defined responsibility (8,2% of the respondents) and hard work (6,1% of the respondents).

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These results allow adapting financial incentives and organizational and administrative mechanisms in order to stimulate youth entrepreneurship, which includes the following processes:

- Adjusting state (regional) programmes for the development of entrepreneurship, small and medium-sized enterprises (subsidy procedure, grant programmes, venture capital financing, taxation and other preferences);

- Adapting educational programmes to modern needs of young people and market requirements;

- Attracting representatives of the real sector of the economy and business to educational process, practical training of future entrepreneurs, approving in real conditions the developed business models for the implementation of youth initiatives.

Interpretation of the research results enables us to develop a number of practical recommendations (Fig. 2).
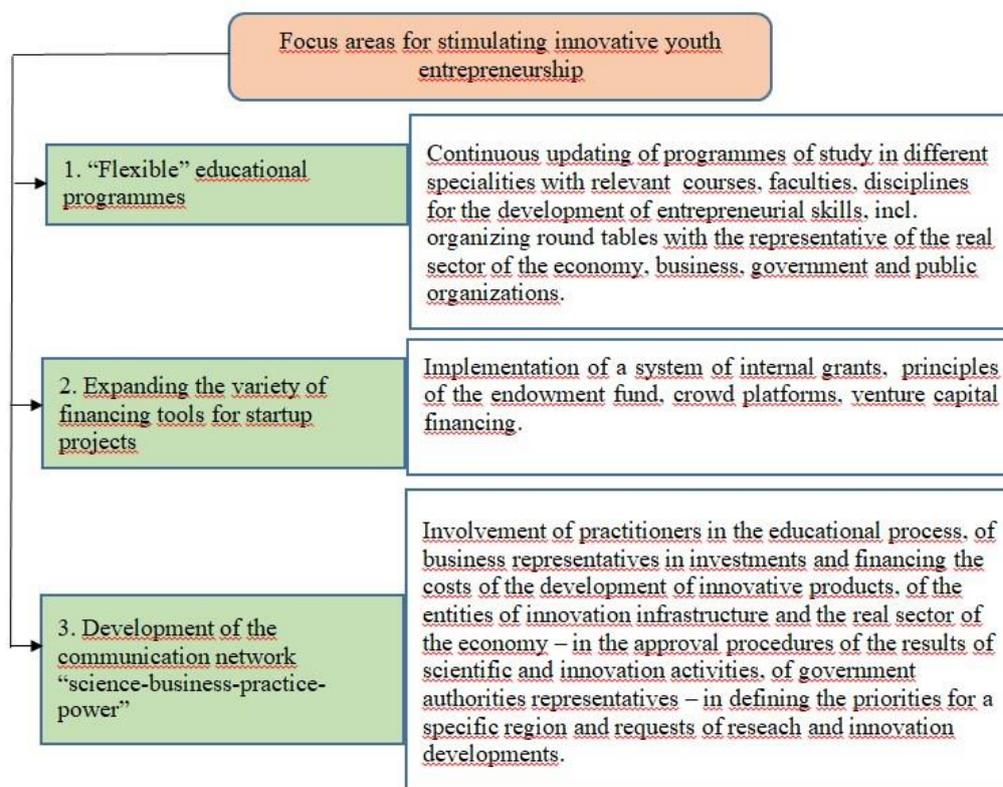
Figure 2. Focus areas for stimulating innovative youth entrepreneurship

Source: Author

3. Conclusion

The following are suggested as focus areas for stimulating innovative youth entrepreneurship:

To include in university programmes of study the disciplines that would help compensate for the insufficient knowledge of young people in the field of entrepreneurship. Such educational courses can include "Fundamentals of Entrepreneurship", "Start-up design", "Project management", "Business planning", "Creative management", etc.

To involve practitioners from the real sector of the economy and business representatives (mentors) to provide practical examples and teach young people based on their own experience. For example, part-time jobs,

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commercial agreements, guest lectures, interdisciplinary subjects, mentoring sessions, project and analytical platforms, etc.

To solve the issue of insufficient financial resources it is suggested to use a system of internal grants (education grants to initiate student start-ups, provided by state or private organizations), venture capital funding, certain funding opportunities for innovative youth start-up projects from the republican and local funds under favourable conditions, to use crowdfunding algorithms as an alternative funding of youth initiatives.

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Credit risk management in small and medium interprises

Sabina Mammadova[a]

[a] Ph.D candidate in Organization and Management of Enterprises, Azerbaijan State University of Oil and Industry, Baku, Azerbaijan
E-mail: sabinagluckl@yahoo.com

Abstract

The modern enterprise faces a variety of risks on a daily basis. The risks of such situations pose a threat to the business, can lead to a shortfall in profit, interfere with the implementation of plans, and also threaten the very existence of the company. To maintain stability in business, a well-built risk analysis and management system is required. The main goal of creating such a system is to improve work efficiency, maximize income and reduce the level of possible losses. In order to correctly build the work of this system, it is important, first of all, to understand what risk is and what it is fraught with. The article analyzes in detail the methodological aspects formation of a risk management system at the enterprise based on the specifics of small business. Stages of risk management structure are considered. The article identifies two groups of modern methodological approaches to assessing the credit risk management system for small and medium-sized enterprises. Their comparative analysis is carried out. The position on the strengths and weaknesses of the existing methodological approaches is proposed.

Keywords: credit risks, small and medium enterprises, methodological approach, credit risk management

Jel Codes: G32, M21

1. Introduction

In modern economic conditions, successful risk management, especially of small and medium-sized enterprises, cannot be carried out without an objective assessment of risk parameters, the likelihood of its implementation and financial consequences. Risk parameter assessment is an integral part of the concept and subsequent policy used for parameter assessment and risk management. The risk assessment procedure includes a set of interrelated regulatory and organizational measures. In the course of their implementation, the nature of the risk is analyzed, its parameters are assessed, and in subsequent actions to minimize the risk, an operational assessment of the effectiveness of the measures taken is carried out in order to continuously improve the risk management system. Regulatory measures provide for the development of documents regulating risk management processes. Methods for assessing risk parameters and the reliability of the information used in this case, as well as risk management procedures can act as such internal regulatory documents. The risk management procedures include the assessment of the results of the work done and the adoption of management decisions. These documents also regulate the order of interaction between divisions in the process of collecting, systematizing and analyzing information, which forms the composition and structure of organizational activities. The successful implementation of the risk management process depends on the effectiveness of the methodology for assessing risk parameters, the manufacturability of the procedure for its application, as well as the procedure for collecting information necessary for such an assessment, its reliability and representativeness. Such an approach to the risk assessment procedure guarantees that the collected information will be reliable, its volume is sufficient for assessing the risk parameters, and the methodology used is adequate for the task at hand.

The results obtained will form the basis of management decisions in the process of enterprise functioning. As a result, the risk assessment procedure should naturally integrate into the overall risk management system. Thus, the company must adapt the constituent elements of the risk assessment system for its own needs, taking into account the specifics of the business. If the enterprise already has a risk management practice, then the experience of its application should be analyzed to assess the feasibility of its modification and the development of the most effective ways of its further implementation. Risk assessment is understood as the process of risk identification, its analysis and determination of the values of the parameters characterizing it. In order for the risk assessment procedure to provide a reliable result and to be practically feasible, the assessment process must be carried out in accordance with certain rules. For small businesses, one of the basic rules is the principle of low cost of the cost of implementing this procedure. In addition, this procedure should be easy and technologically advanced to implement. Therefore, the assessment of risk parameters should be carried out consistently with other business processes, i.e. the process of assessing the parameters of risks should be an integral part of the set of organizational

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processes for the functioning of the enterprise. Correctly and timely performed risk assessment will allow the CEO of the enterprise to make the right choice, prioritize and identify alternative options for actions in the process of carrying out his business activities. It should be borne in mind that the risk itself and its parameters, such as the probability of occurrence and financial consequences, are random values. Therefore, the assessment of risk parameters should reflect this uncertainty. To reduce the subjectivity of assessments of risk parameters, it is necessary that the information on the basis of which the assessment of these values is made is reliable.

2. Literature Review

For enterprises, the greatest danger is posed by risks. The risks are varied; they are all very significant and have a strong impact on enterprises, often "undermining" them. (Kachalov, 2017) Thus, the study of risks is a very important aspect of the enterprise, because all risks need to be prevented for the normal functioning of the organization. To understand risks and their management in an enterprise, one should look at their origins and consider the different concepts associated with risk management.

The definition of "risk" arose back in the 30s of the 18th century. The study of risk is rooted in mathematical theory. In 1738, an article by the 18th century mathematician D. Bernoulli titled "Presentation of a New Theory of Risk Measurement" appeared in Izvestia of the Imperial St. Petersburg Academy of Sciences. In his article, Bernoulli first of all drew attention to the psychological aspect that pushes people to a rash act, that is, to risk. According to D. Bernoulli, such an incentive to risk taking is the result. People are attracted to the outcome of the outcome of events, and they pay absolutely no attention to the ways to achieve this very outcome. Thus, Bernoulli supplemented the theory of probability with the method of utility. So, D. Bernoulli is rightfully the father of the theory of risk. (Dodge, 1992)

Further development of the concept of "risk" received according to two theories: classical and neoclassical. In classical political economy, the following representatives should be distinguished: D. Mill and N. Senior. In their works, they considered the phenomenon of profit exclusively in terms of risk. Mill and Senior identified risk with the expected loss that might occur as a result of their chosen decision. This interpretation of risk is one-sided. It led to the development of another theory, which was called neoclassical. The neoclassical theory arose in the 50-90s XX century in England and France. Its representatives are scientists Knight, Marshall (England) and Pigou (France). The theory is based on the understanding that an entrepreneur works in conditions of uncertainty, that is, in conditions of risk, and, therefore, the profit received as a result of the entrepreneur's activities is perceived as his random bonus. Thus, according to the neoclassical theory of risk, "with the same amount of potential profit, the entrepreneur chooses the option associated with a lower level of risk." (Badalova, Panteleev 2016)

Currently, no theory is used in its original interpretation. But the neoclassical theory of risk received the greatest recognition, but supplemented by the provisions introduced by Keynes, who:

1) for the first time systematized the previously existing theories of risk and gave a detailed classification of entrepreneurial risks;

2) supplemented the neoclassical theory with the "satisfaction" factor, which is that an entrepreneur, in anticipation of greater profits, is likely to take a big risk.

Risks appeared at the same time when enterprises appeared, and, therefore, their management became one of the important tasks of the enterprise. In other words, various concepts of risk management were developed for the normal functioning of the enterprise.

One of the most important and frequently used concepts of risk management in an enterprise is the concept of risk controlling. This concept was first heard in the 1980s. The basic principle of this concept is as follows: operational comparison of planned normative indicators with actual indicators and identification of possible deviations between them, as well as determining the relationship of these deviations in order to influence the key factors of stabilization of the enterprise. It should also be noted that risk controlling is divided into two narrower areas: risk analysis and risk planning. Risk analysis is a narrowly focused concept that performs one of the most significant tasks - it is risk analysis in the enterprise. Risk analysis can look at individual departments in an enterprise and analyze them, or it can perform an analysis as a whole for the enterprise. As for the concept of risk planning, then within the framework of this concept, the task of developing and planning concepts that will contribute to the complete elimination or minimization of risks in the enterprise is carried out. Risk planning is the second concept of risks; risk planning is the concept of eliminating risks in an enterprise. (Kachalov, 2017)

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Thus, the understanding of what risk is and how it affects the activities of an enterprise, namely its profits, appeared back in the 30s of the 18th century, and risk management, control over them arose only in the 20th century, when people, the owners of the enterprises have come to understand that the risks directly affect the activities of the enterprise, and, therefore, they must be constantly monitored in order for the enterprise to carry out its activities and at the same time not lose significant losses.

The practice of assessing risk parameters allows the use of various information resources, including historical data, experience, information received from stakeholders, observations, forecasts and experts' statements. Assessing the quality of the information provided by these resources should be the subject of independent research.

As for the methods for assessing risk parameters, they should be adequate to the changing conditions of doing business, the peculiarities of the functioning of the enterprise and the nature of the assessed risk, and the technology itself for their implementation is simple and affordable. The algorithm for obtaining the results should make it possible to clearly define the limitations of the method used and the area of applicability of the results obtained.

The next principle of organizing the assessment of risk parameters provides for the application of the rule for assessing the influence of both external and internal factors on the results of the operation of an enterprise, which determine the nature of its business processes.

External factors should be understood as the environment in which the enterprise operates as an economic entity. This environment is characterized by various aspects, the most important of which for small businesses is the legal environment for the functioning of the business, which also includes the practice of law enforcement and the availability of financial and investment resources. Moreover, the second factor can be decisive for the viability of small businesses.

3. Data and Methodology

Risk analysis - procedures for identifying factors that negatively affect the activities of the enterprise, the likelihood of certain undesirable events occurring and how they will affect the activities of the enterprise. Risk assessment is the determination of the magnitude or degree of risks in a quantitative or qualitative way.

Risk is an integral aspect of every business. All organizations are subject to them, only the degree of influence of risks is different. In other words, the activities of enterprises are directly associated with the likelihood of certain threats, in the form of risks. Risk assessment is an essential component of the overall risk management system. It is the process of quantifying or qualitatively determining the degree of risk. The main task of the qualitative analysis, in addition to identifying possible types of risks, is also the definition and description of the causes and factors affecting the level of this type of risk. (Soboleva, 2015)

The following methods of qualitative risk analysis are distinguished:

a) The method of expert assessments;

b) Method of rating estimates;

c) Risk source checklists;

d) Method of analogies.

 The method of expert assessments is the conclusion of an expert who has the skills of an analyst, capable of comprehensively assessing and analyzing a particular type of risk. (Penyugalova et. al. 2015)

The following main methods of expert assessments used for risk analysis can be distinguished:

- SWOT analysis;

- rose and spiral of risks;

- Delphi method.

 The second method can be distinguished: the method of rating estimates. It consists in the following: qualified specialists give their rating to this or that enterprise. If specialists are involved for this, then this method is considered a kind of expert assessment method. One of the simplest forms of ranking is ranking. In this method, they resort to a rating system in points, which are often given from 1 to 5, but points consisting of 10 points and

sometimes even 100 points can also be given. The ranking scale is chosen independently by each specialist, for example, in accordance with the industry of the enterprise. The expert assigns each risk a certain score depending on its impact on the enterprise. (Penyugalova et. al. 2015)

Risk source checklists are a method that uses historical information. Within the framework of this method, past incidents, risk factors, losses that they caused are analyzed. The list of risk sources is constantly replenishing and growing, as each operation is entered into this list, therefore, there is a continuous addition, thus helping to present a complete picture of the impact of risks on the enterprise throughout its entire activity. But there is also a negative side of this method, namely, some of the negative events may not be included in the checklist and, accordingly, they will not be taken into account in the future, which means that the picture based on these lists will be incomplete, and therefore unreliable. This method helps the company to analyze the mistakes of the past and not repeat them again.

The next method is the analogy method. The essence of the method of analogies is to find similar phenomena, objects, systems and their comparative analysis. That is, all available data are analyzed regarding the implementation of similar projects or transactions by the firm in the past in order to calculate the probabilities of losses. The analogy method is most used in the risk assessment of frequently recurring projects. At the same time, it should be noted that in new projects or transactions this method will not be fully applied, since the method is directly based on the analysis of data from more than one period. (Penyugalova et. al. 2015)

Initially, there were 3 approaches to risk management: fragmented, episodic, limited. But modern models are based on an active professional position that takes an integrated, continuous and expanded approach. They are now used in combination.

Table 1. Approaches to risk management

Outdated approaches	New approaches
Fragmented risk management: each department of the enterprise independently manages risks in accordance with its functions (finance department)	Integrated, unified risk management: risk management is coordinated by senior management; each employee of the enterprise considers risk management as part of their work.
Occasional risk management: Risk management is carried out when managers deem it necessary.	Continuous risk management: the risk management process is continuous in the implementation of any decisions
Limited risk management: concerns primarily insured and financial risks.	Advanced risk management: all risks and opportunities of their organization are considered.

Source: compiled by the author based on data from sources

The risk management strategy is formed by the heads of the enterprise. There are two main task to be implemented by the management. (Akhtulov, 2016)

1. Save the base capital (shareholder value) of the enterprise.

2. Create additional capital (new shareholder value) of the company.

As for the methods of risk management, they are quite diverse, experts identify the following methods: avoidance, retention, sharing, transferring, loss prevention and reduction. (Badalova, Panteleev 2016) The choice of a risk management method depends on which concept of "fight" is chosen by this or that enterprise.

Risks are increasing, so there is a need to improve their management methods, as well as the introduction of new methods that help prevent risks at the enterprise: analysis and assessment of risk management of SME and analysis and assessment of risks at the enterprise. Risk assessment is a process of analyzing identified risks and their consequences in order to ensure their further management, including elimination or minimization, and the implementation of the necessary control procedures. Formalized procedures for identifying and assessing risks make it possible to obtain comparable results of risk assessment to prioritize efforts to manage them and implement the necessary control procedures. (Sarkisova, 2017) As noted earlier, any enterprise is subject to risks, both

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external and internal. For the enterprise, risk assessment and management is one of the priority tasks, since there are many different risks.

At present, the situation in the sphere of small business lending is rather complicated. Commercial banks do not want to search for projects in need of investment, as this requires financial and time costs in carrying out operations for their processing. The representatives of the banking sector also consider a high level of credit risks as an obstacle, which is explained by the fact that there is no guarantee of full responsibility of a small enterprise for its obligations. There are a number of problems associated with insufficient elaboration of investment projects due to the low level of knowledge of the employees of a small enterprise, due to the high cost of services for the preparation of projects for investment. (Kupriyanova, Sokolinskaya, 2011) The active and diversified development of lending is hindered by a number of risks common to all types of lending and special ones that operate only in the field of loans to small businesses, which can be grouped into the following groups: General risks of lending to businesses:

1. Risk of insufficient resources. Banks do not have a sufficient resource base for issuing long-term loans to small enterprises; therefore banks are limited to short-term lending to replenish the working capital of enterprises.

 2. The risk of inadequate determination of the financial position of the borrower. A serious obstacle to increasing the volume of lending is the lack of transparency in the finances of small business funds, which are often associated with the own funds of the owner of the enterprise as an individual.

3. Risk of collateral for the transaction. Small businesses often do not have sufficient collateral of their own fixed assets.

4. Risk of concentration of loans in individual banks. There has been a tendency for lending to small businesses to be concentrated in large and regional banks

5. Growth of overdue debt on loans and the size of formed reserves.

Special risks of lending to small businesses:

1. Risk of uncertainty of results. With costs comparable to lending to other legal entities, it is unprofitable for a bank to lend to a small business due to the uncertainty of its result.

2. The risk of a large number of transactions and their poor-quality execution. Loans to small businesses to replenish working capital are allocated by a large number of transactions for small amounts. There is a direct relationship between the number of transactions and risk, since there are no low-cost procedures for conducting a large number of small transactions, while at the same time ensuring a sufficient quality of the loan portfolio.

3. Availability of unsecured loans. For the development of such loans, banks must have common technologies for assessing the financial condition of the borrower, his ability to repay the loan from permanent sources of income. The absence of such systems leads to the attribution of the same borrower in different banks to a different group of creditworthiness of the financial position.

4. The presence of a large number of types of homogeneous portfolios. To minimize this risk, it is necessary to apply the correct risk management methods for a particular type of homogeneous small business portfolios. In addition to the listed risks of lending to small businesses, it is necessary to distinguish between aggregate and individual types of credit risk: - aggregate implies an assessment of the entire aggregate of loans issued to small businesses in relation to their quality; - individual characterizes the amount of risk of an individual borrower of a small enterprise whose loans are included in a representative sample. (Ponomarev, 2013)

Control systems over credit transactions should include procedures for detecting signals of possible non-payment and measures to respond to this danger already in the process of executing a credit transaction. In most cases, the control service will draw conclusions based on periodic meetings and negotiations with the client, as well as on the basis of regular analysis of financial information. However, monitoring the risk and the factors that determine it, of course, is not limited to observing the action (or inaction) of the smallest borrowing enterprise; the processes occurring in the environment are also important. For the successful operation of a small business, it is necessary to predict changes in the industry and respond to them in a timely manner. The bank needs to assess the client's ability to prepare for change and take action. As such, providing a loan as part of a package of measures to assist this small business is an important factor in significantly reducing the risk of bank lending to small businesses.

Scenario analysis is a methodological approach to assessing the risk management system for lending to SMEs by means of models of the probable states of the elements of the lending risk management system, taking into account

the uncertainty of the manifestation of risk factors of external and internal origin and studying the consequences if they are implemented. The use of scenario analysis to assess such elements of the lending risk management system as credit products for SMEs and the credit process for SMEs is discrete and limited. Scenario analysis of the SME loan portfolio is most widely used in practice. This is due to the traditional focus of banks on the portfolio aspect of lending risk management, which fully corresponds to the risk profile of lending in the corporate segment, but is limitedly acceptable for SMEs. As reflected in the author's article "Issues of assessing the credit risk management system", the directions of scenario analysis are presented by American and French schools. (Morozova, 2014) The generality of the presented directions of scenario analysis, which form the basis of the existing internal methodological approaches of banks to assessing the functionality of the lending risk management system, is manifested in the unity of goals, methodological sequences, partially mathematical apparatus and constituent components. Accordingly, banks' internal methodological approaches to assessing the level of functionality of the lending risk management system using scenario analysis methods, regardless of the scientific school, contain the following hierarchy of stages:

1) Determination of the area and scope of research to build a model of loan products, credit process and loan portfolio; assessment of the quality of information.

2) Representation of the quality of models of credit products for SMEs, the credit process with SMEs and the credit portfolio of SMEs as a function of risk factors for SME lending; identification of basic factors and a generalizing indicator that determines the state of the model of credit products for SMEs, the credit process with SMEs and the credit portfolio of SMEs; factor analysis (retrospective, uncertainty, dynamics and correlation).

3) Testing models of the SME loan portfolio, the SME loan process and loan products for SMEs based on regression and correlation analysis. Regression methods most fully and accurately reveal the relationship between the factors of credit risk and the resulting characteristics of the loan portfolio, credit process and credit products. This makes it possible for the bank to study the combined variants of the models of the loan portfolio and the models of loan products interconnected with it, the credit process with their alternative parameters in different situations and to form the optimal management decision and action.

4) Approbation of management decisions based on retrospective and hypothetical data with the subsequent formation of conclusions. (Kovalev, 2007) The traditional elements of scenario analysis are: stress testing in combination with back testing, conditional scenario models and sensitivity analysis to individual elements of risk.

Stress testing. This approach for assessing the impact of predicted values of risk factors on a bank's stability. (Basel Committee, 2009) Stress testing is a set of methods for assessing the stability of financial institutions and their portfolios to significant events with a high probability of implementation in the macroeconomy. Consequently, stress testing is aimed at assessing the functionality of the SME lending risk management system by analyzing the exposure of its elements to the influence of a certain range of negative events and their possible consequences, which are associated with negative deviations from target rate of return on lending to SMEs. For example, indicators such as the proportion of overdue or bad loans, the proportion of non-performing loans, the level of provisions for possible loan losses, net interest margin, and others are used as factors for conducting stress testing. The bank's failure to fulfill its plans for the profitability of lending to SMEs due to the insufficient stability of the models of credit products, the credit process and the loan portfolio to the possible manifestation of certain credit risk factors indicates violations in the functioning of the credit risk management system. As a rule, this is due to incorrect configuration of the credit risk filter subsystem contained in the functional components of the risk management system for lending to SMEs (models of credit products, credit process and loan portfolio), due to operational errors and (or) updating the profile of risk factors, including causal investigative connections.

According to COSO an organization's risk management process has eight interrelated components. Since they are an integral part of the management process, their content is determined by how management manages the organization. These components include:

• Internal environment. The internal environment represents the atmosphere in the organization and determines how the risk is perceived by the people in the organization and how they react to it. The internal environment includes the philosophy of risk management and risk appetite, integrity and ethical values, as well as the environment in which they exist.

• Setting goals. Objectives must be defined before management begins to identify events that have the potential to influence their achievement. The risk management process provides a "reasonable" assurance that the company's

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management has a properly organized process for selecting and setting goals, and these goals are consistent with the organization's mission and level of its risk appetite.

• Definition of events. Internal and external events that affect the achievement of the organization's objectives should be determined taking into account their division into risks or opportunities. Opportunities should be considered by management in the process of strategy formation and goal setting.

• Risk assessment. Risks are analyzed based on their likelihood of occurrence and impact in order to determine what actions should be taken in relation to them. Risks are assessed in terms of inherent and residual risk.

• Risk response. Management chooses a method of risk response - risk aversion, acceptance, reduction or redistribution of risk - by developing a number of measures that allow bringing the identified risk in line with the acceptable level of risk and risk appetite of the organization.

• Means of control. Policies and procedures are designed and established to provide "reasonable" assurance that responses to emerging risks are effective and timely.

• Information and communication. The required information is determined, recorded and transferred in such a form and within such a time frame that allows employees to fulfill their functional duties. There is also effective exchange of information within the organization, both vertically from top to bottom and bottom to top, and horizontally.

• Monitoring. The entire risk management process of the organization is monitored and, if necessary, adjusted. Monitoring is carried out as part of the day-to-day activities of management or through periodic evaluations.

Table 2. Analysis of risk assessment methods established by COSO standards, taking into account the specifics of the business model small businesses

Category methods risk assessments	Assessment Methods	Method content	Limitations for use method by small enterprises business (MBB)
Quantification Methods	Comparison with benchmark	Exchange based process information between a group of enterprises, aimed at assessing events or processes and involves the comparison of indicators and results using common parameters, as well as identifying opportunities for improvement	1. The method is applicable for a group enterprises, however, MBB as usually represent single objects. 2. Even if the owner has several MBPs, it may not be possible to establish common parameters for comparison due to the lack of sufficient knowledge and skills of the owner in the field of business management. 3. It is not always possible to obtain reliable data on events, processes and indicators, since the MBB does not have statistics on indicators of economic activity
	Probabilistic models	Probabilistic models allow determine the likelihood of events and their influence based on certain assumptions. (Berkowitz , 1999) The likelihood and impact are assessed based on past data and modeling results that reflect assumptions about future behavior Examples of probabilistic models. (Enterprise Risk Management, 2004) - the model of the cost risk; - model of cash flows at risk; - the model of income subject to risk;	1. It is not always possible to get reliable data on past events, since the MBP does not have statistics on economic activity. 2. Carrying out simulation results reflecting assumptions about future behavior can be difficult for MBP leadership lack of sufficient knowledge and skills in business management. Since the content of the methods in COSO is not disclosed, management needs to implement search for additional sources of information for understanding their content

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		- credit distribution model and operating losses. The content of these methods in COSO not disclosed	
Quality methods appraisals	"The incredible models "	In these models, when assessing the impact events use subjective assumptions without quantifying the associated probability. The assessment of the impact of events is based on past data and on assumptions about future behavior. (Enterprise Risk Management, 2004) Examples of "Improbable" models (Basel Committee, 2009): - assessment of the sensitivity to the event; - stress testing; - scenario analysis. COSO does not provide examples of good risk assessment methods and does not their content is revealed. However, it is clarified that the management uses methods of quality assessments in cases where it is impossible to quantify risks, and also in cases where sufficient reliable data required for a quantitative assessment, or cannot be obtained, or obtaining and analyzing such data turn out to be too costly	1. Since the content of qualitative risk assessment methods in COSO is not disclosed to the management of the MBP, the specifics of the application of these methods may be incomprehensible

Source: compiled by the author.

In order to be confident in the effectiveness of risk management, the enterprise must compare its results with indicators that are periodically reviewed for compliance with requirements. Based on the results of monitoring at the enterprise, measures should be taken to improve the risk management procedure and measures for its implementation.

Risk assessment enables the head of the enterprise to make a management decision that is adequate to the degree of threat from the possible realization of the risk. Risk assessment includes risk identification, analysis and assessment of the parameters characterizing the risk.

In the process of identification, the risk is identified, studied and described. The purpose of risk identification is to identify threats, the implementation of which may affect the results of the business, and the degree of impact of these threats on the results of the business process. Risk identification also identifies the causes and sources of risk. Risk identification techniques can include analysis of accumulated data, expert judgment, and various assistive techniques, including brainstorming.

In the process of risk analysis, indicators are identified that indicate a change in the probability of risk realization, factors influencing the risk parameters are determined, and recommendations are developed on the composition of measures that reduce the likelihood of risk occurrence. In addition, when analyzing a risk, the financial consequences of its implementation and the likelihood of its occurrence are determined, as well as the effectiveness of existing measures of influence on factors affecting the parameters of risk to reduce or prevent it. This characteristic is called risk manageability.

Assessment of risk parameters involves determining the value of the probability of its realization and the magnitude of the possible financial consequences of risk realization. These two quantities determine the level or

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significance of the risk. In addition to quantitative methods, qualitative and semi-quantitative methods are also used. The nature of the method used depends on the specific case and the availability of reliable data. In a qualitative assessment, indicators such as "high probability", "medium" and "low" are used to determine the likelihood of a risk and its financial consequences. Semi-quantitative methods use numerical scales for assessing damage, consequences and probabilities, which are used to obtain an idea of the level of risk. For example, in this case, the magnitude of the risk can be expressed as the probability distribution over the range of consequences from its occurrence. A quantitative assessment of risk parameters is not always possible due to the lack of information about the analyzed process or due to the lack of the need to obtain such an assessment or its high cost. In this case, one can restrict oneself to a semi-quantitative or qualitative assessment of the risk parameters carried out by experts and competent specialists in the relevant field.

As for the assessment of such a parameter as risk controllability, it is an independent task, in the process of solving which it is necessary to consider the effectiveness of risk management measures and their feasibility.

However, in most cases, due to the complexity and multifactorial nature of the problem being solved, it is impossible to obtain high accuracy of the results obtained. Nevertheless, assessing the effectiveness of risk management is necessary to determine the appropriateness of the costs of its implementation. This can be accomplished using a step-by-step methodology for assessing the risks of small and medium-sized enterprises.

At the first step of the analysis, it is necessary to carry out a preliminary risk analysis in order to concentrate efforts on processing information about the most dangerous risks. At the same time, special attention should be paid not to exclude from consideration less dangerous risks, the impact of which accumulates and can create a significant cumulative effect.

The next step is to analyze the parameters of risk: the likelihood of its occurrence and financial consequences. The analysis of financial implications can range from a simple description of the results to detailed quantitative simulations and estimates. Impacts may have minor consequences but high probability of occurrence, or significant consequences but low probability. In some cases, it is advisable to consider risks with potentially significant results, in other cases, risks with minor consequences may be more important due to their cumulative effect or long-term consequences.

To assess the likelihood of a risk realizing, the following methods are usually used:

- the use of previously accumulated data to identify events or situations that have arisen in the past, which makes it possible to extrapolate the likelihood of their occurrence in the future. However, if in the past the risk was realized very rarely, then any estimate of its probability will be very uncertain.

This is especially true in cases where the risk in the past has never been realized, which, however, does not allow us to reasonably assume that it will not occur in the future;

- the use of special techniques to predict the likelihood of risk realization. For example, analysis of the "tree" of faults, analysis of the "tree" of events and other techniques that describes the specifics of the implementation of the relevant business processes for which these risks are characteristic;

- the use of expert judgments based on the available information about the business processes under consideration. Existing methods for obtaining expert judgment include the Delphi method, pairwise comparisons, ordinal ranking and others.

At the third step, the significance of risks is assessed, which is necessary for making a decision on the implementation of measures to minimize and prioritize them. The general approach is to divide risks into three groups:

- the first group, in which the level of risk is considered as unacceptable, regardless of what benefits can be brought by business activities associated with this risk;

- the second group, which takes into account the costs of implementing measures to minimize risk, and the benefits of business activities associated with this risk;

- the third group, in which the level of risk is considered so low that there is no need for any risk management measures.

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4. Conclusion

The analysis of the applied risk assessment methods allows us to form the concept of not only building a risk assessment model, but also risk management for small and medium-sized enterprises.

So, first of all, it is necessary to determine goals, set tasks, select estimated indicators and indicators, and then draw up a specification of structural elements of the structure and technology for building a model, test it and optimize the parameters. In this regard, and with this approach to risk assessment and risk management, small and medium-sized enterprises will receive a tool that allows them to diagnose financial stability, simulate methods for strengthening it and foresee the prospects for the development of events.

In the process of carrying out business activities, it is necessary to constantly monitor risk indicators, identify incidents, analyze their causes and periodically assess risk parameters, since the factors affecting the company's activities change over time. The effectiveness of risk mitigation measures should also be monitored to ensure that the funds spent on these measures are effective. Since a business activity has its own life cycle, starting from the initial idea or intention, its implementation extends to regular production activities, up to the final curtailment of production or its deep modernization.For this reason, risk assessments should be carried out at all stages of the life cycle with varying levels of detail in order to arrive at the correct management decision.

The assessment of risk parameters can be carried out using various methods, previously noted, which must correspond to business activities, meet the nature of the analyzed risks and the significance of the consequences of their implementation. But no less important are factors such as the cost of risk analysis, which should be commensurate with the possible level of loss when the risk occurs.

In addition, the professional experience and skills of the analysts and the time constraints allocated to the analysis also influence the choice of risk assessment methodology. Ignoring these factors leads to errors in the assessment of risk parameters, which may be due to low quality data or their lack. For example, there may be no accumulated data for unique types of risk, or they may be interpreted differently by different specialists, and they, when performing a risk assessment, must understand the nature of the uncertainty and its effect on the results of the risk assessment.

For complex systems, risks can be complex in nature, when they need to be assessed within the entire system as a whole and not considered each component in isolation. Understanding the need for a comprehensive assessment of individual risks is important for the selection of appropriate methods for their assessment. Thus, the organization of risk assessment can be applied to all types of risks and various types of business activities of small and medium-sized enterprises, and at all stages of their life cycle in order to make the necessary management decisions to minimize damage from their occurrence.

Since the stages of the life cycle are characterized by different conditions, this requires the use of different methods for assessing risks. Moreover, if there are several options for carrying out business activities, then risk assessment can be carried out for alternative concepts in order to find such a solution that will provide the best balance of positive and negative consequences from the implementation of risks.

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Research the energy status of military personel in tactical exercises in a mountain forest area

Ivan Ivanov [a] & Krasimir Koynakov [b] & Simeon Simeonov [c]

[a] *Kaneff University Hospital, Ruse, Bulgaria*
E-mail: isivan@abv.bg
[b] *National Military University „Vasil Levski"- Veliko Turnovo, Bulgaria*
E-mail: krasi.koynakov@gmail.com
[c] *Kaneff University Hospital, Ruse, Bulgaria*
E-mail: sansiood@abv.bg

Abstract

The present study is related to the comparison of the daily energy consumption with the daily energy intake of servicemen, in particular cadets from the Vasil Levski National Military University during a tactical exercise in a mountainous and forested area. By comparing these data, the energy status of the cadets is determined. This is related to the use of some of the existing methods for determining these indicators. The use of the data from the energy status is a step towards achieving a balanced diet of the cadets from Vasil Levski National Military University and maintaining them in good physical health.

Keywords: military education, training, cadets.

Jel Codes: O10, P00, I20

1. Introduction

The determination of the energy status is carried out through the study of two aspects: the daily energy consumption and the daily energy intake of the studied group. The definition and comparison of these two components can be used to achieve a more balanced diet of the cadets from the Vasil Levski National Military University and to maintain them in good physical health when conducting classes in different field conditions.

The foundation of healthy eating is a balanced diet and includes the following four areas:

- energy balance;
- nutrient balance;
- product balance;
- balance in the diet.

The so-called functional foods are of major importance in a balanced diet - foods that satisfactorily demonstrate beneficial effects in relation to one or more targeted functions in the body, beyond adequate nutritional effects, as well as influencing improved health status or reducing health risk of development of disease (Popov, 2006).

Energy balance is the balance between calories consumed and calories expended. If the calories you eat are more than you burn, then you gain weight and vice versa. When more calories are consumed than consumed, it is assumed that the energy balance is positive, and when the calories consumed are less than consumed, there is a negative energy balance.

To maintain energy balance, you need to eat food that meets your daily energy expenditure. They include energy to maintain:

- basal metabolism;
- physical minute activity;
- digestion (Popova, 2008).

The total energy costs of servicemen involved in tactical exercises and exercises in the field can be quite high. The field classes of the area include:

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− tactical and combat training; tactical-special occupation; tactical exercise; tactical case (flyer);

− group activity in the area (with or without elements of KSC);

− training (staff and special);

− exercises with and without combat shooting;

− combat firing with real missile launches; flight and tactical exercises;

− flying exercises;

− field preparation of a specialized landfill; field camp and others (Nichev, 2016).

A number of researchers believe that the total energy consumption of servicemen increases in winter and in cold climates. The studied energy costs of US rangers involved in field training are an average of 5,185 kcal per day (Tharion et al. 2005). The values of the energy expenditure of Polish soldiers during a typical training day depend on the type and nature of the unit and fall in the range 3339-4651 kcal (Bertrandt, Kłos and Bertrandt, 2012). In a study of US Marines in cold weather (at ambient temperatures of - 10 to 5° C), an average energy expenditure of 5398 kcal per day was observed.

2. Nature of the research

Current o this study was done during the international tactical exercise „Rhodope 2019". The exercise was held from September 17, 2019 to September 20, 2019 in the city of Smolyan, with the participation of servicemen from the armies of Bulgaria, Romania, Poland, the Czech Republic, Austria and Slovenia - a center for research, development and improvement of NA capabilities. To for waging a mountain war. The event was hosted by the 101st Alpine Regiment of the Land Forces of the Republic of Bulgaria (Glushkov, Simeonov and Georgiev, 2018; Terziev and Nichev, 2017a; 2017b; 2017c; 2017d; 2017e; 2017f; 2017g).

3. Research of energy consumption

The survey was conducted among 22 servicemen and cadets , participants in the tactical exercise, who were divided into three groups. The mean anthropometric data of the groups are given in Table 1.

Table 1. Mean anthropometric data of the researched groups

	1st group	2nd group	3rd group
Height , cm	18 2	179	179
weight , kg	84	82	77
years	29	29	36

Source: Authors

The method of group tabular timing was used to determine the energy consumption of the servicemen, as the defined groups are in the formations in formations in which the servicemen perform the same actions. The servicemen are stationed in a mountainous and forested area, at 1500 meters above sea level and the average measured temperatures for the period are 4 ^{0}C. The data are summarized in two days, due to the fact that the actual tactical actions took place on 18.09 and 19.09.2019.

After processing the data and summarizing them, the following results were obtained:

− The energy consumption of the servicemen of the 1st group varies from 4321 kcal to 5011 kcal. The average measured energy consumption is 4666 kcal.

− The energy consumption of the servicemen of the 2nd group varies from 2899 kcal to 3822 kcal. The average measured energy consumption is 3360.5 kcal.

− The energy consumption of the servicemen of the 3rd group varies from 3280 kcal to 3618 kcal. The average measured energy consumption is 3449 kcal.

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The difference in the values of the energy consumption of the studied groups is due to the different intensity and tasks of the military formations, related to the design of the tactical exercise.
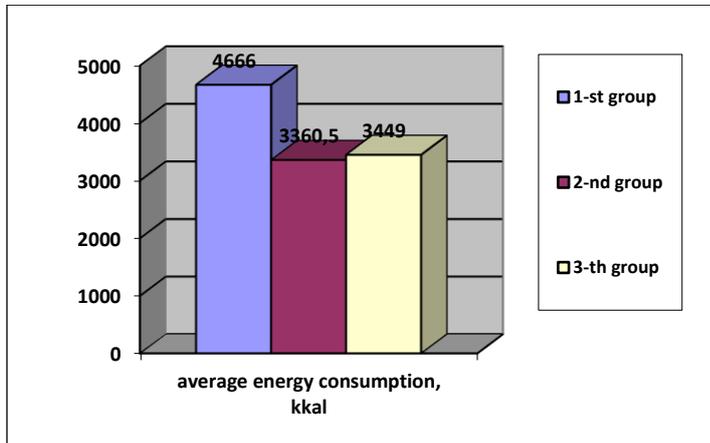
Data on military energy consumption are shown in Figure 1.

Figure 1. Average values of energy consumption of the groups

Source: Authors

When comparing the average obtained minimum and maximum data of the studied groups, the following results were obtained:

- − Minimum average energy consumption of the groups - 3500 kcal;

- − Maximum average energy consumption of the groups - 4150 , 33 kcal;

- − Average values of energy consumption of the groups - 3825.16 kcal.

A comparison of the data obtained is shown in Figure 2.
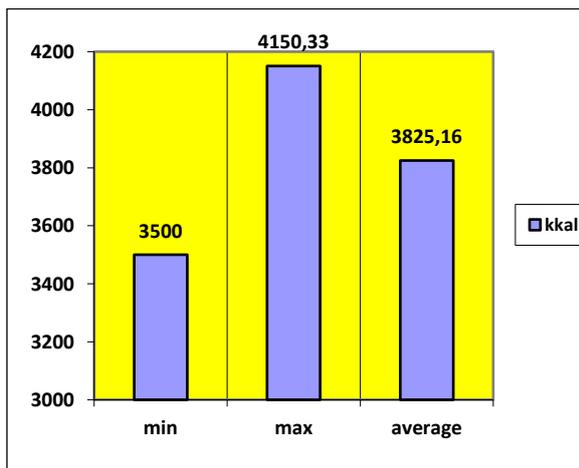
Figure 2. Energy cost groups of groups

Source: Authors

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4. Research Energy status

During the period of the tactical exercise, the servicemen were provided with food according to the appendices of the current nutrition ordinance, which includes the main appendix plus supplements applied in various activities, such as exercises, aggravated energy consumption, etc. The value of the annexes to the ordinance is taken from an annual ministerial order in which the Minister of Defense of the Republic of Bulgaria announces the values of the annexes under Ordinance H5 / 02.04.2015. According to the ministerial order for 2019, during the tactical exercise of servicemen food was provided according to their due applications in the amount of BGN 14.36.

Based on the prepared menu-layout for the purposes of the exercise, the servicemen were provided with macronutrients, providing an average energy intake of 5921.11 kcal. per day per person. Breakfast provides an average energy intake per person of 1561.87 kcal, lunch provides an average of 2233.45 kcal, and dinner - 2125.6 kcal (Fig.3).
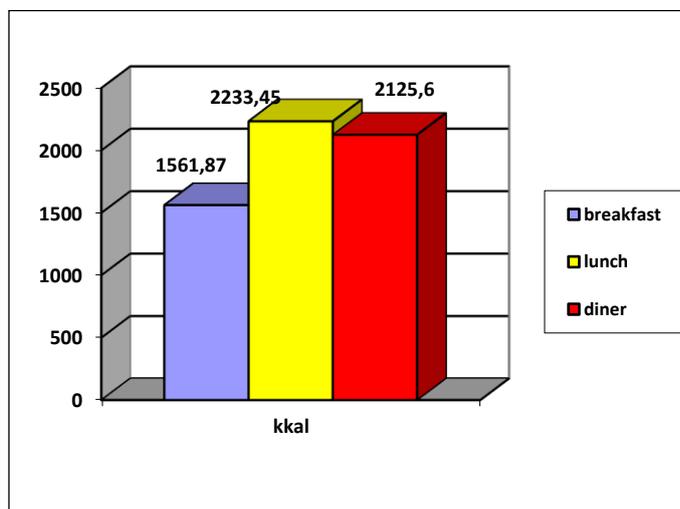
Figure 3. Energy intake by meals

Source: Authors

The biggest sources of energy from the meals and food products provided to the servicemen are mainly bread, instant coffee, cheese, sausage, chocolate, bananas, natural juice, butter, sausage, yellow cheese, halva, pork.
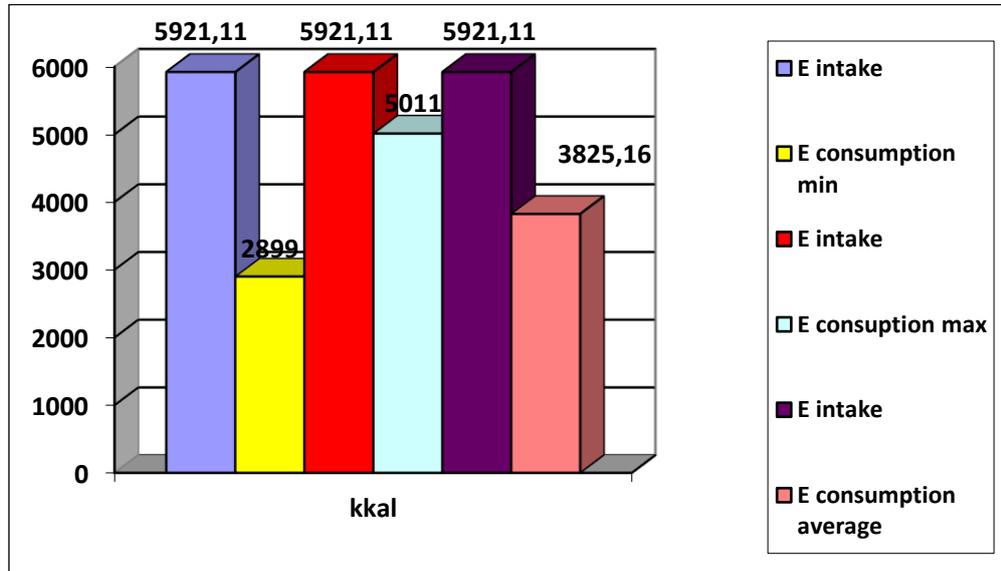
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Figure 4. Energy status

Source: Authors

In order to determine the energy status of servicemen, it is necessary to compare the two quantities - energy consumption and energy intake. After comparing the values, there is an exceptional imbalance between the energy received by the servicemen and their energy consumption. The average values result in a difference of 2095.95 kcal in favor of energy intake . Even at the highest measured values of energy consumption there is a difference of 910.11 kcal again in favor of energy intake. The comparison of the energy status data is shown in Figure 4.

5. Conclusion

From the results obtained for the energy status of the servicemen during tactical exercises in a mountainous and forested area, it is evident that their nutrition is in an exceptional imbalance in relation to their needs. With prolonged intake of such norms for food intake there is a risk to the health of servicemen (Terziev and Solovev, 2020a; 2020b). Given these results, it is necessary to optimize the daily energy intake of cadets from food, which could lead to positive effects in health and economic terms.

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Reviewing the Literature of Financial Performance in the Airline Industry[1]

Andreas-Daniel Cociş[a]

[a] PhD candidate, Babeş-Bolyai University, Cluj-Napoca, Romania
E-mail: danielandreas25@gmail.com , andreas.cocis@econ.ubbcluj.ro

Abstract

This article is based on scientific research available in literature, published by finance specialists. As a revised topic, there are the studies that addressed the financial performance of the global airline industry. Overall, this article mainly offers a conceptual approach in order to familiarize the topic in this industry. The purpose of this study is to analyse the specialized literature in the field of finance within the airline industry that provides information on financial performance. As a theoretical support, a number of approximately 50 available research papers have been studied, and their selection was performed by observing the topic and the industry. Based on the research steps, we acknowledged the fact that there is no conclusive relationship between financial performance and operational performance; non-financial performance measures provide information on financial performance; and following global warming, researchers have recently focused on operational efficiency measures for the airline industry, assisting the environment protection measures.

Keywords: Financial performance, airlines, operational performance, non-financial performance, CSR.

Jel Codes: G30, L25, L93.

1. Introduction

Taking into consideration the importance given to financial performance within certain companies, stakeholders place great value on its determination, especially as they signal the state of financial health. Financial performance knows no international limits and is used to assess the status of companies around the world.

The results determined by assessing the financial performance ratios of a company provide a basis for comparison, both with itself in different periods and with competing companies from the same industry. Another utility is found in the way of signaling the health of these companies by means of the ratios. In the airline industry, financial performance is often neglected, and operational performance is the most common in research (Wang, 2008, p.1838) (Feng and Wang, 2000, p.133), the reason being the shareholders' interest in returns.

The main objective of financial performance has become to establish the key factors determining the performance, in order to eliminate negative influences and to improve those with a positive impact on business (Costea, 2015, p.1).

Following the literature review, three lines of analysis came to light, therefore I included the articles in three categories. The first category is the assessment methods used by researchers to make comparisons. The second category is represented by the methods for improving the financial performances by developing the current ones. And the last category includes the empirical studies made by researchers.

2. Literature review

The literature review offers a fairly varied range in the airline industry when it comes to evaluating, improving, comparing financial performance, but also empirical links with other variables. New methods for evaluating financial performance are emerging; methods of improvement that can increase the ability to predict financial performance; comparison tools in force majeure situations and past events; shaping some opinions of researchers following empirical analyses.

2.1. Assessing financial performance in the utility of comparisons

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In order to assess measure financial performance, financial indicators are obtained from past financial statements (balance sheet, profit and loss account and cash flow statement). Comparisons in the airline industry by means of financial performance occur if an image of the health status over different time periods, a separate assessment of financial performance with other variables and the assessment of companies in the same industry are desired. The most common method of measurement used in finance and statistics is the financial report (Naz, Ijaz and Nagyi, 2016, p.81).

2.1.1. Financial versus operational performance

Many studies have focused on evaluating the financial performance compared to the operational performance (Wang, 2008) (Gramani, 2012) (Feng and Wang, 2000). The authors mainly expressed concern regarding the neglect of the financial performance that can directly influence the survival of a company in any industry, not only the airline industry. The objective of Gramani's research (2012) was to evaluate separately the operational and financial performance, for example a number of 34 Brazilian and American airlines were analysed over 9 years. The results showed that, in emerging markets, the operational performance is much better than financial performance, which indicates that the major concern of companies in the airline sector has been the optimization of resources. The results also showed that improving the operational efficiency does not lead to an improvement in the financial efficiency. As a counterargument, (Pineda and Others, 2018, p.103) conclude in their research that in order to achieve financial efficiency, the operational performance must be improved.

Wang (2008, p.1837) specifies that in order to compare the operational performance and the financial performance, it is necessary to have financial indicators divided according to several criteria, obtained from the balance sheet, the profit and loss account and the cash flow statement. Feng and Wang (2000, p.133) specify that the financial performance could directly influence the survival of an airline. The lack of financial reports leads to a biased assessment, the authors' goal being to build a performance assessment process for airlines by means of financial reports. The result of the study showed that the assessment of the airlines' financial performance can be more comprehensive if the financial reports are also taken into account.

2.1.2. Financial versus operational performance

The comparison of financial performance indicators is discussed when certain decisions are made about the company or when the company faces certain inherent events. Therefore, the company seeks an assessment after that time. The assessment of the financial performance gives us the company's reaction to that event, how it perceives that event and what repercussions it had in its evolution.

After the process of economic regulation of the United States in the airline industry in 1978, the poor results of the airlines worsened. The profitability of airlines has been much lower since the new regulations than before. People at the time called it a "bankruptcy policy", because many companies went bankrupt at the time. Dempsey's article (2008) creates a comparison between the two moments, before the new regulations and after their application in the United States airline industry. This article has shown that, even if macroeconomic trends (recessions) and/or global events (terrorism or war) are taken into account, they will not have an impact as great as the one after the new regulations adopted in 1978.

Other articles focus on the terrorist attacks of September 11ᵗʰ, 2001 (Flouris and Walker, 2005) (Cappel, Pearson and Romero, 2003), attempting to assess the financial performance after this event. Both researches are turning their attention to the airlines in the United States. The event brought major changes in this industry, affecting revenues and the method of calculation of future profits. The two researches have the same objectives, but with different approaches, focusing on the two types of low-cost and full-service companies. Flouris and Walker (2005) evaluate low-cost and full-service airlines in light of the financial performance. They find that the performance of low-cost companies was much higher than that of full-service companies.

Cappel, Pearson and Romero (2003, p.53) specify that, as changes were introduced in the European airline industry, the authors found that superior financial performance was achieved by European airlines that used a low cost approach. They also found that the most successful US airlines in terms of financial performance are those that adopt a low-cost approach. From the investors' point of view, low-cost companies offer significantly greater financial and operational flexibility than full-service companies.

Mergers and acquisitions are other important actions of comparative strategy that help companies in external development and offer them competitive advantages. As you can well guess, we can talk about comparisons by means of performance indicators between certain actions taken by the company management. Nowadays, mergers and acquisitions are used to improve the competitiveness of companies by obtaining higher market shares. The

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goal of the research of the authors Mahesh and Prasad (2012) was the analysis of Indian airlines, assessing whether they achieved financial efficiency in the post-merger and acquisition period (2007-08). Financial performance indicators are used to compare the status of companies before the merger and their status after the merger. The result of the study showed that following the merger there is no improvement in profitability and there are no significant differences in terms of financial performance.

Another representative article focuses on the stock market effects of the merger announcement of 3 airlines of the United States. The data consisted of the cumulative daily returns using 2 benchmarks for comparison. The methodology of the study of the authors Wilfred and Dawna (2014) proposed the accumulation of information for 60 trading days around the merger announcement. The impact of this action on airlines is positive, stock prices having risen, except for one company that has been affected by the recession. The merger came as the US economy entered a recession.

The result of financial performance indicators in the airline industry often appreciates the effectiveness of a new strategy used by companies, it also appreciates the upswing periods of companies, the periods of glory and not only. Performance indicators are also used in assessing the success of a company, Dayi and Esmer (2017) trying to analyze the success of the Turkish company Turkish Airlines Corporation, which, according to Skytrax, is the best company in Europe. The great dilemma of the authors was that the main reason for this success may have been the presence of a strong financial situation. The authors apply the objective by means of the evaluation of the company Turkish Airlines compared to other companies in Europe using financial performance indicators. The results showed that Turkish Airlines and Lufthansa have the most successful performances, while Air Berlin and Thomas Cook Group have the lowest performances.

The article of Fernandes and Capobianco (2001) addresses performance, financial strategy and efficiency in the global airline industry. The main objective of this study is to investigate the level of indebtedness that allows airlines to obtain the best performance. Most resources are financed from equity and from third party capital. Given the high level of indebtedness of the sector, the authors sought to identify the companies that have approached different performance strategies, which are constantly satisfied. The result showed that the financial strategy can be understood as a determining factor in the performance of companies, being an important measure in supporting the activities in the competitive environment.

2.2. Methods for improving the financial performance

The development of methods for improving the performance of airlines is crucial and the difficulty arises due to the large number of complex factors in this matter. In order to improve the traditional financial reporting, academics and decision makers have suggested that users of financial statements should be provided with non-financial performance information, which can enhance users' ability to assess and predict financial performance (Behn and Riley, 1999, p.29) (Liedtka, 2002, p.1105).

2.2.1. Relating financial to non-financial performance

The area of financial performance tends to evolve, as it has crossed the boundaries of financial indicators aiming at non-financial indicators. Many studies in the literature give major importance to non-financial factors in assessing the performance of airlines. Taking into account that financial performance assesses the health status of a company, the performance of non-financial indicators signals the same problem.

Company management uses financial indicators to measure, report and improve its performance. It was proven that in order to obtain a global situation of an economic entity at a specific time, it is necessary for the assessment to be based on a multidimensional balance that includes both financial and non-financial indicators (Costea, 2015).

Behn and Riley (1999) note that academics and users of financial statements required to be provided with information about the non-financial performance, because they say that it can increase users' ability to assess and predict the financial performance. The authors test whether the non-financial information is a useful predictor of financial performance in the airline industry. The research is explained empirically by means of instrumental variables (customer satisfaction, timely arrivals, mishandled baggage, onboard services). They find that the customer satisfaction, the load factor, the market share are associated with operational variables and that the customer satisfaction is also associated with expenses. The authors conclude that the information on non-financial performance may be useful in predicting the operating income.

Another study offers strong evidence that, for the airline industry, a large number of non-financial indicators provide performance information that is not included in a comprehensive set of financial indicators (Liedtka,

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2002). This article expands the literature on non-financial performance measures by assessing a broader set of non-financial statements. The study uses an exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) by means of 19 non-financial indicators, observing whether they provide information beyond the information provided by the financial performance in the airline industry. The author concludes that, for the airline industry, more non-financial information provides information on financial performance that is not included in the financial performance.

Most research investigates how the non-financial performance influences certain airline variables, such as the executive compensation (Davila and Venkatachalam, 2004) (Srinivasan, Sayrak and Nagarajan, 2004). The research investigates how the non-financial performance influences the executive compensation on a sample of airlines. These authors investigate how the passenger load factor, a non-financial measure, influences the CEO's remuneration. They started from the premise that the non-financial measures offer additional information on the actions of general managers, therefore they would receive a higher compensation. The authors find weak evidence that there would be a significant impact on the relationship between the non-financial performance and the executive compensation.

Another research provides an empirical analysis according to which the non-financial performance measures of the airline industry could influence the executive compensation for performance. The study uses other financial performance measures or non-financial performance measures such as: the load factor and market share. The authors' results suggest that several non-financial measures specific to the industry provided by the US Department of Transportation (DOT) could influence the relation to the compensation of airline executives, other than those provided by accounting, market and other non-financial performance measures. The conclusion of the study is that the non-financial indicators provided by DOT influence the executive cash remuneration and not the compensations to the salary (Srinivasan, Sayrak and Nagarajan, 2004).

Riley, Pearson and Trompeter (2003) examine the relevance of the non-financial variables in the airline industry for the investors. The authors start from the premise that the non-financial values of airlines influence investors much more than the indicators drawn up based on the accounting. Many researchers are concerned that the financial reports and the presentation of the financial information do not keep up with a dynamic and ever-changing business world. In these circumstances, the authors suggest that the financial statements should also include non-financial performance information which, combined with the financial performance, assesses much better the future financial performance. The authors' data show that the non-financial performance values, the load factor and the tons per mile are positively associated with the stock returns, while the market share and the customer satisfaction are negatively associated with the stock returns. The authors concluded that the non-financial variables explain the return of airlines to a small extent.

2.2.2. Other methods for improving

As mentioned above, the development of methods for improving the performance of airlines is quite complicated and complex. The difficulty arises because there are too many factors that influence this matter. The factors to be assessed are brought to attention based on the criticisms/opinions of researchers and specialists. Pineda and Others (2018) propose an integrated model that combines data, then extracts the critical factors for improving the airline performance. The method uses a set of assessment factors (MCDM, VIKOR and DANP). The article concludes that operational efficiencies must be improved in order to achieve a financial efficiency.

Jenatabadi and Ismail's research (2012) presents a new perspective of structural equations for the analysis of airline performance. This perspective explicitly assesses the relationships between the companies' performance and the economic indicators taking into account the internal factors. Each variable in the study was designed from several indicators. This model was created to estimate the performance of airlines. The results showed that the relationship between the internal variables and the companies' performance was the significant control of the economic variables.

Like the more recent research of the same authors, Jenatabadi and Ismail (2014) presents a procedure of the type of structural equation modeling (SEM) (estimation method that generates a larger number of endogenous and exogenous variables as well as latent variables). The main objective is to introduce a triangular model in order to investigate the economic situation regarding the performance of some companies in the airline industry. Unlike other research papers, where each indicator is assessed separately, this study introduces a latent (unobservable) variable to represent the overall performance of the company. The result shows that the model is able to estimate the performance in relation to the economic situation.

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Gittell, Nordenflycht and Kochan, (1999) start from the premise that the quality of working relationships and the workplace culture lead to better or worse results for airlines. The materialization of this experiment is done by testing these interpretations using a mosaic of qualitative and quantitative historical data of the airlines in the United States. Both quantitative and qualitative factors suggest that rational factors (conflict and workplace culture) are more important factors of performance than structural factors (of common governance and wages). Continuous improvement in the quality of services and financial performance will require the improvement of the quality of the work environment and the specialization of the staff.

2.3. Empirical connections to other variables

Many studies use the assessment of the financial performance by means of companies' profitability. In the airline industry, a lot of research has focused on the possible links between the profitability of a company in relation to the services provided by it (Mellat-Parsat and Others, 2015) (Sim, Song and Killough, 2010) (Demydyuk, 2011). Also, a new trend has emerged nowadays, more and more importance being given to environmental protection measures for several years now. In the airline industry, researchers are exploring the possible links that the financial performance has with the social responsibility activities (Astryan and Brezinova, 2014) (Lee and Park, 2009) (Phillips, Thai and Halim, 2019) (Inove and Lee, 2011).

2.3.1. Connection between profitability and airline services

The goal of Mellat-Parsat and Others (2015) was to understand the relationship between the quality of services and airline profitability. The article tries to reconcile the inconsistencies between the existing theory and the empirical findings regarding the quality of services and the profitability in the airline industry of some companies in the United States. This research uses theories based on strategic management, operational strategies and the world economy, all to explain the relationship. The authors find that baggage handling and customer complaints affect the profitability of airlines. Also, the relation between late arrivals and profitability is generally negative.

Another study tries to provide an overview of the relation between the services provided and the profitability of airlines in the United States. The empirical analyses found that customer complaints are an important indicator of future financial performance as measured by the return on sales (ROS). The companies' actions to reduce the mishandling of baggage are associated with future financial performance. The authors specify that the literature related to services stipulates that service failure (flight cancellations, wrong connections, mishandled baggage or boarding passes) may negatively affect customers and their future intentions. In this case, the authors would give a recoordination for the service failures, attention being directed to employees, which must be prepared and empathetic with their customers in these difficult situations (Sim, Song and Killough, 2010, p.28).

Demydyuk (2011) starts his research from the premise that the selection of performance indicators involves an assessment of measures based on costs and revenues. Using data from the global airline industry, this paper demonstrates that the KPI (Key Performance Indicator) determined by revenue or profit, applied consistently will lead to better performance compared to the flight itself. The study examines in particular the efficiency of the models, which characterize the performance based on 2 indicators (load factor and km/passengers). The research indicates that the operating profit per passenger is the most significant variable when it comes to explaining the variation of the profitability of airlines.

2.3.2. Financial performance and corporate social responsibility

With growing concerns about global warming, the airline industry has been subject to public pressure as a result of its status as a major consumer of carbon dioxide (CO_2) fuels. Airlines must not only reduce the impact on the environment through operational efficiency (e.g. more efficient aircraft and routes), but must also be more aware and responsible for their impact on the society (Lee and Park, 2009, p.185).

The following article contributes to the understanding of the activity of corporate social responsibility and their ability to influence the financial performance of some airlines in the Central and Eastern Europe. The paper of the authors Asatryan and Brezinova (2014) tries to contribute to the existing research in the financial field, examining the extent to which the corporate social responsibility is related to the financial performance of airlines. The dependent variables used in the study were ROA, ROE, and the independent variables were the community performance (the environmental management system and the employee relations). The results of the study showed that there is a positive relationship between the variables of corporate social responsibility and the financial performance of airlines in terms of ROA and ROE.

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The study of Lee and Park (2009) starts from the hypothesis that the corporate social responsibility has been recognized as an important ingredient for business success, specifying that few researchers examine the relation between the corporate social responsibility and the financial performance in the airline industry. The authors note that, following their research, the estimation of corporate responsibility indicators in the financial performance is quite inconclusive, the previous research being quite vague in expressing a relation. The results of the studies show positive, negative or even non-existing relations. The conclusions of the study show that there is a positive impact between the two variables, these results providing airlines with strong knowledge which can help them strategically develop better business plans that incorporate social responsibility activities.

Inoue and Lee (2011) suggest the breakdown of corporate social responsibility, arguing that the previous research has not investigated the dimensions of the corporate social responsibility, but took it as a whole in relation to the financial performance. The study focuses on the tourism industry, which includes the airline industry, the aim being to break down the CSR into 5 parts (employee relations, product quality, community relations, environmental issues and diversity issues), they examine how each dimension would affect the financial performance in the 4 industries (airline, hotels, restaurants and casinos). The results showed that each dimension had a differentiated effect both on short-term and future profitability. These variables varied across the 4 industries. The conclusions can provide managers in each industry with information on the dimensions of CSR activities that improve the companies' financial performance.

One of the most recent research in the field examines the impact of corporate social responsibility in leadership (CSRL) and culture (CSRC) as valuable intangible resources on corporate social responsibility performance (CSRP). It also analyzes the effect of social responsibility variables on: customer satisfaction and financial performance in the airline industry. Phillips, Halim and Thai (2019) adopts the concept of CSR which consists of 2 aspects of social and environmental sustainability. The research focuses on strong and contemporary business thinking such as culture and leadership within CSR. Following this research regarding the 3 carriers in the airline industry, the goal is to highlight the preservation and promotion of the CSR culture and leadership, so as to positively influence the financial performance. The conclusions of this research showed that there is a strong interest in the sustainable financial performance of companies in the current environment, which changes in terms of basic activities. Therefore, in other words, the financial performance changes through CSR, if CSR objectives are included in the basic activities.

3. Prospective directions

As we could notice in the articles studied from the specialised literature, the topic of financial performance is quite broad in the airline industry. Logically, we discovered studies that analyse force majeure events, global crises, but also articles that focus on climate change caused by this industry. Many researchers develop ranking methods in their studies, and thus provide the airlines with a score based on different performance criteria; such technique is useful for investors in structuring an investment decision.

In the future I will focus on optimizing the financial rates used in the airline industry. Like the method proposed; through certain ranking methods existing in the specialised literature, I will try to build a unique score rendered from several ranking methods, an area of financial performance (e.g. profitability, liquidity, etc.) being assigned to each method. The score is rendered from financial performance rates used in existing research papers. The goal, as I mentioned, is to incorporate several scores resulting from the various ranking methods proposed and to reach a final score for each company every year. This final score will be used in empirical research in relation to environment variables, stock market variables, etc.

4. Conclusions

There is a lot of interesting and diversified research in the literature of finance when it comes to analyzing or measuring the financial performance in the airline industry. We were able to notice the importance that researchers give to the non-financial information and determine the empirical connections between certain variables. In most articles, rankings of airline companies in the airline industry are created based on the financial performance. Grey analysis is often used to identify representative indicators. Classification methods with several criteria (TOPSIS; FMCDM;) are also used. And the new trend was marked as the relation between the financial performance and the social responsibility activities.

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Shared knowledge as a part of open science

Venelin Terziev[a]

[a] University of Rousse, Rousse, Bulgaria & Kaneff University Hospital, Rousse, Bulgaria
E-mail: vkterziev@gmail.com

Abstract

This work attempts to discuss knowledge sharing as part of the Open Science movement. It attempts to briefly analyse its historical development and the options for modern implementation of the open science idea. It discusses the process of knowledge sharing as an element of recognition of scientific works and part of social development. It seeks a solution to the established national and other restrictions for sharing of knowledge, as well as its importance in the situation of limited sharing.

Keywords: knowledge, open science, regulation of knowledge

Jel Codes: I20, P00

1. Introduction

The definition of Open Science states that it is a summarizing concept of the movement that aims to make research and research results accessible to all interested people, amateurs and professionals. It includes the publication of open research works, campaigns for open access, the encouragement of scientists to practice open-notebook science, and the facilitation of scientific work and the publication of scientific knowledge in general.

The movement dates back to the 17th century with the advent of the first scientific journals, when the public need for access to scientific knowledge led groups of scientists to start sharing resources and working collectively (David, 2004a). Today, there is a debate about the extent to which scientific information should be shared (Nielsen, 2011). The conflict is between the desire of scientists to have access to shared resources and the desire of individuals to earn when others use their resources (David, 2004b).

An article in the journal "Az Buki", issue 1/2021, under the title "Open science - the mission is possible" makes an attempt to justify this possibility in Bulgaria (2021):

The introduction of open access to scientific information and scientific data in our country is related to the priorities set in national strategic documents for the development of science, research, innovation and dissemination of scientific achievements. The Operational Plan for implementation of the first stage of the National Strategy for Research Development in the Republic of Bulgaria 2017 - 2030 and the national concept for application of the principle of open access to scientific information analyse the trends in the development of open science and set the necessary steps, actions and preconditions for approving the open access initiative. The creation of the Bulgarian portal for open access to scientific information is an important step in the process of development of open science in our country. The portal is maintained by the Minister of Education through the National Center for Information and Documentation (NACID) in implementation of a European recommendation dated April 25, 2018 on access to scientific information and its storage. The Bulgarian Open Science Portal is part of the implementation of the large-scale task to unite and freely access all results of research in Bulgaria, funded by public funds. In addition, all scientists who wish to provide open access to their publications are encouraged to publish in the portal and its repository, even if they are not publicly funded. This will ensure the widest possible access to scientific publications and this will contribute to the development of science and its dissemination among society. Joint efforts and coordinated actions of all interested people will create the conditions for the success and sustainability of open science in Bulgaria.

According to the Universal Declaration of Human Rights adopted by the United Nations, each person has the right to freely participate in the cultural life of society, to enjoy the arts, participate in scientific progress and enjoy its achievements. Everyone has the right to protect their moral and material interests that are the result of any work of science, literature or art of which they are an author. The genesis of open science movement is based on the inalienable human rights defined in Art. 27 of the UN's Universal Declaration of Human Rights. The phenomenon is multi-layered and has gained global importance nowadays. A number of organizations at global, regional, national and institutional level are involved in open science. The main ones are few. At the 40th session of the

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UNESCO General Conference, the Member States instructed the organization to develop an international tool for setting open science standards in the form of a recommendation. This process is expected to lead to the adoption of the document in 2021. The Organization for Economic Cooperation and Development (OECD) published a report entitled: "Making open science a reality". It reviews policies in this field. Evidence of the impacts of the promotion of open science and open data is analysed. Legal barriers and solutions for greater access to research data are also explored. It describes the key participants and their roles and evaluates the progress in the OECD and selected not-member countries based on a study of the latest policy trends.

2. Shared knowledge as a part of open science

The European Union has made the greatest progress in promoting open science as movement, politics and culture. A number of European Commission's initiatives and documents are tracing the way for turning the open science into reality. Amongst the leading documents is the Amsterdam call for action towards open science from 2016. It describes clearly and in detail the steps to be taken, as well as the EC recommendation dated 25 April 2018 on access to scientific information and its storage. For the purposes of the movement, a platform for open science policy has been set up, where latest news, events, publications on the subject are uploaded. Open science is often defined as a summarizing term that includes various actions aimed at removing the barriers for sharing any kind of output, resources, methods and instruments at each stage of the scientific research process. Open access to publications, open research data, open-source software, open cooperation, open review, open research notebook, open educational resources, open monographs, citizen science and research group funding are the main features of open science. This is a continually developing initiative that covers various movements aimed at sharing all types of science resources. In the publication "Open innovation, open science, open to the world - a vision for Europe", the European Commission defines open science as a "a new approach to the scientific process based on cooperative work and new ways of diffusing knowledge by using digital technologies and new collaborative tools. The idea captures a systemic change to the way science and research have been carried out for the last fifty years: shifting from the standard practices of publishing research results in scientific publications towards sharing and using all available knowledge at an earlier stage in the research process". The EU-funded project FOSTER is aimed at fostering the practical implementation of open science in "Horizon 2020". Its primary aim is to contribute to a real and lasting shift in the behaviour of researchers and to ensure that Open Science becomes the norm, by providing resources for practical guidelines and trainings in the same-name portal to help researchers. The Open Science manual states "Open Science is the practice of science in such a way that others can collaborate and contribute, where research data, laboratory notes and other research processes are freely available, under terms that enable reuse, redistribution and reproduction of the research and its underlying data and methods. In other words, Open science is transparent and accessible knowledge that is shared and developed through collaborative networks". Open access is one of the main aspects of Open Science. Among the first major steps in its support is the Budapest open access initiative since February 2002. The definition states "free internet access that allows all users to read, download, copy, distribute, print, search or connect the full texts of these articles examining the indexing content, transfer them as software data or use them for any other legitimate purpose without financial, legal or technical barriers other than those who are an integral part of receiving access to the Internet. The only limit to reproduction and dissemination and the only copyright aspect in this area should be the authors` right to control the integrity of their work and the right to be duly recognized and cited". Budapest's initiative was followed by Bethesda statement on open access publishing from 20 June 2003, drafted at a meeting held at the headquarters of the Howard Hughes Medical Institute in Chevy Chase, Maryland. The principles are designed to "stimulate discussion within the biomedical research community on how to proceed, as rapidly as possible, to the widely held goal of providing open access to the primary scientific literature". A little later, in October 2003, the Berlin Declaration on Open Access to Knowledge in the field of Natural sciences and Humanities was issued. The aim is to stimulate the easily accessible distribution of knowledge to educate the society through free online access in a sustainable and interactive network with interoperable software. Open access is defined as a practice for providing online access to scientific information that is free and reusable. In the context of research and development, open access to scientific information relates to two main categories – scientific publications (mostly reviewed research articles published in academic journals) and research data (unpublished data or raw data acquired during scientific research). There are two main recommended ways to provide open access via self-backup, or so-called "Green Road" - the author or his representative deposits the published article or the final reviewed manuscript in an online repository before, simultaneously or after its publication (2021).

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There are many documents that define relationships and positions in education and science – from laws and normative documents to regulations, standards, ordinary rules and many more. Each such document has a precise and certain place in terms of meaning and content. Within a specific frame, everyone develops pursuant to these systems – teacher, lecturer, scientist ... which is needed, yet an insufficient condition, to be a good teacher, lecturer and scientist. The teacher, the lecturer, the scientist teaches, distribute and share knowledge. And knowledge is a special category. It is not a fruit or vegetable to be sold or exchanged. Knowledge is a "great event" and this is how we should refer to it – as to something great.

2.1. What are the peculiarities of knowledge?

The Oxford English Dictionary defines knowledge as: facts, information and skills acquired through the experience or education, the theoretical or practical understanding of the subject, or what is known in a given area as a whole or awareness, acquired by experiencing a fact or situation.

To know means a lot, and a little. You know a lot, but the knowledge limited to one`s personal space remains only individual possession. It brings relatively little benefit to others and society. The power of knowledge is in its sharing – either verbally expressed, spread, taught or written. The more you distribute the knowledge, the more useful it is for a society and its development, it becomes alive. The shared knowledge is fundamental to human survival and development. Shared knowledge generates new ideas, creates opportunities and prospects, removes limits, creates new products and enables any development. In the business environment, shared knowledge is an invaluable resource and a driving force for the functioning of market relations, from which the end user always wins.

It is not accidental that open educational and scientific spaces are created, which even cover political and social initiatives (European Open Science cloud, European Research Area, etc.).

2.2. How do we share knowledge?

In order to share knowledge, you have to master it, you should not only possess someone else`s knowledge that you have realized, analysed, rationalized, but you should enrich it with your opinion, comment, or your own knowledge, acquired with your own efforts. Knowledge is shared in many ways, often not defined as such. Teaching and research work are defined as fundamental in knowledge sharing.

To teach, distribute and share knowledge with others requires many other things (skills, experience, competencies, mastery of communication channels, various amplifiers, etc.) that cannot be read or found in laws and regulations. Beyond the documents it is required to have certain qualities like specific and quality creative energy, dedication, self-sacrifice, understanding, empathy, sympathy, lust for learning, indomitable spirit, desire for discovery, indefatigability, constant striving for improvement, intransigence and many other purely professional features. In order to be a good teacher, you do not have to read the textbooks or ask the right questions to evaluate your students, to have your lectures in the classroom and laboratory and write a number of publications to follow the path of academic growth. Being a good teacher and scientist is a mission that only few can pursue. That is why I believe that to be a good teacher means to be able to share knowledge so that it reaches many people and in a way that will create new knowledge. Then there is a point in living for and with knowledge. For those who share knowledge this is their essence and meaning, it is their belief. Is everyone capable of this – to fully devote yourself to the point of exhaustion or not being able to do so? And even if you do not have such opportunity, for a number of reasons, this is a matter of your own development.

However, knowledge is not only shared through teaching. Knowledge sharing is performed in many ways outside of school and university. And these methods are no less important, because they create an environment and a network for process continuity. This has long been invented and we only apply these methods without thinking about the significance they bring, the effects they create and the influence they make. Conferences, seminars, congresses are the places where knowledge is shared. The same knowledge can and should be shared on many different forums. And there is nothing wrong or unnatural about that. The same knowledge can be described in many scientific, and not only scientific journals, and there is nothing wrong about that either. Thus, it reaches a much larger and more diverse audience, finding its users. This way it stimulates new ideas and creates followers.

Does knowledge need followers? One, I hope, rhetorical question that has an unambiguous answer. Yes – in order to be shared, knowledge must have its followers. Otherwise, how certain ideas, thoughts, deliberations or theses will reach a certain community and how will they become a necessity? This is a contribution that not everyone can and does make. It is very fashionable to talk about "influencers" today. There is no greater "influencer" than shared knowledge. As long as we give it a chance and do not limit it – due to a lack of understanding and a desire to put

it in frame. And even worse – to put chains on it that will keep it where someone has decided is its place. There have been such times and periods, but today, we hope they are over.

Today, in the period of transition from automated to digital systems, the distribution of knowledge takes place in different ways, with the help of different methods and techniques than a century ago. Naturally, the most important of them is learning – formal, non-formal, informal, which takes place in and out of school. Furthermore, the school is supported by many additional methods for distribution of knowledge – organized or unorganized, individual or collective. Many lecturers, scientists, researchers, managers and various specialists analyse this topic and there is always something different and interesting in their opinions regarding the different types of knowledge and the different ways of its distribution.

At the same time, many managers not only analyse, but also create rules by which knowledge is distributed and shared, and when everything is put in a certain framework, it fades and brings relatively little added value. When managers create the framework "you can - you cannot", "you get - you do not" and this framework is formalized to the degree of favouritism or elimination, to the degree of creating friendly circles, to the degree of creating an academic layer without much contribution to knowledge, but with possibilities for distribution of influence – then knowledge also loses its main purpose, it loses a lot. It loses because the manager "gets" a bonus for everyone who is below him in the hierarchy to become "visible". It doesn't matter where you rank on the list of authors, only the number is important.

True knowledge does not follow this pattern. It tries to come to the surface in different ways – informally, personally, with its own style. It enters new audiences, appears in front of new listeners and fulfils the mission of sharing and distribution. Whether this type of knowledge will receive a title or recognition is a matter of approach. Maybe, but not for sure! Is this type of knowledge useful? Yes, because it creates. Does not participation in various competitions through which we strive to engage young people to pursue teaching or research count as knowledge sharing? Why do we do this? Because today we lack leadership in knowledge. Leaders and not managers attract young people. Leaders do not share knowledge in order to be liked, but to create followers of knowledge. They are innovators and they are different. They are liked if they are attractive, if they know a lot, if they know how to communicate, if they carry the charisma of the knowledge they have. And isn't this a new reading?

Knowledge, which is distributed through various means, such as books, magazines (of various kinds), newspapers, electronic platforms and the Internet, means familiarity with certain content, information about facts of various kinds and allows for understanding, associativity, reasoning, perception and discovery. Certain and different processes start from knowledge. Of course, all these considerations do not provoke a violation of the rules, but seek that change that will create new models of knowledge sharing. Knowledge management and artificial intelligence are part of this unexpected but unavoidable process.

Every mean of knowledge distribution can be referred to as knowledge sharing. To my mind, it is the sharing of knowledge that makes it alive, active, useful, working, effective, ensuring the development not only of the relevant factual resource, but also generating a new one. Every teaching activity, no matter where – at school, university, training center or scientific structure – is an activity of knowledge distribution and sharing. But not everyone who does it gets to the top of sharing. Knowledge sharing is a network activity, as the network grows to huge sizes, requiring strict systematization and consolidation by topic in order to be able to cover and to continue its development. On the one hand, teachers and scientists teach knowledge accumulated so far, on the other hand, by expressing their own opinion or adding their own research and studies, they enrich and further develop it. With a small amount of knowledge, like it was at the beginning of its accumulation, each newly discovered fact was usually named after the person responsible. This is how many laws in science that bear the names of their discoverers appeared. This is how the "Eureka" exclamation reached many people, but is it possible to achieve similar effect today with a publication that will be read by a limited number of people (and in some cases only by the authors)? With the accumulation of vast knowledge that are even difficult to systematize, this does not always happen, or only happens in special cases of serious discoveries and contributions. Recognition of the contribution of anyone who has added even a little new knowledge is done differently. Thus, the citation of the contribution becomes an important element of the evaluation of this contribution to the development of knowledge.

Nowadays, when knowledge and science occupy huge space in economic, social, research life and social development in general, it is becoming increasingly difficult to track contributions. Evaluating contributions to the development of knowledge before you, before your own work, is not so important for documentation as it is important from the point of view of recognition, of ethics in relation to everyone who has contributed their own development to the development of knowledge. Therefore, the evaluation of the contribution is inextricably linked

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to the sharing of knowledge. The difference between evaluation and sharing is that you evaluate and distribute the evaluated knowledge as an original, but in sharing you put your own understanding or create "new developed knowledge". "I believe that each of us possesses useful knowledge that he or she can share with others and even should do it at every opportunity to help those pursuing the same professional path – just as he or she received assistance and guidance from the more experienced colleagues in the beginning. From my own experience the best programmers, designers, businessmen, coaches and others like being asked questions and give advice to people who are just starting their careers, changing professions or need other types of help. However, they are rarely asked because many people think that these experts are "unreachable" and are afraid to just write to them asking a question", said Silvina Furnadzhieva, the site's founder (www.edinvapros.org).

Shared knowledge becomes part of every creative path, i.e., you can share it with different audiences, in different ways, adequate to those audiences, and that's how you participate in the process. In this sense every way is important and valuable.

Sometimes sharing knowledge would not be possible when a research paper is published in our own university edition and only in Bulgarian. An unbiased assessment in this regard would be that the users of such knowledge are limited to the circle of our colleagues and a very small number of people outside. Different means of knowledge sharing like publishing and distributing it in various scientific publications, platforms, presentations at conferences and seminars and last but not least in different languages, help expand it. The limited use of the Bulgarian language is a kind of barrier and even an obstacle to the transfer of knowledge. Examples in this direction include translations of a number of Bulgarian writers and authors (which have been translated into dozens of languages), as well as of scientific publications presented with the same content in a number of scientific journals. The SSRN research platform provides detailed information of this nature, which in practice proves to be an effective amplifier for knowledge transfer. Otherwise, it will remain in a closed system, and it needs to be perceived, affirmed and, last but not least, to be recognized by the community.

3. Conclusion

We share knowledge verbally and in writing. In verbal knowledge sharing we can omit names, dates, positions, but it is not the same in written works. There, every name and year is important, in order to follow not only the ethical norms of the recognition of achievements, but also to provide that systematization which is important from a factual point of view. There every author's opinion is significant, that is not "taken" from anyone, i.e. - this is the actually created knowledge, which becomes part of the general. This is where we encounter the terms "citation", "self-citation", "plagiarism", "self-plagiarism"' – frightening terms that can not only confuse knowledge sharing, but can also destroy one's destiny. The first two terms are, of course, surmountable and in some cases "re-used" - either out of reinsurance or out of a desire to create prestige in terms of analyticity. When it comes to using the methods of publishing, this can also be expressed by sharing your previous experience (research) and in fact each subsequent work is an upgrade of the previous one. Such sharing can and is done more than once and it does not in any way violate the norms for the distribution of knowledge. And this is important because it is not just sharing. This is an upgrade and it becomes part of the general development of knowledge. In today's science, this is called self-citation.

The other two concepts can be compared to a scientist's and a teacher's guillotine or to sending them to a not very favourable group, which marks them as harmful or even expels them from the system. "Non-plagiarism" is a skill, but "plagiarism" is an inability to share knowledge. It is true that no one has the right to boast with other people's achievements and other people's knowledge. However, it is a matter of consideration whether someone`s knowledge is enriched and further developed, whether it creates value or benefits society.

When it comes to "self-plagiarism" it is difficult for me to give a definition – an author plagiarizes himself ... If plagiarism literally means using someone else`s work, then self-plagiarism is the use of one's own work. Something like an autoimmune disease. Is knowledge suffering from this?

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Mechanisms affecting innovation development of industrial business organizations

Venelin Terziev[a] & Viladimir Klimuk[b]

[a] *University of Rousse, Rousse, Bulgaria & Kaneff University Hospital, Rousse, Bulgaria*
E-mail: *vkterziev@gmail.com*
[b] *Baranavichy State University, Baranovichi, Republic of Belarus*
E-mail: *klimuk-vv@yandex.ru*

Abstract

The article presents the mechanisms influencing the development of innovations in industrial business organizations in the Republic of Belarus, emphasizing the stimulation of the innovative development of organizations from the real sector of the economy, research and education sector The innovation policy plays an important role in the development of country`s competitiveness, creating favourable conditions for the increase of financial potential, development of intellectual resources, modernization of scientific and innovation infrastructure.

Keywords: education, business, organization, innovation development, economy

Jel Codes: M21, O10

1. Introduction

Stimulation of innovation development of organizations of the real sector of the economy, research and education sector and business is determined by the need to increase country`s competitiveness in the world economy by ensuring new markets, growing demand for innovative products and additional financial flows. The successful implementation of this process, related to innovation development of organizations, is a comprehensive process of intellectual potential development, improvement of communication channels between partners (participants), search for main and alternative sources of funding for research and innovation developments.

2. Mechanisms affecting innovation development of industrial business organizations

The innovation policy plays an important role in the development of country`s competitiveness, creating favourable conditions for the increase of financial potential, development of intellectual resources, modernization of scientific and innovation infrastructure. An analysis of the level of innovation development of countries based on the main indicators of the European innovation scoreboard (2021a) indicates a high level of the Republic of Belarus compared to the average in the EU and, in particular, in the Republic of Bulgaria. These indicators include a share of employment in knowledge intensive sectors (exceeding the value of this indicator by 3,6 times and by 2,63 times compared to Bulgaria and the EU average, respectively), sale of innovations new to the market and to an enterprise (increase by 2,55 times and 1,22 times compared to Bulgaria and the EU average, respectively) (Fig. 1). Those values indicate the development of a state system for motivating organizations` innovation activity, stimulating R&D and innovation activities in the direction of intellectual potential development as the driving force of innovation development. In general, the indicators for the state funding, share of knowledge-intensive products export and share of innovative products export are at the same level in Belarus, Bulgaria and EU, which demonstrates the similar priorities for innovation policy implementation. The indicators reflecting the share of commercial funding for R&D, the share of small and medium-sized enterprises implementing internal innovation, as well as the share of participants of the joint projects are lagging behind in Belarus, which is characterised by an insufficient level of interaction between the scientific and educational organizations, the real sector of the economy, business and government authorities. To eliminate these problematic issues in the country, since 2017 an emphasis is put on the entrepreneurship development within social and economic development of Belarus, which includes the improved mechanisms for interaction between state authorities and business entities (2021b); support policies for small and medium-sized enterprises (2021c; 2021d); development of the activities of innovation infrastructure entities (2021e) and their performance.
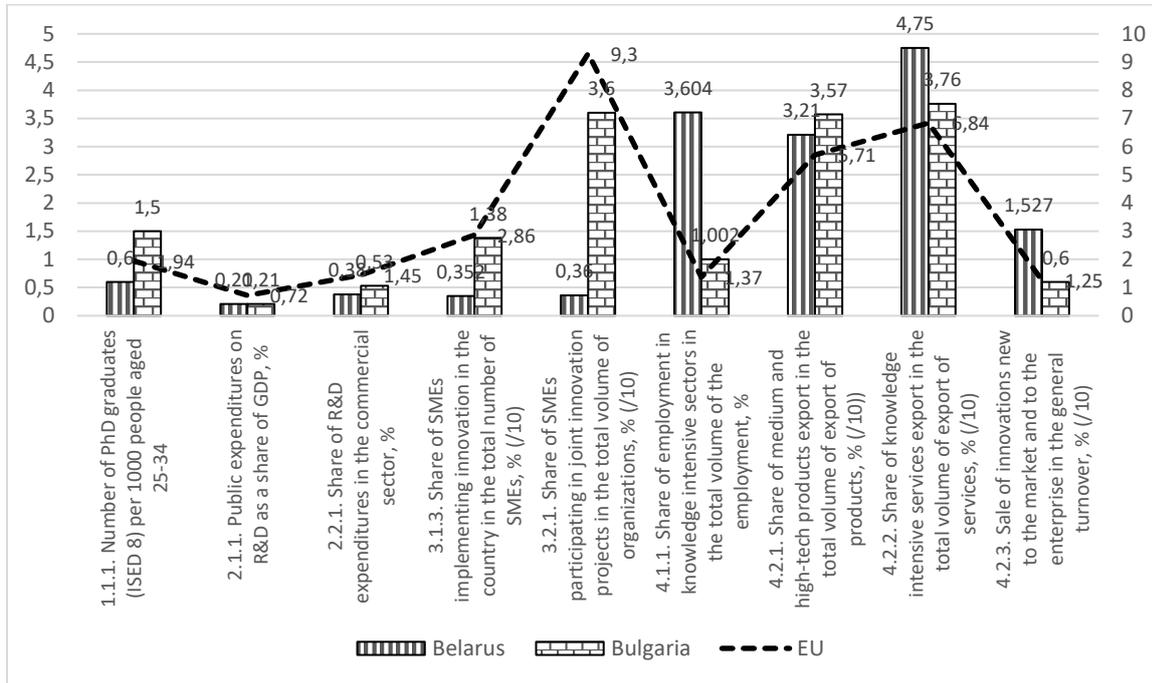
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Figure 1. Main indicators of the European innovation scoreboard in the Republic of Belarus, the Republic of Bulgaria and the European Union for 2019 (2021f)

Source: Authors

According to the Global Innovation Index reports, the Republic of Belarus ranks 64th out of 131 countries in 2020 in terms of this indicator (31,27 points, which is 1,1% more than the average), in 2019 Belarus ranked 72nd out of 129 countries (32,07 points, which is by 5,2% less than the average). For comparison, Bulgaria in 2020 ranked 37th (39,98 points, which is by 27,8% more than the average) and 2019 – 40th (40,35 points, which is by 25,8% more than the average) (Fig. 2) (2021g).
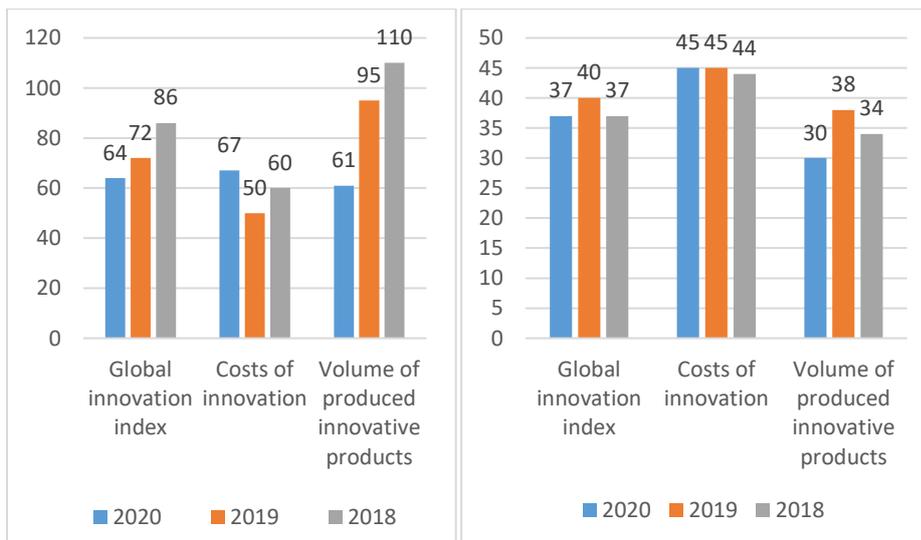
Figure 2. Ranking of the global innovation index of the Republic of Belarus and the Republic of Bulgaria for 2018-2020 respectively, ranks (2021h)

Source: Authors

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An analysis of the statistical data demonstrates a positive tendency of the global innovation index in 2020 compared to the previous years` values in the Republic of Belarus and in the Republic of Bulgaria. It should be noted that the ranking of Belarus and Bulgaria in terms of investments in innovation has deteriorated. Despite that, it is important to mention that the analyzed countries have shown a significant increase in their ranking in terms of the return of investments on innovation (the volume of produced innovative products, works and services).

For successful implementation of innovation in organizations – creation of a finished innovative solution (product, work, service) – it is necessary to develop effective mechanisms that would make the process precise and gradual and ensure the coherence between the actions of the parties for achieving the set objectives. The mechanism of innovation development of an organization is a set of interrelated actions agreed in terms of resources (financial, intellectual, material and technological resources), deadlines of each stage, responsible contractors and partners, expected outcomes (priorities) and possible risks. Such structure of the mechanism allows considering performance (expected economic and social effect) and resource costs (needed current costs, investment resources).

Apart from this, the mechanism acts as a universal approach to increasing innovation performance. For more specific implementation of mechanisms of innovation development in individual organizations (regions) it is necessary to develop a detailed programme of actions, i.e. a road map for innovation development.

Based on a number of authors` research papers (Terziev and Klimuk) (Terziev, Klimuk, 2021i; 2021j; 2021k; 2021l, the mechanisms of innovation development of organizations are arranged in 3 groups: financial and legal, information and knowledge-based and organizational and managerial (Table 1).

Table 1. Mechanisms of innovation development of industrial business organizations

Mechanism	Tool	Way of implementation	Coordinators (communication channels)	Priority (expected outcome)	Risks
Financial and legal	Combined scheme of funding research and innovation	Financing research and innovation with budget funds and costs of private organizations through actual participation of potential buyers (consumers, clients) in the process of creating an innovative product (work, service).	Ministry of Finance, Ministry of Economy, State Committee for Science and Technology, sector ministries, local authorities, partner organizations	Receiving additional finances for successful and timely innovation project implementation (creation of a product, work or service). Increasing the interest and quality of interaction between the developer and the buyer (user).	Reduced share of budget funds for research and innovation. Reduced paying capacity of private organizations. Poor interaction between the developer and the client (partner).
	"Flexible" calculation of expenses	Developing cost estimates for generalized (structured by purpose and results) expenditure items with a possibility of adjusting the quantity of needed products (works, services), their price within the total allocated funds and the need to direct them to achieve the planned results (with a preliminary assessment of the	Ministry of Finance, Ministry of Economy, other sector ministries (innovation development oriented), local authorities, partner organizations	Prompt adjustment of product items (works, services) during research and innovation taking into account changing conditions, reduced duration (stages) of the process of approval of finances on each purchase, justified costs based on the results achieved (intermediate and final).	Difficulty in the development of a single and universal algorithm for 'flexible' calculations (in terms of sectors). The probability of misuse of budget funds by individual recipients. Insufficient level of competences of

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	validity of these costs, an operational and simplified coordination of the procedure for distribution and volumes of financing).			compliers, lack of experience in developing and reporting procedures.
Funding from international grant giving organizations	Searching for international organizations (funds, programmes) that provide funding for research and innovation, Preparing application documents for participation in open grant funding competitions.	Sector ministries, partner organizations	Receiving additional funding (foreign funds) for financial incentives for innovation projects implementers and researchers, for development of material and technological base for significant accomplishments in innovation. Development of international scientific and technological cooperation and international network of innovation infrastructure entities.	Reduced possibilities of foreign funding (incl. non-refundable) (introduction of restrictions in legal documents concerning a list of grant giving organizations and purposes of use of foreign funds). Insufficient competences for the development of project applications and lack of experience of participation.
Crowdfunding platforms	Creation, support and development of crowd platforms on the Internet (incl. with global investors) for introduction of new innovation ideas in various fields and search for investments resources.	Ministry of Finance, Ministry of Economy, financial institutions – contractors, partner organizations	Receiving partial (full) expenses coverage for the implementation of research and innovation activities through online fundraising from interested users, and search for potential participants (contractors) in the working team for innovations development.	Insufficient development of such form of alternative funding (lack of a clear system of crowd-platforms management, incl. with global investors). Low interest.
Local incentive funds (internal grants)	Initiating separate (joint) incentive funds (for research and innovation development) in organizations for targeted financing of research and innovation by means of deductions in the form of percentage from each successful research or innovation activity (grants for the implementation of research and innovation, organizational fees	Partner organizations	Creation of a reserve fund to be used as an additional source of financing the implementation of the set objectives in research and innovation activities.	Low number of activities/events for the provision of paid services. As a result – insufficient amount of contributions to the fund that cannot cover costs of an individual (initial) stage of work.

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		and other charged services).			
	Preferential terms of taxation, lease	Reducing tax rates regarding the results of research and innovation activities, rental costs for organizations implementing research and innovation developments, as well as innovation start-ups.	Ministry of Taxes and Levies, State Committee for Science and Technology, government authorities.	The release of part of the funds (as a result of a reduction (temporary cancellation) of tax rates, a decrease in the amount of rental payments) for research and development of innovation projects, so that to use them as an additional source of financing.	The probable lack of significant accomplishments in research and innovation activities as a result of the introduction of incentive measures. Failure of the authorities to agree on these incentive measures. Formal use of these "benefits" by individual organizations.
Information and knowledge-based	Continuous training system for employees	Introducing in organization, those carrying out research and innovation in particular, the mandatory training system consisting of professional training, short-term training programmes, internships based on the development of individual (from an organization) innovation potential.	Partner organizations	Increase of professional, social and individual competences of employees in order to improve their performance in implementing scientific and technological tasks, innovation processes and activities, generating new ideas (solutions) that would ensure optimized use of financial resources, conditions for 'conquering' new markets and expend target consumer segments.	Insufficient funding for the implementation of training programmes. Lack of interest among employees themselves (fictitious approach to training).
	Base of innovation requests and proposals	Maintaining and updating an open Internet database of technological requests from organizations of different industries, innovation proposals from developers (research initiators)	Partner organizations, government authorities	Stimulation of direct interation between innovators and clients through monitoring the current organizations` needs in terms of innovative solutions and searching (based on selection determined by given parameters) potential contractors (developers).	Probability of database obsolescence (data on requests and proposals are not updated). Lack of demand for innovative products from developers and clients.
	Information resource for monitoring and predicting the development of organizations	Implementing and using specialized software in organizations to assess the current level of innovation performance and create predictive	Partner organizations	Ensuring the possibility of receiving operational information on the state of innovation development by identifying	Probability of a formal approach of managers to using the data obtained for development of effective

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		scenarios for innovation development.		'bottlenecks' that need to be fixed.	corrective actions.
				Rational distribution of limited resources (financial, intellectual, material and raw materials) in compliance with the results of the current and predicted state of innovation development.	Time-consuming calculations and analytical procedures. Insufficient competences of users.
Organizational and managerial	Innovation alliances based on a cooperative resource model	Establishing regional (interregional or international) associations based on a cooperative resource model, which would represent the research and education sector, the business sector, government authorities and public organizations to accomplish one (narrow-focused) or a few (narrow-focused, full-range) innovation tasks regarding priorities or specific features of the region (country, possible international cooperation).	Partner organizations, sector ministries	Joint exploitation of resources by partner organizations to generate new innovative (creative) ideas (technologies) (develop innovation potential, exchange experience), to obtain additional sources of funding, to optimize part of the costs, to have access to modern material and technological infrastructure, to initiate adjustments to the legal regulatory system to stimulate innovation.	Lack of full commitment from each partner to achieve the objectives. Difficulties in distributing the final financial result (profit). Difficulties in ensuring the needed financing on the basis of participation of all partners. Insufficient interaction between the partners.
	Scientific and applied science activities	Initiating the obligation to organize (participate) in applied sciences events: conferences, forums, exhibitions of the developments, workshops, trainings, round table, etc.	Partner organizations, sector ministries	Presentation of the accomplishments of research and innovation activity of organizations to find potential investors, partners, contractors for working team of innovators, to increase professional competencies of employees, to receive feedback and critical assessment from potential buyers (clients) of innovative products (works, services) with further development of measures aimed at eliminating (balancing) the drawbacks, to receive support from government authorities (ways to stimulate innovation).	Insufficient funding for successful organization of events. Lack of experience of holding practical research events. Insufficient interaction between the initiator of the event and partners or participants (lack of mutually beneficial interests and future profit).

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| Joint research and innovation centres (incl. international and interregional) | Establishing specialized research centres focused on the development of innovative solution in different fields by scientific, educational organizations, organizations of the real sector of the economy and other organizations of the social sphere. | Partner organizations, sector ministries | Development of new solutions, generation of new ideas on current problematic matters (on sectoral or cross-sectoral level) based on processing and interpreting of data obtained during joint research, innovation projects in order to create an innovative product (work, service), improve (optimize) the production, organizational and managerial processes (in terms of time, financial resources, raw material base, material and technological infrastructure). | Insufficient financial resources for establishing these centres. Low performance level. Insufficient professional competences of employees of such facilities. |

Source: Authors

The mentioned mechanisms affecting innovation development act as a guide to action for organizations on the basis of thorough analysis of the current development state of an organization (region, country) and the retrospective analysis of its activity. The competitive advantages and bottlenecks (drawbacks) in activities identified on the basis of these analytical procedures determine the choice and implementation of appropriate tools within the framework of mechanisms affecting innovation development.

For a clear and comprehensive implementation of innovation development mechanisms it is appropriate to use 'road maps' of innovation development created on the basis of chosen priorities (planned outcomes) and means for their achievement within financial and legal, information and knowledge-based and organizational and managerial mechanisms (Fig. 3).
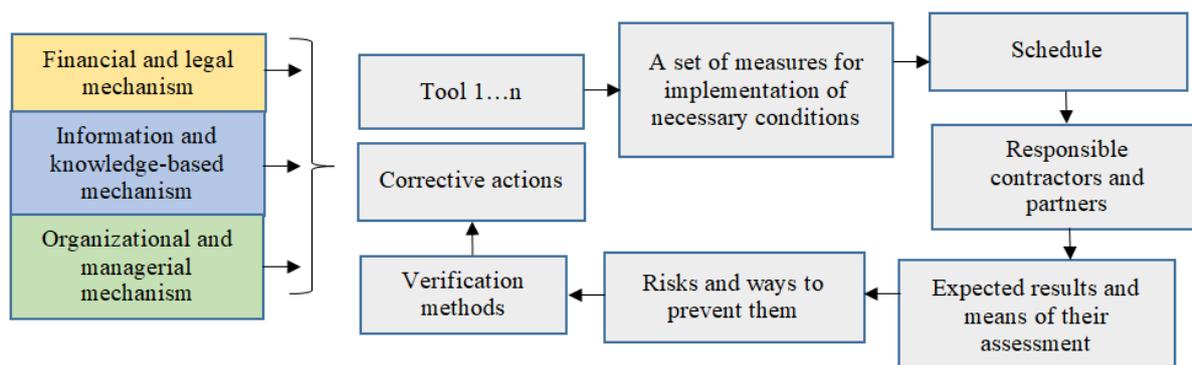

Figure 3. Basic 'road map' structure of innovation development of industrial business organizations

Source: Authors

It would be effective to use this structure as a foundation for the development of a 'road map' for innovation development of organizations (regions, a country). It is developed on the basis of:

- a set of selected tools within each of the discussed mechanisms,

- a set of measures aimed at successfully implementing them in the activities of an organization (region, country),

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- factors and conditions necessary for a successful implementation of the planned activities,

- a schedule for each tool, activity,

- a group of contractors and interrelated partners that ensure the implementation of the activities,

- expected results based on the success of implementation of each activity and, necessarily, a system of quantitative measures (for assessing the degree of achievement of planned results),

- considered risks, their possible consequences and measures for their prevention (elimination, reduction),

- means of verification (to recognize the accomplishments and compare them with the expectations),

- a set of corrective actions needed for immediate regulation of innovation processes, managerial and organizational actions in compliance with the developed plan.
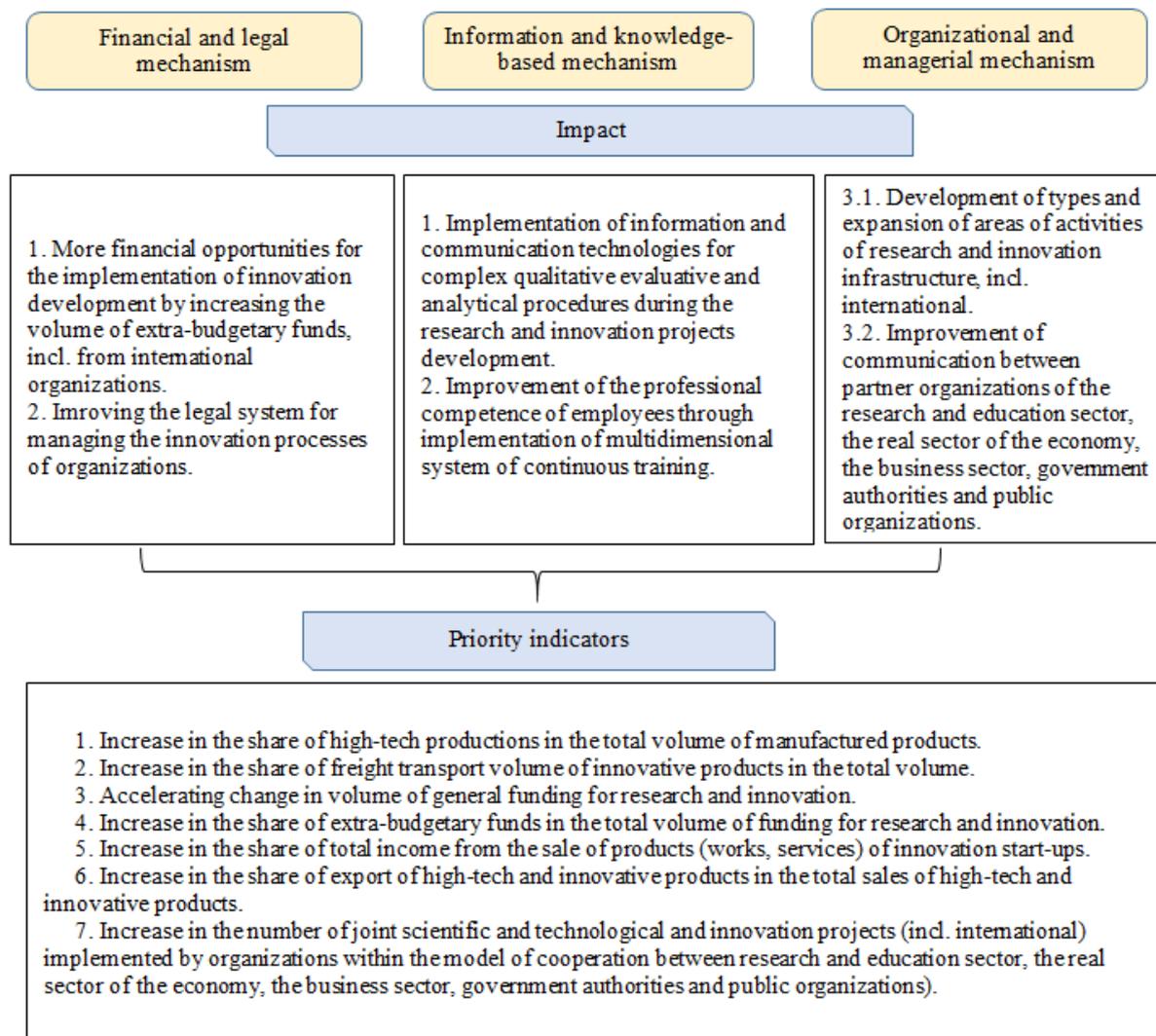
Figure 4. Results of implementation of mechanisms for innovation development of organizations

Source: Authors

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The developed mechanisms for innovation development of organizations are focused on the stimulation of innovation, improvement of its performance and the return of invested resources. The described mechanisms with the help of specific tools should ensure dynamic impact on the overall innovation development level (Fig. 4).

3. Conclusion

To conclude, in the contemporary conditions an active search for organizations in the national and international markets of products (works, services) and innovations and the development of financial potential should be performed with the help of effective mechanisms of innovation development. These mechanisms would ensure a systematic, interconnected and gradual implementation of innovation policies by organizations in particular and regional and national innovation policies in general to increase competitiveness on a global level. The process of innovation development of organizations includes the following components: development of financial potential, adaptation and flexibility of legal system for stimulating innovation, research and innovation infrastructure, intellectual potential, active implementation of information and communication technologies in the main and additional activities. The mechanisms provide for tools that ensure the implementation of specific objectives, while providing the ways of their implementation, a team of contractors and partners, expected outcomes and possible risks. According to the set priorities, assessment of the current (and retrospective) state of innovation development, an organization develops a specific action plan in the form of a 'road map' on the basis of tools, forms and ways of implementing each mechanism of the innovation development system. The implementation of each stage of the 'road map' for innovation development allows achieving the planned objectives by ensuring the stimulation of innovation activities of organizations within the cooperative resource model and strengthening international competitiveness.

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Georgi Rakovski - whom we must remember and follow

Venelin Terziev[a]

[a] *University of Rousse, Rousse, Bulgaria & Kaneff University Hospital, Rousse, Bulgaria*
E-mail: vkterziev@gmail.com

Abstract

This article follows and reviews the life of Georgi Stoykov Rakovski, as a role model in behavioral, national and cultural aspect. The opinion of various Bulgarian researchers from different periods is presented, as meanwhile an attempt is made to assess the development of the national culture, education and folklore. Defining the national identity is the basis of the current piece of work, which puts Georgi Stoykov Rakovski, as one of its pillars.

Keywords: national identity, Georgi Stoykov Rakovski, cultural development

Jel Codes: P00, I20

1. Introduction

Enlightenment is part of the maturation of a society and in its purpose and essence it is the difference that forms its identity, strength and opportunity for development. Also called the „age of reason", the Enlightenment was an age that not only praised man and his wisdom, but also imposed the awareness that a change in public order was needed. This hardly happens in an instant or is the result of a specific action, but rather part of an overall path of growth. A path different and similar for each nation. A path that we, the Bulgarians, have walked with our own steps, searches and achievements.

2. Georgi Rakovski - whom we must remember and follow

Whether we are looking for and where we find our enlighteners today is a complex question that may have many and ambiguous answers. History gives us sufficient reason to believe that in far more difficult and tumultuous times, the Enlightenment has survived. Moreover, it is the force that has given impetus to a number of events. And if today we explain prosaically that „The World Is Big and Salvation Lurks Around the Corner", the truth of salvation is hidden or covered with dust. The German writer with Bulgarian roots Iliya Troyanov seeks an answer to this question in his book with the same name and offers not just a plot of an interesting story, but the image of the one who can „wake you up" - with an outstretched hand and a way to himself. The story of Alex - a young man, a child of emigrants forced to flee Bulgaria to Western Europe in the 1970s, lost his parents in a severe accident, and he himself lost his memory. All those threads that connect him to the world disappear. What's worse is that the passion for life disappears. And then his grandfather comes to him - the only remaining connection between past and present, between memory, family and hometown. They, two strangers, but with a coded memory of a common past, take the road home. A path that returns Alex not just the memory, but the desire for life. Thus, a seemingly not very awakening scenario refers us to memory as a symbol and meaning of what we have been, what we are and will be. And the term "enlightener" acquires the human measure of a person who has led you out of darkness into the desire to exist.

The desire for a creative and meaningful life is the important thing we have to look for and find, because otherwise we will get lost in the sense of meaninglessness. And if this is rather a life and moral problem, then the enlightenment work is important both for the individual and for the whole society. Sometimes these people go unnoticed alongside the storms that strike us and alongside the prosaic problems that accompany our lives. But their existence is so strong and important to all of us. Because there is no way to confuse and change the value and worth of their deeds, which have left a sign and a deep mark in our development. That is why today all of us, the followers of these significant personalities, must seek and find that desire which will guide us and encourage us to do worthy deeds. There is a long list of Bulgarian enlighteners, there are names of iconic names not only for Bulgarian history, such as Paisii Hilendarski, Neofit Rilski, Sofroniy Vrachanski, Neofit Bozveli, Lyuben Karavelov, Hristo Botev, Vasil Levski, Georgi Rakovski, Ivan Vazov, Dobri Chintulov, Hadzhi Dimitar, Stefan Karadzha, Lyuben Karavelov and many, many others. And their mission as public figures, writers, defenders and

freedom fighters has contributed to the definition of our national identity and to the formation of our strength and maturity as a nation.

In the rich pantheon of figures of the spirit, Georgi Stoykov Rakovski (1821 - 1867) is undoubtedly one of the names written in capital letters in Bulgarian history. „Love for the Fatherland surpasses all worldly goods", he says, and continues, „Let everyone write deep in his heart: freedom or death!" And he himself gives an answer to his torments and desires: „It is easier for a nation to decide to die in blood than to live in the mud".

Georgi Stoykov Rakovski has been a politician and national revolutionary since the beginning of Bulgarian political life. Known mainly to researchers and scientists, his work and mission remain insufficiently popular and appreciated. Having lived and worked on the eve of the liberation of the Bulgarian people from Turkish slavery, the great merit of Rakovski is in the unification of the scattered rebel detachments and turning them from a gathering of exiles, each attacking the enslavers in his own way and in isolation, into a politically single institute ready to serve the liberation goals of the Fatherland. His enlightenment work covers all those aspects of spiritual growth that the national self-consciousness must experience in order to reach the level of readiness that independence belongs to him, not him to it. And the undisputed „global responsiveness", by the measure of Dostoevsky, thanks to which he managed not only to look soberly at the policy of the great powers, but also to maintain his sensitivity to their morality.

2.1. A brief description of the life of Georgi Rakovski

Rakovski was born on 2 April 1821 in Kotel in the family of the relatively wealthy merchant and craftsman Stoyko Popovich and Ruska Mamarcheva. He is listed in church records as Sabi Stoykov Popovic, probably named after his grandfather, Sabi Popovic, who is a well-known fur trader and has lively ties to Romanian cities.

His father - Stoyko Popovich, is a native of the Sliven village of Rakovo, whence comes the surname Rakovski. His mother Ruska was the sister of Georgi Mamarchev - a Bulgarian revolutionary, one of the organizers of the Velchova conspiracy in 1835 in Tarnovo, a captain of the Russian army, who in July 1829 liberated the towns of Kotel and Sliven during the Russo-Turkish War (1828-1829). This prompts Sabi, in honor of his uncle, to change his first name to Georgi. In the period 1828 - 1834 Georgi Rakovski studied at the monastery school in his hometown, where in addition to Bulgarian he also studied Greek. In 1834 he entered the school in Karlovo, which he left two years later due to a plague epidemic at that time.

At the end of 1837 he went with his father to Constantinople, where he continued his education at the prominent Greek school in Kuruchushme. There Rakovski studied philosophy, eloquence, theology, mathematics, Latin, physics, chemistry, French, Persian, Arabic and other subjects. It was during his stay in Constantinople that Rakovski became a co-founder of the „Macedonian Society", which aimed to liberate the Bulgarians from Turkish rule. Under the influence of Neophyte Bozveli, Ilarion Makariopolski and Sava Dobroplodni, Rakovski joined the struggle for church independence of the Bulgarian people.

In addition to his native Bulgarian, Rakovski speaks Turkish and Greek in both versions. He is fluent in spoken and written several European languages, including Serbian, French and English. He uses Arabic and Persian. He is a bright representative of the romanticism, strongly influenced by Meinhardt and the Brothers Grimm, who through their tales create a national feeling in the German people. Under their influence he created an ethnographic questionnaire and asked all Bulgarians to fill it in and describe their beliefs, songs, riddles. Rakovski remained in the field of ethnography with „Pokazalets" (1859) and „Bulgarian Antiquity" (1865). In them he outlined for the first time the idea of collecting folk antiquities and they are the beginning of the collecting and ethnographic activity in Bulgaria.

With the higher education he received, Rakovski undoubtedly became a person with a great ideological scope - he was an ethnographer, journalist, publisher, foreign language teacher and even a poet. Rakovski was also the first ideologue and organizer of the national liberation movement in Bulgaria and its leader in the first ten years. His „students" to a greater or lesser extent are Vasil Aprilov, Dragan Tsankov, Ivan Kasabov and especially Vasil Levski.

Rakovski was a famous person for his time, known in Greece, Serbia, as well as among the Bulgarians of Odessa. His contemporaries describe him as a very handsome, elegant gentleman and with European manners. He kept a huge correspondence, which certainly helped him in the work for the liberation of Bulgaria from Ottoman rule, to which he dedicated his entire life.

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In 1866 Rakovski visited the Russian Empire, spent some time in Chisinau, the Căpriana monastery and Odessa, and passed through the Bulgarian colonies in southern Bessarabia. His purpose is to raise money for the organization of armed detachments, as well as to prepare the participation of Bessarabia Bulgarians in them. He did not achieve much success in finding money because of the pressure of the Russian police on the Bulgarian community in Odessa.

On January 1, 1867, his work „Provisional Law on the People's Forest Detachments for the Summer of 1867" was published, in which the organizational principle of the construction of the detachments and the rights and obligations of the rebels themselves were recorded. Rakovski firmly believes that with the establishment of well-organized detachments will be able to raise the people to struggle and achieve their liberation. In the spring of 1867, the detachments of Panayot Hitov and Filip Totyu were transferred to Bulgaria. Unfortunately, he could not get involved in the realization of his ideas. On 9 October of the same year, at the age of 46, Rakovski died of tuberculosis.

When today, from the distance of time, we take a look at Rakovski's life and activity, we discover, above all, the great national ideal that drives the new Bulgarian history. This great man belongs to the generation that is destined to finally prepare the political and social emancipation of Bulgarian society in a completely democratic spirit. Among his contemporaries, Rakovski is the unifying strongest and most authoritative person. Being a publicist, a historian, a politician, a poet and an organizer of uprisings at the same time, Georgi Stoykov Rakovski concentrated in himself the divided talents and aspirations of the generation that prepared the national liberation of the Bulgarians - a multifaceted, dangerous, complicated and majestic deed in itself.

According to Academician Mihail Arnaudov, one of its researchers: „Rakovski's biography is one of the most fascinating authentic novels we could read in the new Bulgarian literature. It contains all the elements of a personal destiny, woven of bold adventures and unexpected vicissitudes, of great hopes and painful disappointments; there is also a dramatic outcome, the tragic greatness of which can fill the following generations with enthusiasm and gratitude. It is not the imagination of the poet, who transferred his free visions to a turbulent past, but the time and the conditions that create the hero here with his high aspirations and his memorable deeds. And we can only grieve that Rakovski fails to write his started „Zhitie" in order to introduce us to the details of the seemingly wonderful misfortunes, to his hopes, pains and disappointments. Such a story would be invaluable in our attempt to penetrate the spirit of the era and understand the real foundations of a rare heroic legend".

In the foreword to his monograph on the famous figure of the Bulgarian and Balkan Revival, academician Mihail Arnaudov summarizes: „This man has a strong love for his family and fatherland, his will is extremely active, his moral culture is healthy and rich - and this is a necessary prerequisite for achieving a practical activity capable of turning the individual into a significant factor in the historical process".

The interests of the Bulgarian people, their right to be free and independent, are the basis of every decision and action of Rakovski. Along with the guerrilla tactics that he developed and proclaimed, he attached great importance to economic issues and sought their practical solutions in favor of Bulgaria. According to him, the international situation of the people and their future state should be based on such decisions. And although Bulgaria is not yet a separate state, but part of the Ottoman Empire, Rakovski presents it as a separate political community with a different population and relative self-government. And the great goal to which he aspires and which gives meaning to his whole life is for this relative self-government to be stately empowered. The idea in which he surpasses most of his comrades is the proclamation of the preservation of identity. Rakovski believes that Bulgaria should expand according to its capabilities, without squandering its wealth. According to him, taking a worthy place in Europe can be done not by copying, but by creating and producing.

One of Rakovski's contemporary researchers, Panko Anchev, in his work „The Bulgarian Mind. The Unread G.S. Rakovski" emphasizes the importance of the journalistic and publishing activity of the protagonist of his research.

The 19th century was the time when Bulgaria appeared on the political map and again „became" part of the world. As such, it is realized and legitimized through its intellectuals and spiritual leaders. Universal processes require knowledge of life and international politics, to monitor and analyze the behavior of European countries, their condition and trends in their development. The place for these analyzes becomes the press, which is already something common in the Bulgarian reality. The newspaper is that window to the world, a carrier of information, which is closely monitored and with interest, looking for fiery pieces of information, talking of good attitude towards Bulgarians and a growing will to successfully solve their problem of spiritual and political liberation. The newspapers „Balgarska dnevnitsa", „Dunavski lebed", „Budushtnost" and „Branitel" published by Georgi Rakovski devote a lot of space to articles and information about international events and trends in European

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politics. He clearly realizes that without knowledge of what is happening in the world around us, it is not possible to prepare the public consciousness for decisive action, to inspire it with courage and confidence in the rights of the chosen path - the struggle for independence.

Through his shrewd mind, foresight and powerful creative energy, Rakovski for the first time began to „do" journalism in favor of the national struggle. Rakovski's journalistic activity, which lasted from 1856 to 1864, was completely subordinated to his political and social convictions, to his thirst for freedom and justice. It is the „Dunavski lebed" newspaper that is the basis of the early Bulgarian Revival journalism. The young publicist and revolutionary began working on the „Dunavski lebed" with all his energy. The publication is characterized by speed and is a measure of the reliability of the information published in it, giving a brighter light on the relevant issues in the Balkan and European context. These facts once again come in support of the exceptional flair with which Georgi Rakovski was endowed. „Dunavski lebed" soon became a newspaper - role model of the publications at the time. On its pages Rakovski raises the questions of the day: he comments on the need to abolish the Greek Phanariot clergy, presents the various religious dangers to the unity of the Bulgarians, raises the topics of education and moral uplift of the national ideal through armed and open resistance. The readers quickly realize that in front of them is a newspaper that defends the common man and protects his interests.

In „Dunavski lebed" Rakovski gives advice, encourages, appeals, reminds, compares, demands. His seriously sharpened journalistic sense observes the European policy of the other countries, seeks the dependencies and makes references to the situation of the Bulgarian people under the shadow of the crescent. Rakovski reacted to every news item in the Western press that concerned Bulgarians. In his newspaper he refutes or agrees with what has been said, trying to create an impression and to build through his articles an attitude towards the great powers on the pressing Bulgarian issues. „Dunavski lebed" commented on political, economic, social issues, foreign policy issues, presented an unequivocal attitude to the Sublime Porte and the national liberation movements in Europe.

It is natural that for many people Rakovski becomes an outspoken opponent because of the tone he spreads through the pages of „Dunavski lebed". A tone, born in contrast to the moderate Enlightenment views of many public figures. Bold, ardent and with remarkable conviction in his rights, Rakovski turned "Dunavski lebed" into a colossus of the early Bulgarian Revival journalism.

After the great success of „Dunavski lebed", on 8 March 1864 the first issue of the newspaper „Budushtnost" was published, of which a total of 10 issues were published. The publication plays its role as a supporter of the Bulgarian-Romanian friendship, because it is published in both languages and discusses common problematic issues. That fact that the newspaper has done its job is shown by that the Turkish government has ordered that anyone who is seen with an issue of „Budushtnost" in hand to be sentenced to death.

On 9 July of the same year, the first and only issue of Rakovski's last newspaper, „Branitel", was published, which unfortunately failed to develop.

After the circumstances around the two newspapers, in 1865 Rakovski indulged in one of his old dreams and published a magazine, which addressed issues concerning Bulgarian history, folklore, mythology and folk wisdom. The only issue of „Balgarska starina" is published in Bucharest - an impressive book body with a volume of 208 pages. The magazine was unsuccessful, and Rakovski ended his career as an editor of newspapers and magazines plagued by destitution and disease.

From 1856 to 1865 Georgi Rakovski published a total of four newspapers and one magazine, of which 92 issues were published. To these we must add the two trial issues of printed publications, several extraordinary sheets and four supplements. It is clear that it is not the large-scale journalistic work that builds the strong authority of the man from Kotel as a master of the journalistic pen. The contents. It is there that we must look for the power that radiates from the texts of Georgi Rakovski. Each note, letter, comment and analysis resonate with the thrills and expectations of a large part of the Bulgarian people, who found in the „Dunavski lebed", as well as in other publications, a printed body that covers the problems of the weekday, gives advice for a better present and draws reasoned schemes for the future.

The impact of Rakovski's newspapers is astounding. Combining the qualities of a people's psychologist, a man firmly connected with his time and at the same time outgrown him, the Bulgarian publicist managed to answer the exciting political and ideological questions that reflect on the social development of the fatherland.

Georgi Stoykov Rakovski for the first time gives an example of journalism in the service of the national struggle. His brilliant talent, combined with his exceptional ability to navigate the socio-political processes, gave birth to fruitful years in the field of Bulgarian periodicals.

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Academician Mihail Arnaudov writes about Rakovski's publication with similar force. It is about the brochure "Migration to Russia or the Russian murderous policy for the Bulgarians", which was printed in 1861. The reason for it is the agreement reached between the Russian government and the Sublime Porte for the resettlement of the Bulgarian population from the Vidin region within the borders of Southern Russia and its exchange with the Tatar and Circassian population. Until then, no one had exposed and whipped so directly Russian policy towards the Bulgarians and towards other peoples living in its territory. With an impatient speech based on facts and his own observations, Rakovski confirmed the words of Karl Marx, who at the time defined Russia as a „prison of nations". Following the publication of this pamphlet and his articles on Russian politics, Georgi Rakovski was declared a persona non grata by the Russian authorities and banned from traveling to and residing in Russia.

„This small pamphlet was printed anonymously, without indication of place or year - in all probability in Bucharest, in May 1861. It has 15 pages and is entitled "Migration to Russia, or Russia's murderous policy for the Bulgarians".

The reason for writing the brochure is the agreement between Russia and the Sublime Porte to emigrate the Bulgarians from Vidin. A firman in this sense was also read in the Bitola region, but while the Macedonian Bulgarians refused to leave their homeland, the Vidin Bulgarians - instigated by Russian agents and encouraged by the Turkish government and by bribed Bulgarian ready tools - began to emigrate. „This is a pure murder for our poor Bulgarian people from Russia", exclaims Rakovski - and with fervent words and deeds he wants to thwart the harmful agitation.

Let's note that the old people of Vidin still remember this trip to Southern Russia and their return from there, due to disappointment with the living conditions. The language of the pamphlet - in addition to all the peculiarities of Rakovski - shows some features that bring it quite close to live colloquial speech. This could be due either to the author's desire to be better understood by his readers, simple Bulgarians, or to the influence of Teodosi Ikonomov, whom Rakovski charged with taking care of printing and whom some contemporaries even consider to be the compiler of the pamphlet. True, however, is the first, as in the Archive of Rakovski is preserved the original manuscript of the author, which shows that only the spelling in the print is changed in some places. This manuscript is entitled: „Migration to Russia, or Russia's murderous policy for the Bulgarians", and covers 23 pages, signed at the end by „A Bulgarian".

Panko Anchev defines Rakovski as the first Bulgarian political scientist, who examined the problems of politics as power and public organization. Rakovski managed to derive the basic rules which drive the Ottoman and European politics, to formulate the main mechanisms by which the phenomena in it take place and to trace the reasons that give rise to them. The most important principle is that this policy is selfish and that the great powers are guided by their own interests and never make concessions unfavorable to them and do not show sympathy and solidarity with those in need of help and support. This principle gives direction in the organization of the Bulgarian national liberation revolution and in Rakovski's plans for its preparation and course. As a sober analyst G.S. Rakovski is never misled by emotions and strong desires and warns that such should also be and the Bulgarian politics. We need to be strong, united and organized, to work for our own fame and to be able to show our merits in order to win some partners in our holy cause.

According to Todor Bakardzhiev, Rakovski was the first in Bulgaria to introduce the word „oligarchy". „When we say the people, we understand all the good Bulgarians, excluding the „chorbadjii" (rich/wealthy men)", wrote in 1864 Rakovski. He called the rich Bulgarians „heirs of the Janissaries". His anger goes so far that he speaks in the extreme even of their destruction. Forced due to their intrigues to stop in 1864 his Bulgarian-Romanian newspaper „Budushtnost", the great revivalist addressed the following lines to the future: „They are people in whose heads an oligarchic spirit has entered and they demand that every Bulgarian deed be done only according to their will and conviction. They despise the people and have never thought of concentrating the population's thoughts on one thing. Everything they have done so far under the name of people's cause was not such, but it was conducted from the very point of view of personal interest, and most of all murderous selfishness!"

Rakovski's protest against the people's exploiters is not limited to national frameworks. Again, with the same motives - to protect the poor from robbers, Rakovski protested against the already mentioned resettlement of Vidin Bulgarians in Russia, where they are awaited by the „torturous Mongol government" of tsarism and „eternal torment" if they fall into its "iron nails".

We do not know whether the father of organized Bulgarian combatants, fluent in several languages, did not read something from „The State", where in the chapter „Oligarchy" Plato says in a different sense: „The more money there is, the more inaccessible the oligarchy is". But from today's historical point of view, it can be said that

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Rakovski was the first Bulgarian publicist to use the term oligarchy in a very sharp socio-political context, still relevant today.

„Budushnost" is the third newspaper edited by Rakovski, also written in Romanian, in collaboration with Dimitar Veliksin and the Romanian publicist and scholar B.P. Hasdeu. It was published in ten issues from 8 March to 17 May 1864. The Sublime Porte forbade the newspaper to be brought into the empire and threatened its distributors with the death penalty.

Typical of „Budushtnost" are review articles that trace problems historically or look at the fate of the European and Balkan peoples in parallel. Rakovski uses the new for Bulgarian journalism forms of the pamphlet. With this tradition he became the forerunner of the publicist satirist Hristo Botev, who even more strongly condemned the chorbadjii - oligarchs.

Rakovski's educational work resonated with the attitude of two prominent Bulgarian intellectuals and public figures - Veselin Hanchev and Petar Stapov.

In 1942 in „Literarturen glas", (issue 566, 21.10.1942) Veselin Hanchev writes: „Rakovski went through all the troubles of a wanderer, patriot and rebel. He transformed and changed every moment, from a meek merchant to a dervish in a Turkish tekke. From a poet to a bandit in the Balkan. But no matter what image he had on, he remained the only one, the great Rakovski. And this is how he differs from you, my dear contemporaries, who change your image every moment and still remain without an image! When the tuberculosis visited the indomitable spirit, who has been fighting for freedom and independence all his life, his parched lips sent these immortal words to the generations: „I have always been a Bulgarian, I will be not only like that to the grave, but even after death, I my will is that my dust is not to be mixed with another nation!"

As I learn, Rakovski's bones will be transported from Sofia to his hometown, where the proud and inaccessible Stara Planina forests will calm them down".

His word for Rakovski the teacher and writer Petar Stapov begins with the verse from Vazov „Mad dreamer, image impossible..." (newspaper „Literary Life", no. 1, 5 November 1942) and also writes: „Rakovski is one of the turbulent figures of our pre-liberation movement. It can be said that he alone, for his time, felt especially deeply a Bulgarian son and with a surprising perseverance and great love for his people he wanted to show the world the vitality and spiritual greatness of the Bulgarian tribe, which according to him is teacher of almost all of Western Europe…

Rakovski's fate is not very enviable. When the names of our 19th century titans are mentioned, he is, indeed, one of the first, but he is not the first. And objectively speaking, his place is in the forefront. Maybe only Botev is in front of him.

But if Rakovski was not so ardent and failed to express his rebellious inner element in rebellious articles and verses, in importance he stands out as a huge figure, gathering in himself all the virtues of a devoted son of the people, whose thought is only for his homeland and whose destiny is the destiny of his people ...

That is why he will be eternally immortal, and when his place is indicated where he should be, from his spirit, from his dreams, from his aspirations and from his love for the people, many more worthy sons of the people will drink bright hope".

Francois Voltaire, he says that „Great deeds are always accompanied by great obstacles", which best describes the primordial desire to move forward. And perhaps he is right, because the moving forward happens, albeit in a difficult and painful way, which is not just a survival, but an ascent.

Usually, we Bulgarians have always put in the foreground the original value of education and to give instructions to our children to get a better education, but our distorted value system puts us in a far from advantageous position to push them to go do it in abroad. This in one way or another constitutes the worldview and value system of the young person in the society in which he falls. Undoubtedly, the accumulated knowledge and experience are of deep value, but they will be even more useful and important for Bulgarian society if they are applied here in Bulgaria. Because when we are faced with fateful decisions, crisis situations or revolutions, we turn to that quiet part of our society, which is the bearer of innermost ideas, wisdom and strength - to draw energy and move forward (Arnaudov, 1969; Anchev, 2016; 2013; Bakardzhiev, 2020; Literaturen svyat, 2021a; Semova, Lyutskanova, Stoeva, 2013a; Stapov, 2016a; Hanchev, 2016b; 2021b; 2021c).

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3. Conclusion

I will allow myself to recall an inspiring quote from another Bulgarian enlightener - Lyuben Karavelov: „History teaches us that when there are no more ideas to excite it, only then is a nation lost" Not we, nor today nor now, will evaluate Rakovski's case. But neither his supporters nor his critics can deny that it was the enthusiasm and zeal with which he embarked on every endeavor that had the power to inspire and awaken the people's consciousness.

And we can't help but be followers of Rakovski, as he says: „We will prove irrevocably why we are the first and oldest inhabitants of Europe" and because „Truth is never covered forever; it will come to light on a good day!".

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On the role of innovation and market structure on competitivity

Marc Guei Kore[a] Ireen Choga[b]

[a] *Faculty of Economic and Management Sciences (F-EMS), North-West University (NWU), South Africa.*
E-mail: marcgueik@gmail.com
[b] *North-West University (NWU), South Africa.*
E-mail:Ireen.Choga@nwu.ac.za

Abstract

We investigate the linkages between innovation, market structure and competitivity. Using a detailed level dataset of 8 OECD countries in a panel of 17 industries, we find that at the aggregate level, innovation and market size have positive and significant effect on competitivity in most of our specifications. However, innovation is negatively associated with economic performance in the case of bilateral trade between Spain and Netherland. Also, the sectoral analysis provides evidence that the innovation-competitivity nexus depends on technological classification. We show that: (i) the effect of innovation activity on economic performance is lower for the high technology and high concentration (HTHC) market compared to the low technology (LT) market; (ii) the impact of innovation on economic performance is ambiguous for firms in the high technology and low concentration (HTLC) market.

Keywords: Innovation, competitivity, bilateral trade

Jel Codes: O31; L110; C23

1. Introduction

There is the need for policy makers to understand the mechanisms through which innovation policy can support higher GDP growth especially for the post covid-19 pandemic period. In that context, the EU leaders have proposed a budget of over US$ 180 billions for the period 2021-2027 (European Commission, 2020). They stress that spending on innovation and research can enhance productivity. One of the goals of this fund is to create a financing instrument that can support job creation and build a more social and inclusive society.

Despite the needed resources to recover from the coronavirus, some are against this recovery plan. This has sparked a debate on how best the funds need to be allocated to recover from the pandemic and fuel economic growth. The question that arises is how effective innovation policies can ensure a sustainable recovery.

The role of innovation on economic growth has been emphasized on early endogenous growth models (Grossman & Helpman, 1991; Romer, 1990). Much of the empirical literature on how technology affects trade documents that innovation is an important determinant of the trade performance. For instance, Eaton & Kortum (1996) examine the role of innovation and the diffusion of technology among a panel of OECD countries. They find that technological knowledge contributes to more than half of productivity growth for all the countries examined except the United States. Their study also shows that innovation in Germany, the United States and Japan spur more than half of the growth in OECD countries.

Phelps (2013) argues that prosperity in many advanced economies occurred as a result of widespread technological invention. This translated into a higher standard of living, wealth accumulation and better jobs for people.

Since then, a large body of literature have studied the implications of technological adoption and its impact on firms'productivity (see Scarpetta & Tressel, 2002; Griffith, Redding & Van Reenen, 2004; Cainelli, Evangelista & Savona, 2006; Crespi, Tacsir, & Vargas, 2014; Busom & Vélez-Ospina, 2017).

Scarpetta & Tressel (2002) examined the impact of innovation activity on multi-factor productivity. They find that productivity convergence across OECD countries is stronger in the services sector compared to the manufacturing sector. They also provide evidence that there is a feeble convergence in productivity in the high-tech industries. Crespi, Tacsir, & Vargas (2014) in their work investigate and compare the determinants of innovation and labour productivity at the firm level in Latin America. They show that innovation activity leads to improvement in the production process.

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In the same context, Peters et al (2018) highlight the important role of innovation in contributing to higher productivity in service enterprises. Overall, the empirical literature indicates that technology is an important determinant of productivity.

Although several studies have examined technological spillover via trade, none of them have given attention to the link between bilateral trade performance and market structure. However, we expect technology to have different effects on trade depending on each country relative investment in research and development and patents. Also, technological spillover through export varies if countries export or import products with different quality in the same or different industries. Hence in this paper, we study the link between bilateral trade structure and technology empirically.

For the modelling analysis, our econometric approach is based on a production function that allows for innovation and market size.

The model we employ resembles that of Sanyal (2004) in which he assesses how relative innovation and factor endowment affect export performance in 10 intra-OECD countries.

Empirical studies on market structure classification have identified 3 types of market according to the degree of market concentration and the innovation's returns. For example, when the revenue from innovation is moderate, the amount of investment devoted to it will be small. This setting indicates low-tech industries (LT). It represents a market in which firms compete aggressively on price which is approximately equal to the marginal cost.

However, if the revenue from innovation is large, firms will spend large sum in technology to increase the production process. In such case, the market may react differently leading to different or one trajectory. When firms embark on different trajectories (product differentiation), it implies that there will always be a demand for a new product and an increasing number of producers. Such industry is referred as the high-tech low concentration (HTLC) market. In such market each firm has some monopoly power which is reduced because of free entries of new firms. If high revenues form innovation can be obtained through one trajectory, such market is referred as the high-tech high concentration (HTHC) market in which few firms control the market.

Hence the study contributes to the literature by providing a complete understanding of the effects of innovation on firms'competitivity by grouping industries according to their market classification. Also, few studies have examined the relationship between bilateral trade performance and technology across firms. This is crucial for labour productivity and also for sustainable development in the current context of the world economy.

In determining bilateral trade performance, we use the ratio of exports between two countries, namely country m to country n over exports from country n to country m in a sector s. We add other important determinants of trade flow such as market size and labour cost identified in the general equilibrium model of trade to capture factor endowment and productivity, respectively. The inclusion of these variables has been supported in the literature (see Egger & Pfaffermayr, 2005; Grossman, Helpman, & Szeidl, 2006) for a detailed review.

The paper attempts to address two main issues between technology and trade performance. First, we investigate the relationship between technology and trade performance across countries. Generally, studies in the literature have either focused on one or several countries. Because countries have different characteristics in terms of natural endowment and national policies, we investigate trade performance for each bilateral trade setting. The second issue is related to the differences in technological intensity across sectors. Therefore, we argue that it is necessary to group each sector based on their R&D intensity and evaluate their impact on competitivity. This helps to understand whether industries classified as HTLC, HTHC, or LC play an important role in influencing trade performance.

The remainder of the paper is organized as follow: The next section discusses the analytical framework of the model. Section 3 describes the dataset and the econometric approach used in the analysis. Section 4 presents the results. Section 5 summarizes the findings and concludes.

2. Empirical framework

Our modelling estimation starts with the factors that can impact competitivity in a group of Z countries ($i = 1,\ldots, Z$) and J industries ($j = 1,\ldots, J$). We also assume that production in each industry j and country i at a time t takes the following form:

$$Y_{ijt} = F_j A_{ijt} (K_{ijt}, L_{ijt}) \tag{1}$$

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Where K stands for physical capital, L is labour. and A denotes technical efficiency or technology that changes across each industry, country, and the time period.

Hence the production function can be re-written as a cobb-douglas production function:

$$Y_{ijt}/L_{ijt} = (Y_{ijt}/L_{ijt})^{\alpha} \, A_{ijt} \qquad (2)$$

We then estimate a log-linear regression of the cobb-douglas function:

$$y_{ijt} = k_{ijt} + a_{ijt} \qquad (3)$$

International competitivity is defined as the ability to sell goods in the international market in the presence of other competitors. Bilateral export has been used in the literature to measure competitiveness. It is defined as the ratio of exports from country m to country n over exports from country n to country m in an industry s. The subscript m refers to our parent country, n is the bilateral partner or the host country, and s represents the NACE industry.

$$y_{mns}/y_{nms} = f \, [\, (k_{ms}/k_{ms}), \ (a_{ms}/a_{ms}), \ (l_{ms}/l_{ms})] + u_{ts} \qquad (4)$$

The dependent variables (y) represent competitivity, (k) captures the capital stock to the number of employed in a sector s, (a) is the innovation intensity variable, (l) captures labour input. Market size is an important determinant of intra-firm exports (Markusen & Keith, 2002; Egger & Pfaffermayr, 2005). We augment our modelling specification by including apparent consumption (ac) at an industry level which represents market size in our analysis. Siedschlag & Zhang (2015) have stressed the importance of size in determining productivity.

$$y_{mns} / y_{nms} = f \, [\, (k_{ms}/k_{ns}), \ (a_{ms}/a_{ns}), \ (l_{ms}/l_{ns}) + (ac_{ms}/ac_{ns})] + u_{ts} \qquad (5)$$

The log-linear model takes the following form:

$$\ln (y_{mns}/y_{nms}) = \beta_0 + \beta_1 \ln(k_{ms}/k_{ns}) + \beta_2 \ln(a_{ms}/a_{ns}) + \beta_3 \ln(l_{ms}/l_{ns}) + \beta_4 \ln(ac_{ms}/ac_{ns}) + u_{ts} \qquad (6)$$

The literature identifies three main aspects that characterize the market environment of industries. The first element corresponds to the entry barriers such as economies of scale due to technological opportunity. The second issue is related to sunk costs which constitutes another barrier to entry. Lastly, products can be differentiated horizontally when consumers are able to attach a value to it.

We then follow the market classification of (Scarpetta & Tressel, 2002) and identify three types of industries. For the LT industries, we include basic metal and fabricated metal products, coke and refined petroleum products, food products, textile and wearing apparel, wood and paper product and printing, building of ships and boats. Also, we group pharmaceutical products and pharmaceutical preparations, audiovisual and broadcasting activities, computer and electronic products, machinery and equipment, manufacturing, and telecommunication in the HTLC industry. We consider chemicals and chemical products, electrical and optical equipment, motor vehicle trailers and semi-trailers, and transport equipment in the analysis of the HTHC industry.   Following this reasoning, our regression equation for the market structure becomes:

$$\ln (T_{mns}/T_{nms}) = \beta_0 + \beta_1 \ln(k_{ms}/k_{ns}) + \beta_2 \ln(a_{ms}/a_{ns}) + \beta_3 \ln(l_{ms}/l_{ns}) + \beta_4 \ln(ac_{ms}/ac_{ns}) + u_{ts} \qquad (7)$$

where (T_{mns}/T_{nms}) represents bilateral exports based on market classification as discussed above. Thus, our analytical framework allows us to investigate further the role of diverse patterns of innovation on competitivity.

3. The dataset and methodology

3.1 The data

Our sample consists of 17 industries in the manufacturing and business services sector in 8 OECD countries over the period 2000-2017. The countries included in the analysis are: France, Germany, Italy, Austria, Spain, Netherland, United Kingdom, and Finland. Thus, we have a total of 1360 observations in the analysis. The time span covered was chosen mainly because of the availability of innovation data which is proxy as R&D. We obtain the raw data from several sources. We obtain capital stock, number of employed, labour compensation, and value added from the OECD stan database 2020. Data on R&D by industry is taken from the ANBERD database. We calculate labour input by dividing labour compensation over value added. Market size for each industry (parent and host) is proxied as apparent consumption. The calculation of the latter is given as gross output minus imports plus exports for each year. Imports and exports flow are extracted from the OECD bilateral trade database.

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We expect the coefficient on innovation to have a positive sign. This is because investment in R&D allow to bring in new products in an industry and enhance the quality of the existing ones, thereby improving economic performance. If the level of spending on machines grows over time, and the performance of machines are more efficient than labour employed, then capital stock is expected to increase bilateral trade. Assuming this dynamic is the same for all industries, it has the potential to improve competitivity in the economy. Capital stock and trade performance is expected to be positively associated. We also expect a positive nexus between apparent consumption and trade performance. We follow the convergence hypothesis of (Markusen, 2002) which suggests that a large market size tend to increase the performance of economic activity. A higher labour cost or compensation in the parent market constitutes a barrier to exports in the host market. However, a significant value added supports bilateral trade. Because labour cost can either exceed or be inferior than value added depending on a firm' ability to make profit. We consider the sign of labour input to be ambiguous.

3.2 Econometric methodology

Our goal is to estimate equations (6) and (7) on a pool annual time series for each bilateral setting. Before we proceed on our econometric estimation, we first check the presence of heteroskedasticity in the data. We consider the following bilateral setting: France-Germany, Italy-Austria, Spain-Netherland, United Kingdom-Finland. We also employ robust standard error to deal with potential heteroskedasticity in the model. The stationarity of the data is then examined through the implementation of a unit root test. We conduct a panel unit root test which shows that the series are stationary. These findings suggest that we can safely investigate the role of technology on economic performance. We consider France, Italy, Spain and the United Kingdom to be the parent countries while Germany, Austria, Netherland, and Finland are the host countries.

Also, we removed outliers in our sample by focusing on data that departs away from the mean to minimize the risk of a bias estimation. Thus, we exclude industries with innovation growth rate that are more than five standard deviation away from the mean value in each bilateral trade.

Although the full sample covers the period 2000-2017, the starting period for each country-pair is restricted by the availability of R&D data as noted in the section above. We obtain a strongly balanced panel data for all our specifications which allows us to make a fair assessment of the effects of innovation activity on export performance. We first present the results of our baseline regression by using a pooled OLS estimation and a quantile regression to obtain consistent parameters. The literature has well documented the use of pooled OLS in quantitative studies to study the effects of institutional determinants of trade performance and macroeconomic policies. Thus, the intercept terms are restricted to be the same for each country-pair. The coefficients were initially permitted to change across countries. However, the estimated results appear to be insignificant for all our explanatory variables. One possible explanation can be related to the changing patterns of unobserved parameters which can have an effect on bilateral trade over time and may lead to a biased estimate in the case of fixed effects model.

The quantile regression model allows to estimate the difference between the elasticities of trade performance in each bilateral pair. We investigate the possible innovation-trade performance nexus using 3 quantiles ($\theta = 0.25$, 0.50, 0.75). The regression results for the quantile ($\theta = 0.25$) do not lead efficient estimates. Hence, we report the 0.50, 0.75 quantile regression only. The quantile regression is used as a sensitivity test because of its ability to consider unobserved heterogeneity in the data. The next section reports the results.

4. Estimation results

We now test our empirical hypothesis that innovation activity does contribute to a higher economic performance. Table 1 reports the results of estimating equation (6). Even though the data shows a rise in capital stock over time, the log value for capital stock is significantly positive only for column 3. In the remaining specifications cases however, the coefficients are significantly negative. These results appear to be in contradiction with the a priori expectation. This calls into question the idea that increasing the investment in capital stock automatically improves the trade performance. The coefficients on apparent consumption are positive and significant at the 1% level for all our estimations. This suggests that market size has a positive effect on trade performance. In other words, the larger the size of a sector, the better its ability to trade. This is in accordance with the literature that finds a positive relationship between firms size and exports performance (Nazar & Saleem, 2009). Turning into the labour input coefficients, we find a positive and significant relationship in column 1 and 3. Labour are paid based on the value

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they contribute to the firms. We also observe a rising trend in value added. These results indicate that workers contribute positively to the advancement of firms.

For our variable of interest, the coefficients are significant and positive for column 1, 2, 4 and only negative for column 3. The positive coefficients imply that innovation activity has a positive effect on trade performance. The results from column 3 contrasts with our hypothesis testing. This finding however should be cautiously examined because R&D in the pair (Spain-Netherland) has been declining over time. This trend can be a possible reason for the negative association between innovation and bilateral trade.

Table 1. Pooled OLS estimates (the dependent variable is competitivity)

	(1)	(2)	(3)	(4)
Log (innovation)	0.064*** (0.017)	0.257*** (0.076)	-0.601*** (0.148)	0.468** (0.228)
Log (apparent consumption)	0.090*** (0.017)	0.677*** (0.093)	1.027*** (0.144)	2.346*** (0.360)
Log (capital stock)	-0.088*** (0.029)	-0.481*** (0.118)	0.363** (0.138)	-1.259*** (0.370)
Log (labour input)	0.135*** (0.030)	0.198 (0.217)	0.869*** (0.239)	-0.578 (0.708)
Observations	165	216	130	104
Group	France – Germany	Italy – Austria	Spain – Netherland	United Kingdom - Finland
R-squared	0.330	0.345	0.385	0.525

*denotes significant at 10% level; ** significant at 5% level; *** significant at 1% level. Numbers in parentheses indicate robust standard errors.

Table 2 reports the results using a quantile regression model. Several studies in the empirical literature have used IV regressions or OLS which assume parameter homogeneity. This may lead to a false conclusion if there is heterogeneity in the data under analysis. Put it differently, a positive effect of innovation on growth found in a bilateral trade may vary in other country-pairs because of different data patterns. Therefore, we employ a two-stage quantile method to improve the traditional technique. We present the results using two quantiles ($\theta = 0.50$, 0.75). One of the important finding is that altering the conditional distribution only significantly affects the sign of the capital stock coefficient for the United Kingdom-Finland bilateral trade. There are no significant changes on the coefficients of our variable of interest (innovation) which only reduces with a higher quantile. The results are similar to the work of (Mohnen & Hall, 2013) which show that innovation leads to a better productivity performance. The coefficient on labour input becomes negative and significant in the case of Italy-Austria. This implies a low contribution which can be attributed to the reduction in value added. With regards to apparent consumption, there is positive and significant effect at the 1% level for the 75th quantile of distribution for each country-pair. The results show that on average a 1% increase in economic size leads to (0.2% - 1.5%) increase in bilateral exports. Overall, the sensitivity test supports the findings that innovation activity does not always contribute to increase in export performance.

Table 2. Two-stage quantile regressions (dependent variable is competitivity)

	(1)		(2)		(3)		(4)	
	0.50	0.75	0.50	0.75	0.50	0.75	0.50	0.75
Log (innovation)	-1.488 (3.878)	0.166*** (0.043)	0.161*** (0.022)	0.012 (0.025)	-0.146*** (0.006)	-0.330*** (0.032)	0.175** (0.080)	0.036 (0.063)
Log (apparent consumption)	-7.402 (17.563)	0.214*** (0.049)	0.203*** (0.044)	0.3*** (0.032)	0.785*** (0.011)	1.148*** (0.051)	1.570*** (0.090)	1.178*** (0.067)
Log (capital stock)	2.915 (6.797)	-0.290*** (0.075)	-0.736*** (0.060)	-0.364*** (0.040)	0.481*** (0.017)	0.346*** (0.035)	-1.006*** (0.134)	0.215** (0.075)
Log (labour input)	4.790 (9.933)	0.286*** (0.290)	-1.387*** (0.080)	-0.386*** (0.046)	0.383*** (0.039)	1.473*** (0.120)	-0.423 (0.261)	0.030 (0.272)
Observations	165	165	216	216	130	130	104	104
Group	France – Germany		Italy – Austria		Spain – Netherland		United Kingdom - Finland	

*denotes significant at 10% level; ** significant at 5% level; *** significant at 1% level.

Technological intensity is an important factor of international competitiveness and productivity. However, there is also considerable differences in terms of investment on R&D across industries and sometimes within the same industries. It may be misleading to conclude that all firms commit the same amount on their innovation. The paper attempts to provide an evidence on how different market structure affect economic performance. Hence there is the need to further investigate if technological concentration plays a role in influencing trade performance. Table 3 shows the results of estimating equation (7). Different market conditions lead to high or low returns to innovations. This context allows us to examine the effects of market structure on competitivity. For comparative purposes we consider 14 industries in each sub-group under investigation. We also align the time period (2009-2016) for the analysis in order to evaluate whether high-tech or low-tech industries have different effects on competitivity. For each bilateral pair France-Germany, Italy-Austria, Spain-Netherland and United Kingdom-Finland, we include the following industries: (i) For the LT market we consider Food, Wood, Rubber; Food, Wood, Rubber; Basic metal, Food, Wood, Rubber; Basic Metal, Food, Wood, Rubber. (ii) For the HTLC market we consider Pharmaceutical, Computer; Machinery, Manufacturing; Pharmaceutical, Computer, Machinery, Manufacturing; Pharmaceutical, Computer, Machinery, Pharmaceutical, Computer, machinery. (iii) For the HTHC market we consider Chemical, Electrical, Motor, Transport; Chemical, Electrical, Motor, Transport; Chemical, Electrical, Motor; Chemical Electrical Motor, respectively.

Looking at the results from Table 3, only the innovation coefficients on the LT and HTHC regressions are significant. We observe a non-significant value on innovation for the HTLC regression which is consistent with the work of (Cainelli et al, 2006). This is an intriguing result, hence we try to replace some the industries initially used to re-examine the innovation-trade performance nexus for this particular market. We substitute machinery industry by manufacturing one. The results are provided in the Appendix section. The estimated effect of innovation on trade performance is negative and significant (see Table A2). The results provide 2 reasoning for the HTLC market: (i) innovation investment does not enhance bilateral exports; (ii) innovation worsens exports performance. One possible reason for these findings is that firms in this market have reached their production possibilities frontiers. Hence any increase in research becomes either irrelevant or put a downward pressure on the

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sector's economic growth. Since firms invest large amount on R&D projects, which are considered to be fixed costs in the firms' balance sheet, the rate of returns or the firms 'sales must be high enough to compensate for these costs. If this is not the case, it will limit the firms' ability to grow and remain competitive.

In the high concentration market, a 1% increase in innovation causes a 0.13% rise in exports. This finding supports the common argument that concentrated market structure compliments technological development, with a higher GDP, and a higher welfare. In the low technology market, the innovation coefficient is the highest highlighting the potential these low-tech industries can play in the pursuit of sustainable development.

With regards to apparent consumption and capital stock, the coefficients on these variables are positive and significant for all our estimations. This confirms the hypothesis that firm size and capital stock improve economic performance. Also, the coefficient on labour input is only significant in the high concentration market. Even though in the LT and HTLC market, the coefficients are positive and negative, they are not significant. These findings support the hypothesis that labour input has an ambiguous effect on economic performance.

Table 3. Innovation and the market structure

	Log (competitivity) LT	Log (competitivity) HTLC	Log (competitivity) HTHC
Log (innovation)	0.596*** (0.179)	0.148 (0.149)	0.138*** (0.035)
Log (apparent consumption)	0.512*** (0.238)	0.481*** (0.106)	0.227*** (0.033)
Log (capital stock)	1.879*** (0.306)	0.265** (0.120)	0.244*** (0.050)
Log (labour input)	0.308 (0.384)	-0.113 (0.220)	-0.406** (0.192)
Observations	112	112	112
R-squared	0.438	0.546	0.789

*denotes significant at 10% level; ** significant at 5% level; *** significant at 1% level. HTHC, HTLC and LT stand respectively for High-Technology High Concentration, High-Technology Low Concentration and Low-Technology industries.

5. Conclusion

The paper aims to provide a clear understanding on the links between innovation, market structure and competitivity. In order to classify industries, we adopt a two-way classification method where industries are grouped based on innovation's profitability and the degree of market concentration. Our econometric analysis shows the crucial role of innovation in enhancing competitivity at the aggregate level. On one hand, innovation and competitivity are positively associated in 3 of our specifications. On the other hand, innovation influences competitivity negatively in the case of the country-pair (Spain-Netherland). The empirical evidence for the 8 OECD countries also reveals that market size has a positive and significant effect on bilateral exports. Conversely, the sign of capital stock and labour input are ambiguous.

Regarding market structure, innovation activities improve competitivity in the LT and HTHC market. The results indicate that for the period under study, innovation activities have a higher impact on competitivity in the LT market. Innovation activities in the HTLC market however are unclear.

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In the current context of subdue economic growth these research results have important policy implications. Firstly, the positive impact of innovation on competitivity strengthens its role for sustainable development. The negative coefficient on innovation is an indication that research intensity in some cases has not been able to create a new demand capable to boost economic performance. The market classification analysis provides a new evidence that innovation in the LT market has the potential to enhance competition. Secondly, market size supports industries that are competing in the international market. Policy makers must therefore put in place incentives to encourage firms to grow in size if they want to remain globally competitive.

Further study on the LT market can be explored, for instance the wages and other innovation variables. This would help understand the dynamics aspects of the relationship between wage and innovation and at the same time provide a more robust framework for policy analysis.

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Appendix

A. Tables

Table A1. Industries considered in the sample

Industry name	ISIC Code (Rev. 3)	Market structure
Food products, beverages and Tobacco	15-16	LT
Basic metal and fabricated metal	27-28	LT
Textile, wearing apparel, leather and related products	17-19	LT
Wood, paper product and printing	20-22	LT
Coke refined petroleum products	23	LT
Basic pharmaceutical products and pharmaceutical preparations	2423	HTHC
Rubber and plastic products	25	LT
Building of ships and boat	351	LT
Manufacturing c	36	HTLC
Machinery and equipment n.e.c	29-33	HTLC
Audiovisual and broadcasting activities	32	HTLC
Computer, electronic, and optical equipment	30-33	HTLC
Communication	32	HTLC
Chemical and chemical products	24	HTHC
Motor vehicles, trailers, and semi-trailers	34	HTHC
Electrical equipment	31	HTHC
Transport equipment - air spacecraft & related machinery	34-35	HTHC

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Notes: HTHC, HTLC and LT stand respectively for High-Technology High Concentration, High-Technology Low Concentration and Low-Technology industries.

Table A2: Innovation and the market structure

	Log (competitivity) LT	Log (competitivity) HTLC	Log (competitivity) HTHC
Log (innovation)	0.596***	-0.554***	0.138***
	(0.179)	(0.114)	(0.035)
Log (apparent consumption)	0.512***	0.764***	0.227***
	(0.238)	(0.079)	(0.033)
Log (capital stock)	1.879***	0.357***	0.244***
	(0.306)	(0.085)	(0.050)
Log (labour input)	0.308	0.244	-0.406**
	(0.384)	(0.156)	(0.192)
Observations	112	112	112
R-squared	0.438	0.671	0.789

*denotes significant at 10% level; ** significant at 5% level; *** significant at 1% level

Price discrimination of monopoly[1]

Alena Bašová [a]

[a] *Ph.D., Department of Finance, Faculty of National Economy, University of Economics, Bratislava, Slovakia.*
E-mail:alenkabaso@gmail.com, alena.basova@euba.sk

Abstract

Price discrimination is a set of rules that determine the price of goods sold or services provided in the required volume, at the correct time and according to the criteria for determining the price. In Slovakia, pricing for households is still subject to regulation by the by Regulatory Office for Network Industries (hereinafter RONI) (hereinafter RONI), as the central management body for consumer protection, which was clearly defined in 2009, with the adoption of the third liberalization package in the European Union, which was implemented in Slovakia legal framework 250/2012 Coll. Act on regulation in network industries   Act. In Slovakia, the Price Cap methodology is used to set prices for households and small businesses, which determines the maximum price for the service provided in the gas and electricity industries. For the purposes of this paper, we have chosen the gas industry, specifically the supply of gas to households. A new regulatory period has started since 2017 which lasts until today 2021.

Keywords: price discrimination, household sector, natural gas supply, Regulatory Office for Network Industries

Jel Codes: D18, L12, L43

1. Introduction

The aim of our paper is to analyse the end prices for gas consumers in the household sector. The end prices will be calculated according to the dominant supplier, which is the Slovak Gas Industry. These end prices will be taken from the official price lists that are published on SPP's website every year.   We will compare prices in the new regulatory period, which runs from 2017 to 2021. The previous regulatory period was from 2012 to 2016. Between 2012 and 2016, the natural gas price was calculated as the sum of 80% of the total projected cost in euros of gas purchases resulting from all gas purchase contracts for the provision of contracted gas supplies to all gas customers, including short-term contracts at European Union trading venues, and 20% - the arithmetic average of the daily prices published by the European Energy Exchange (EEX) for the NCG Natural Gas Year Futures Cal-t product in euros for the nine calendar months preceding the month in which the price proposal was submitted. In 2015 and 2016, the methodology was changed to a 70:30% ratio. In the new regulatory period, 2017-2021, the pricing was based on the reference gas price on the EEX (Leipzig Stock Exchange, Germany) for the period from 1 September 2015 to 31 August 2016 was €16.293/MWh (12-month average) and only this price was entered in the pricing procedures for determining the price for gas supply to vulnerable customers for 2017, i.e. the first year of the 2017-2022 regulatory period. In 2018-2020, it was evident that the gas price on the world exchanges has an upward trend. A turning point occurred in the calculation of the gas supply price for 2021, when the benchmark gas price on the exchanges dropped significantly. The decrease was also largely due to the unfavourable epidemiological situation with COVID – 19 and the unstable situation on the gas exchange.

2. Forms of price discrimination

The fact that the monopoly has some monopoly power enables it to use so-called price discrimination in its pricing strategy. The aim of price discrimination is to gain a consumer surplus and turn it into as an additional profit to the monopoly. Price discrimination is based on the fixing of different prices for the same products, without cost conditions motivated. Price discrimination is based on the fixing of different prices for the same products, without reasons cost conditions motivated. Consumer price discrimination means a set of rules that defines a monopoly for

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the determination of the market price of production and which in some way favour or disadvantage certain groups of consumers.

2.1 Price discrimination of first degree

The price discrimination constitutes a more or less theoretical situation according to consumers, when the monopoly states on each consumer the maximum price the consumer is willing to pay for each unit purchased.

Ayers and Collinge call this price discrimination "perfect price discrimination". By such a pricing strategy, the monopoly gains the entire consumer surplus for itself.

An analysis of this form of price discrimination is shown in the following chart.
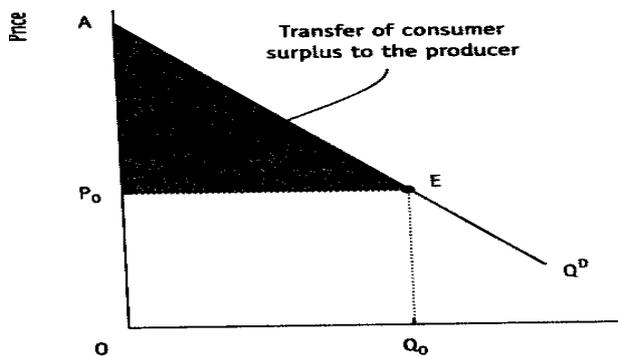
Figure 1. Price discrimination of the first degree

Source: Hope, S. Applied Microeconomics. New York, 1999, s. 265. ISBN 0-471-97914-7.

If a monopoly company produces output in volume **Q0** and sets the same price for all consumers, its revenue will be 0POEQ0. If it charges different prices for each of its consumers, its sales were increased by the amount shown by the AEP0 area. In this way, it would set prices that individual consumers are willing to pay. This form of price discrimination is essentially a theoretical abstraction, an extreme case in which it is a direct transfer of the entire consumer surplus to the monopoly producer because:

1. a business usually does not know the maximum price that each consumer is willing to pay per unit of production,

2. even if the company inquired from every consumer, it would probably not get a true answer, because consumers want the price to be as low as possible.

The size of the firm's profit depends on the slope of the demand curve, the steeper and declining, as shown in the chart in the point E, the higher the firm's profit. Consumers are willing to pay for example a tax or legal adviser who knows the financial situation of his clients can estimate how much his client is willing to pay for his services.

2.2. Second degree of the price discrimination

Second-degree of price discrimination consists in fixing different prices for different cumulative quantities of a given goods or services. In essence, it is discrimination based on the quantity of goods sold, so the price per unit of output is not constant, but depends on the quantity purchased. (William J.)

Every customer buying the same amount of goods pays the same price. Since different prices are set for one consumer depending on the "different blocks" of the quantity purchased.

Some authors refer to second-level price discrimination as "multi-part pricing". (Taylor. Timothy 2014) Multi-part pricing is often used mainly in utilities, in the monopolized sectors of the production and supply of drinking water and electricity, natural gas. The process of price discrimination of the second degree is shown in the following chart.
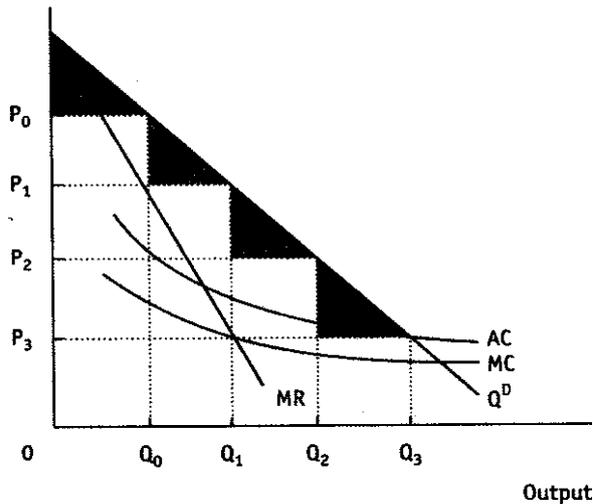
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Figure 2. Degree of 2 price discrimination

Source: Perlof,.J.M. Microeconomcs. Berkeley2004,,University of California,, s.256. ISBN 0-321-18197-2.

The company sets the price of P0 for the amount of output Q0 and a lower price for the next block of consumption, and so the price gradually decreases as the volume of consumed goods or services increases. The company expands its output to the point where prices are equal to the average cost of AC, which is in Q3. Since the monopoly does not set a uniform price for all consumers, but it instead divides the quantity produced into blocks at which it sets different prices. The price of the first block is set at P1 level, taking away part of the consumer's excess. The realization of second-degree of price discrimination is applied in the charging of electricity, natural gas, water prices is based on the fact that each household needs a certain amount of electricity necessary (e.g. for household lighting, operation of a refrigerator, cooker, washing machine). For this first "necessary" block, the electricity company, which has the status of a natural monopoly, will set the price P1. For the second "block" of electricity consumed (used for the operation of television and other household appliances) it sets the price P2 and finally for the third block it sets the price P3.

The second-degree of price discrimination applied by the natural monopoly is ensured by decreasing marginal as well as average costs, while allowing the monopoly firm to realize more production with reduced costs. As the natural monopoly benefits from higher economies of scale in increasing output, so does its profit as the cost per unit of production decreases, even though the benefit to the consumer increases.

2.3. The third degree of price discrimination

Third-degree of price discrimination is similar to first- degree of price discrimination, with the difference that it is discrimination according to consumers. (Bodhisatva Ganguli.: *Imperfect competition*, The Economic Times). It consists of dividing consumers into two or more sub-markets, each with its own individual demand curve. For this form of price discrimination to be realized, the following conditions must be met:

1. the criterion for dividing consumers into groups - market segments are the difference in price elasticity of demand for a given product (which result can from different levels of pensions, different preferences or different options for buying a substitute good),

2. there is no cross-selling between consumers of individual segments, because then someone in the low-price group could sell the product to someone in the higher-price group, thus reducing the price differences. The criterion for dividing consumers into market segments is the different price elasticity of demand. This is illustrated by the following chart, where demand is shown in two separate market segments, designated A and B.
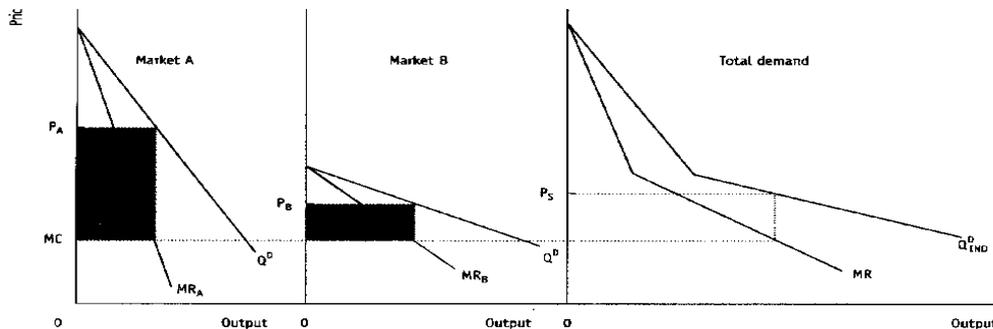
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Figure 3. The third degree of price discrimination

Source: Hope,.S. Applied Microeconomics.New York, 1999, s. 266, ISBN 0-471-97914-7.

Market A has a relatively inelastic demand curve compared to market B. The overall level of demand is shown in the graph on the right and is the sum of demand in individual markets. The monopoly pricing strategy that maximizes profit is at the point where the marginal cost equals marginal revenue. If marginal revenues were different across markets, the monopoly could re-locate its output and increase its profits. Consequently, the monopoly sets a higher price for a group of consumers with lower price elasticity of demand - this situation corresponds to point PA in the graph on the left when the monopoly sets a higher price in this market segment than PB in the market segment with higher price elasticity of demand in market segment B. The monopoly firm's profits from both separate markets are the area marked as a rectangle in the graph on the right and the monopoly profit is higher than if it had set a single price for both market segments.

2.4. Other examples of price discrimination

A very widespread form of price discrimination is time discrimination. The point is that at different times consumers are divided into groups(sub-groups) according to the elasticity of their demand, and different prices are set. Such a pricing strategy is used to market more technologically advanced products. (Varian Hal R.: *Price Discrimination and Social Welfare)* The first group of consumers are those who appreciate the new quality and advantages of a new product and are willing to pay a high introductory price. The second, larger group of consumers are those who appreciate its new quality but do not buy it at such a high price. Therefore, the monopoly will first satisfy the relatively inelastic demand of the first group of higher priced consumers and after this market segment is saturated, will lower the price for the second, larger group of consumers. (Geoff Riley.: *Conditions for price discriminatio)*

A specific form of price discrimination is discrimination in the tip. In this case, due to capacity constraints in times of increased consumption, there is an increase in marginal costs.

A traditional example is the pricing strategy of telecommunications companies, which charge different rates at times of the highest operating than at times of low operating. Perloff calls this form of price discrimination as two-part tariffs. Demand D1 is less elastic (at peak time), which is also reflected in the higher price of P1 at peak time. Thus, in periods of heavy traffic, both output and price are higher (Q1, P1). This pricing strategy increases the company's profit compared to the single-pricing strategy for the entire business. In this case, there is an absolute increase in both consumer and producer surpluses, too.

3. Theoretical approaches to defining price discrimination

A monopoly, in the context of its dominant market position, may adopt a pricing strategy in which it sets different prices to one consumer for the same goods, services or sets different prices for different groups of consumers, which the causes are not cost-related. We call this strategy of pricing as the price discrimination. (Holková, Vieroslava - Veselková, Alexandra - Valach, Matej. Mikroekonómia) According to Stigler, price discrimination is present when two or more similar products are sold at prices that are in different proportions to marginal cost.

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According to economist Tirol, it is difficult to arrive at a satisfactory definition of price discrimination. "We approximately defining ", a manufacturer discriminates on price when two units of the same physical good, service are sold at different prices, either to the different consumers or to the same consumer. (STIGLER, J)

Carlton and Perloff have stated in their work that price discrimination is one of the variants of pricing policy, where the company charges a variable price for the same goods or services according to the consumer. (Carlton, Denis W. – PERLOFF, Jeffrey M. Traduction: Mazerolle Fabrice).

Economists Belleflamme and Peitz define price discrimination as the sale of two types of goods (from the same trader) for two buyers at different "net" prices. The net price is the price adjusted for the costs associated with product differentiation paid by the consumer when purchasing the goods. (Belleflamme, Paul – Peitz, Martin)

Price discrimination can be invoked by a firm due to its monopoly power in the market in order to obtain a consumer surplus and its subsequent conversion into an additional profit for the monopoly firm. In the real world, a discriminatory monopoly segments are on the market divided consumers into different groups, for whom it sets different prices.(Andrew Barkley.: *Price discrimination)*

 Each group of consumers has a different price elasticity of demand, it means is more or less sensitive to price changes. The success of price discrimination lies in the company's ability to identify market segments where the price elasticities of demand differ from each other and at the same time the ability to isolate these market segments - prevent customers who bought goods at a lower price from reselling them to customers at higher prices. (Holková, Vieroslava - Veselková, Alexandra - Valach, Mate)

For maximize profits, the company determines the price and quantity of output at a level where MC = MR. (Farid Tayari, Barry Posner.: *Profit maximizing in a monopoly*) If, we suppose, there are two only groups of customers in the market with different elasticities of demand, the company can increase its profit by charging different prices depending on the slope of the demand curves in individual subgroups.

Therefore, for the group of "adults", where the price elasticity of price demand elasticity (hereinafter PDE) is inelastic, higher prices will be charged, while for the group of "students" the prices will be lower because their demand is elastic.

The following figure shows the situation of how a company can charge different prices based on the elasticity of demand.
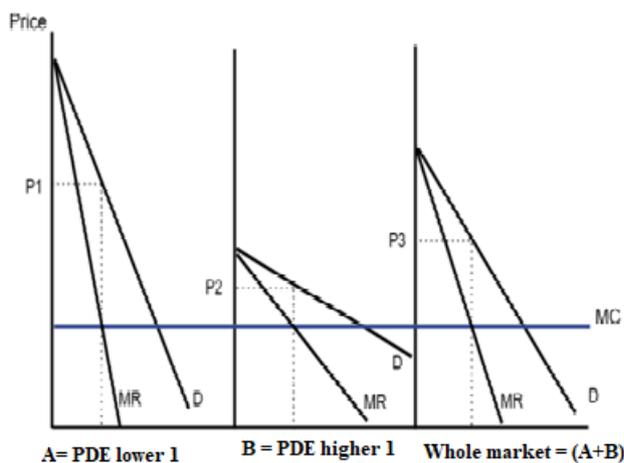

Figure 4. Profit maximization in case of price discrimination

Source: own processing according Pettinger, Tejvan. Price discrimination. Available on: ttps://www.economicshelp.org/microessays/pd/price-discrimination/

The profit is maximum when MC = MR. Without price discrimination, a single price would be charged, P3 for the whole market (A + B). However, price discrimination allows a company to set different prices for group A and group B. Because in group A demand is price inelastic if PDE <1, the profit-maximizing price will be higher, P1.

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In group B, demand is price elastic PDE> 1, which means that the price maximizing profit will be lower, in the point P2.

(Petier, Tejvan.) Pigou knows three basic types of price discrimination on basic information, which the companies have about customers – buyers. If company has complete information about individual preferences of buyers. Than firm is able charges individual price for each buyer and will and for each unit of good or service, therefore it gains whole consumer profit. When a firm does not know exactly each customer's willingness to pay for a good, it can still siphon off some of the consumer surplus by relying on some indicators (such as age, occupation, position) that are related to consumer preferences. (Helen Karen.: *Price discrimination*)If the firm can observe the characteristics of buyers, then it can charge different prices depending on these characteristics. This type of price discrimination is referred to as third-degree price discrimination. This practice is common in the software industry, for example, office software is often sold at different prices to home users and professionals. In this kind of price discrimination is necessary to consider the correlation between price and elasticity of demand.

The marginal cost of producing one additional output must be equal to the marginal revenue in each market. If the marginal revenues in market A exceeds the marginal costs, the firm must pay to increase production in market A as well as in market B. Since the marginal cost is the same in each market, the marginal revenue must reach the same value in each market. That means that the production should bring the same profit whether it is sold on market A or on market B.

For marginal income, we can now use the standard formula to calculate elasticity and write the conditions for profit maximization as:

$$P_1(y_1) \left[1 - \frac{1}{|e1\,(y1)|} \right] = MC(y_1 + y_2)$$

$$P_2(y_2) \left[1 - \frac{1}{|e2\,(y2)|} \right] = MC(y_1 + y_2),$$

where e1 (y1) and e2 (y2) represent the elasticity of demand in the individual markets.

Note that if p1> p2, then:

$$1 - \frac{1}{|e1\,(y1)|} < 1 - \frac{1}{|e2\,(y2)|},$$

what we get

$$\frac{1}{|e1\,(y1)|} > \frac{1}{|e2(y2)|}$$

and that means

$$e_1(y_1) > e_2(y_2)$$

It follows that a market where a higher price is applied must have lower elasticity of demand. After mature consideration, this is quite reasonable. Elastic demand is demand sensitive to price changes. Therefore, a company that discriminates on prices in the market will set lower prices for a group of customers with higher price sensitivity and a higher price for that group of customers that is less sensitive to price changes. In this way, it maximizes its overall profit (Varian, Hal R.).

4. Practical application of price discrimination in the gas market, in the household sector

More interesting is next practical part of article. We selected second degree of price discrimination. We selected second degree of price discrimination of the Slovak Gas Industry (hereinafter SGI) is the largest and most important energy supplier in Slovakia. It has been supplying gas for more than 160 years, but since 2012 it has also entered the electricity market. This step has made it the largest energy supplier in Slovakia. Its services are used by more than 1.3 million customers in total. It supplies all customer areas in the Slovak Republic. Its main objective is reliable and secure, competitive gas and electricity supplies. In this paper we will analyse We will analyse the price of gas for households. We will compare two regulation period and prices according this majority supplier SPP. We will compare the regulatory period up to and including 2016, with the new regulatory period that applies from 2017.

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Since 2017, when the new regulatory period began, households are divided into 8 tariffs, compared to the previous period where they were divided between only 4 tariffs, tariff D4 was not regulated. In the following tables we list the prices for households for gas supply where there were 4 tariffs and then in the regulatory period where there are 8 tariffs, but tariffs D7, D8 are unregulated. To begin with, however, the price of gas supply is made up of a fixed monthly rate and a rate for the gas consumed. The fixed monthly rate is officially quoted on the SPP website each year in €/month, including and excluding VAT. The gas offtake rate is quoted in units of €/kWh, including and excluding VAT. We will first note the prices for gas supply to households in the years up to 2016 under the original D1-D4 tariffs.

Next, we state   the final price according to the proportions of its individual components: commodity, distribution, transportation, delivery and a reasonable profit. The following tables show how the shares of these components of the gas price structures contribute to the price for tariffs D1-D4 and D1-D8. We round the results to 4 decimal places.

Table 1. Share of gas structure components in the final gas price for households with 4 tariffs

Type of tariff	Price of the commodity (55,29 %)	Price of the distribution (38, 43 %)	Price for transportation (3,16 %)	Price for delivery and reasonable profit (3,11 %)	Final price (100 %)
D1 (0 – 2 110 kWh Including)	0,0332	0,0231	0,0019	0,0019	0,0601
D2 (over 2 110 – 17 935 kWh Including)	0,0242	0,0168	0,0014	0,0014	0,0437
D3 (over 17 935 – 68 575 kWh Including)	0,0231	0,0160	0,0013	0,0013	0,0418
D4 (over 68 575 kWh)	0,0302	0,0210	0,0017	0,0017	0,0547

Source: own processing according price list SGI

Similar calculation we made with eight tariffs, new regulation period.

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Table 2: Share of gas structure components in the final gas price for households with 8 tariffs

Type of tariff	Price of the commodity (55,29 %)	Price of the distribution (38, 43 %)	Price for transportation (3,16 %)	Price for delivery and reasonable profit (3,11 %)	Final price (100 %)
D1 (0 – 2 138 kWh Including))	0,0289	0,0201	0,0017	0,0016	0,0523
D2 (over 2 138 – 18 173 kWh Including))	0,0199	0,0138	0,0011	0,0011	0,036
D3 (over 18 173 – 42 760 kWh Including))	0,0197	0,0137	0,0011	0,0011	0,0356
D4 (over 42 760 – 69 485 kWh Including)	0,0186	0,0129	0,0011	0,0010	0,0336
D5 (over 69 485 – 85 000 kWh Including)	0,0257	0,0178	0,0015	0,0014	0,0464
D6 (over 85 000 – 100 000 kWh Including)	0,0256	0,0178	0,0015	0,0014	0,0463
D7(over 100 000 – 300 000 kWh Including)	0,0237	0,0164	0,0014	0,0013	0,0428
D8(over 300 000 – 641 400 kWh Including))	0,0234	0,0163	0,0013	0,0013	0,0424

Source: own processing according price list SGI

The changes to these tariffs mainly affected customers whose consumption was above 42 760 kWh. If a household had a consumption of up to 42 760 kWh as of 31.12.2016, which means tariffs D1-D3, the tariff of the point of consumption has not changed. Customers with higher consumption were split between tariffs D4-D8 according to their annual consumption. These changes have mainly positively affected customers whose consumption exceeds 42 760 kWh. According to the tables that we have stated, we can see that, based on the calculations, customers with consumption higher than 42 760 kWh pay less. On the basis of this change we can see how SPP applies price discrimination, in particular the second-degree price discrimination that we mentioned in the theoretical part. (Slávka Štroffeková*: Cena elektriny a zemného plynu*)

This means that if a customer consumes more units of gas, they will pay less per kWh of gas than a consumer who consumes a smaller amount of gas. If we put this into practice, we would see that if a consumer consumes, for example, 75 000 kWh and he has paid in the period up to and including 2016, when 4 tariffs were in force, they had paid a final price of €0.0547 per kWh. If the consumer consumes the same amount, i.e. 75 000 kWh today, when we apply 8 tariffs, he would pay €0.0464 per kWh. Thus, if we add it up, in the case of 4 tariffs, for 75 000 kWh of gas consumed, the consumer would pay €4102.5 for 1 calendar year.

While in case of 8 tariffs, the customer will pay € 3 480 for the consumed 75 000 kWh of gas for 12 consecutive months, one calendar year. The consumer will therefore save € 622.5. If the household consumes up to 95 000 kWh, he will pay € 4 398,5. For the same consumption, with 4 tariffs, he would pay € 5 196,5, which represents a difference, i.e. a saving of up to € 798 per calendar year. From the point of view of the Slovak consumer, this is clearly a significant difference.

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5. Conclusion

When analysing price discrimination of monopolies in the Slovak Republic, we focused on the gas market, the household sector. In the paper, we determined the structure of the maximum gas price in two regulatory periods, until 2016 and after 2017. The fundamental difference between these periods was the change of tariffs, where from 4 tariffs D1-D4 up to and including 2016, we were started to apply tariffs D1-D8 from 2017 onwards. Comparing the final prices - payments for gas, we found that the dominant supplier Slovenský plynárenský priemysel (hereinafter referred to as SPP) applies second degree price discrimination in such a way that consumers pay different prices per unit of gas. We found that if a consumer consumes a larger quantity of gas, they pay less per unit of gas than consumers with a lower quantity of gas consumed. Using mathematical calculations, we found out what the price differences are between tariffs D1-D3 because tariff D4 was not regulated. We applied the same calculations to the post-2017 period with tariffs D1-D8, while tariffs D7, D8 are not regulated. We have worked out the prices of these tariffs based on the official CAP price lists. We did not compare price differences for unregulated tariffs. Based on these differences, we conclude that consumers will save a significant amount of money due to the new tariffs, which better reflect gas consumption for end consumers. This means that the price discrimination applied by SPP has a positive impact on Slovak consumers.

Final calculation and comparison

	MEDIAN	Period 2012-2016	Period 2017-2021	Annual difference(savings)
D1	1055	63,41	55,18	8,23
D2	10023	438,01	360,81	77,20
D3	43255	1 808,06	1 539,88	268,18

	MEDIAN	Period 2012-2016	Period 2017-2021	Annual difference(savings)
D1	1069	64,25	55,91	8,34
D2	10156	443,80	365,60	78,20
D3	30467	1 273,50	1 084,61	188,89
D4	56123	3 069,90	1 885,72	1 184,18
D5	77243		3 584,05	
D6	92500		4 282,75	
D7	200000	unregulated	8 560,00	
D8	470700	unregulated	19 957,68	

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