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SUSTAINABLE ECONOMIC DEVELOPMENT, ECONOMIC EQUILIBRIUM AND WORK PRODUCTIVITY ON INDUSTRIES OF THE ROMANIAN NATIONAL ECONOMY, 2000-2015

Abstract. *In this paper we aimed to take a methodological look at the interdependence between economic results and employed population, as there have been a series of structural changes and serious imbalances related to work productivity across the four industries of the national economy over the last two decades. Following the economic development theories, we tested three hypotheses about economic equilibrium based both on work productivity across the national economy and also on work productivity in each of the four industries as presented in the National Classification of Economic Activities in Romania (CAEN, Rev. 2), with official data of the period 2000-2015.Our findings highlight a series of forms of interdependency across the four industries of the national economy as well as some potential economic sustainability vulnerabilities of the Romanian primary sector, thus forming a solid reasoning for future sustainable economic development.*

Keywords: *economic industries, sustainable economic development, economic growth, equilibrium theory, work productivity*

JEL classification: E01, E23, E24, J24, R15

1. Introduction

Sustainable economic development has been a key concern for all the States and economies, in the context of the major challenges raised by the need for performance and the high cost of resources. As supporting pillar of sustainable development, economic equilibrium has triggered in time full scientific debates, the results of which are still questionable or in various validation stages.

While the expert theories attempt to prove that medium and long-term economic equilibrium can generate sustainability, the practice shows that some

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economic systems have managed to attain significantly higher performance by pursuing a rather imbalanced approach. Work productivity, as a basic measure of production performance, has followed different trends linked to the particulars of the business sector, the measurement tools applied and the categories of resources involved in the specifically pursued business. Moreover, activity differentiation on industries, linked to the specifics and the available resources of each country, has outlined different paths for productivity increase, based on either resource savings, technological development, or human resources strategies.

In this paper, we aim to benchmark economic equilibrium and work productivity across the four branches of the national economy in order to identify opportunities and vulnerabilities of Romanian economy's development, based on the correlations between effect (gross value added - GVA) and effort (employed civilian population).

We used indicators of relevance for any analysis of economic development (GDP, GDP per capita, employed civilian population, annual and monthly work productivity), expressed in real terms, within a workable timeframe (16 years, period 2000-2015), so that the results of this research would be able to support articulation of medium and long-term economic development scenarios (Săvoiu, 2013).

The paper is structured as follows: we first outline the theoretical concepts, by having a brief review of the existing research on sustainable economic development, economic equilibrium, and work productivity; we then select and apply a statistical research method in order to test our hypotheses and conclude with a series of implications for future research and economic practice.

2. Sustainable economic development, economic equilibrium and work productivity – A brief literature review

2.1 Sustainable economic development

Wassily Leontief, the mastermind behind testing the economic equilibrium in the context of the global crisis, started by dividing the national economy into industries (with production for consumption by industries or by final consumers), then found the interdependency of the production relationships across the economy, and ended up with a review of the flows running between them, the input-output model (Leontief, 1966).

Economic development, both a final goal and support for the evolution of the human society, is a permanent center of interest for developing social and business policies. Such interest is justified if we are to consider that sustainable economic development is, in fact, the process whereby nations create and support the well-being of their peoples (Arrow, 1972).

The zero hour of the concerns about and debates on economic development is very difficult to trace back in the literature. Still, what we can distinguish are several opinions, such as the one Mansell and Wehn (1998),

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according to which economic development was understood, in the aftermath of World War II, as a means to drive economic growth, increase income per capita, put in place standards of living that would match those established in the industrialized countries, or that of Schumpeter and Backhaus (2003) that considers *economic development* as a statistical theory that pictures the state of an economy at a given point in time. According to this latter opinion, only occurrence of external factors can trigger equilibrium changes in this state.

Over time, the *economic development* theory has seen some highlights: the period 1940-1960, when the State played an important part in advancing industrialization as key axis of one country's development; this was followed by a period when the focus was placed in modernization (the modernization theory); around the 70s, we saw the basic needs growing for a short period, with the interest being directed towards development of human capital and redistribution; then, the neoliberalism was born in the 80s, shifting the agenda towards free trade and industrialization policies as import replacements.

Looking into the definition of economic development (Schumpeter,2006), one could be confused about the content and use of concepts such as *economic growth* and *economic development*, which demands for additional explanations. Thus, in order to prevent any potential confusions with respect to the similarities and differences between economic development and economic growth, we look at the two concepts as follows: economic growth regards the increase in results in time, whereas economic development regards the increase in results at the same time with enhancement of policies that target the social and political well-being of one country's people. Therefore, economic development captures indicators that concern both growth and well-being.

Sustainable development, unlike pure economic growth, is not focused mainly on productivity increase, but on the responsible use of resources (Brad et al., 2016). While in the neoclassical development model it is considered that economic growth ensures the premises for sustainable development, some authors highlighted the need to look more at the needs to improve the quality of life, at the environmental and inequality issues (Greenwood and Holt, 2016). Ciegis et al. (2015) showed that sustainability is quite a challenging objective that needs a balance in the way production process takes place (a fast growth of production might have negative implications on the environment, while a low one might lead to unemployment and social problems).

1.1. Economic equilibrium and Pareto optimality

The general equilibrium is a theoretical concept developed to help to understand a system as a whole, using a "bottom-up" approach. Once launched, the idea has been put to good use in explaining and grasping various systems. In economy, the concept has proven highly useful as it brought along a different perspective as compared to the one supported by the Keynesian economists, whose

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approach is rather "top-down" and who start building their analyses on the so-called "big picture." Essentially, the theory of the general equilibrium tries to explain the developments in supply, demand, and prices in an economy with more or less interacting markets, building on the idea that the interaction between demand and supply would eventually result in an overall general equilibrium. The theory of the general equilibrium contrasts with the theory of the partial equilibrium that only looks into stand-alone markets (Kenessey, 1987).

If we are to take the work of the French economist Léon Walras and his paper Elements of Pure Economics into account, we then accept that the theory of the general equilibrium stretches back to 1870s (Walras, 1926).

The modern approach to the general equilibrium came gradually into the shape of a model (Arrow and Debreu, 1954).

While much has been written on this topic, the overall equilibrium analysis remained just a theory before the 70s. It was the breakthroughs in technology and computer science that have allowed modeling of national economies and global economy, and thus putting this theory into practice.

The economic literature and practice have seen several models emerging and being put into practice, such as the Applied General Equilibrium (AGE) model, or the Real Business Cycle Theory. The Applied General Equilibrium (AGE) model used by Scarf (1973) provided a numerical method to address the general equilibrium in Arrow-Debreu model (Arrow and Debreu,1954). Later on, the model was taken over, implemented and made famous by Shoven and Whalley (Shoven and Whalley, 1973). Nevertheless, around the 80s, the AGE models became less popular due to their inability to provide accurate solutions and the high cost incurred; the Computable General Equilibrium (CGE) models overtook and eventually replaced the AGE models in mid 80s, for their ability to provide faster and more accurate means of drawing the big picture of an economy. They became the favorite models for many governments and The World Bank. The CGE models are still used today and are presented in the literature alongside the AGE models, with a focus on their interchangeability. The Real Business Cycle Theory considers that the business cycles are strongly influenced by the changes in the economy, and the endorsers of this model do not attribute unemployment to the failure of the markets to reach their potential, but to the balancing of this potential that has decreased as unemployment has increased (Black,1995).

For a better understanding of the content and functionality in the economy of the theoretical concepts in connection with general equilibrium, we made a selection of some of its key features:

- All the debates on the analysis of the general equilibrium are only of interest when such an equilibrium is efficient; the efficiency of this equilibrium also gives its security, uniqueness, and stability.
- As it is virtually impossible to reach a unique equilibrium, it is worth asking ourselves whether any particular equilibrium is at least unique at the local level. If so, we can use statistical benchmarking when the system variations

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are not too extensive. Under these circumstances, we can conclude that equilibrium is limited in a regulated economy, and, consequently, unique at the local level.

- The second theorem of welfare considers that even when each individual equilibrium is efficient, an efficient allocation of resources does not necessarily need to be part of the equilibrium. In order to attain a certain Pareto-efficient result, only a redistribution of the initial facilities of the businesses is required, and then the market could be left to do its job. Thus efficiency and equity problems could be separated, and reaching a compromise is not mandatory.

Despite the interest triggered, the equilibrium theory has not been shielded from criticism. Thus, Keynes (1923) described the equilibrium theory as dangerous in his work, *A Tract on Monetary Reform*. To his mind, no equilibrium could be achieved by default. Exceptionally, long-term equilibrium is achievable, if we are to accept extremely high costs, efforts, and related difficulties.

Pareto optimality is a multi-criteria optimization concept that is rooted in the theory of economic efficiency. It is generally used to distribute resources (goods, income, equipment) and only concerns the economic dimension, having nothing to do whatsoever with a desirable or fair distribution of resources (Mathur, 1991). Pareto optimality entails availability of a distribution strategy that would ensure that situation of no party can be improved without detriment to that of another party. When trying to reach an optimal equilibrium, employees could also be seen as resources. Thus, we can consider, for instance, the brain drain phenomenon that implies investments in education in the country of origin and following benefits in a series of more developed countries, where people are moving to obtain increased earnings. While putting an end to this phenomenon is virtually impossible, it can still be mitigated by adequate policies in the country of origin (Ramos et al., 2014).

Other authors believe that no balanced development is attainable unless linked to the specific pillars of the investment strategy (Dobrea et al., 2013). The globalization context and the increasingly accelerated developments in the economic systems highlight the need for a complex approach to the interdependencies between economic development and investment policies intending to identify support tools and to capitalize on them.

1.2. Work productivity

In modern economies, the effort of the human factor that aims to make most efficient use of each unit of natural, human, financial or information resources is an essential prerequisite for sustainable economic development. On this basis, we must keep in mind that the economics specialists very widely share the view that economic prosperity of a nation and the standard of living of its members are closely linked to work productivity. We can say that productivity gives the measurement for the standard of living in a region or a country (Porter, 1990).

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The term "productivity" comes from the Latin *productio* (production) and *ducere* (drive). It is generally defined as the ratio between the measured volume of production (outputs) and the measured volume of resources (inputs). In other words, work productivity is defined as the output per unit of labor, where labor can be expressed in the form of the number of hours worked, the number of persons employed (employees and other categories), or the number of employees.

Higher productivity supports increased production at the same labor costs, and employing more people should lead to a higher increase in output compared to the increase in the labor costs. Regardless of how it is calculated, work productivity is just a partial measure of productivity that highlights the aggregate effect of several factors, especially capital and intermediate consumption, but also technology and organization effectiveness, potential economies of scale or higher use of production capacities (Oancea and Chideștiuc, 2007).

Lipinska (2016) showed that generally in the European Union the efficiency of resource use is growing slowly, while in a series of countries in Eastern and Central Europe the level of efficiency is very low. Interestingly, Hartwell (2016) showed that, on average, resource-abundant countries make a less efficient use of resources compared to resource-scarce countries.

The analysis conducted by Fourastié (1957) on the main three sectors of a national economy allowed him to make some interesting comments: work productivity is higher in the secondary sector (manufacturing and construction), medium in the primary sector (agriculture), and low in the tertiary sector (services). Currently, this ranking is significantly changed as services account for increasingly more in forming of the GDP, particularly if we are to consider the growth of IT, financial and tourist services. Interestingly, Wlodarczyk (2011) noticed that disparities in employment among the economic sectors decreased in Euro zone after the introduction of a common currency.

2. Analysis of the macroeconomic context of Romania in 2000-2015 and the prospects of sustainable development

On the basis of the official data supplied by the National Institute of Statistics (INS), this study works with statistically and econometrically processed indicators of relevance for the analysis of Romania's economic development: *Gross Domestic Product (GDP), Gross Domestic Product per capita (GPD/capita), Civilian Employed Population (EP), Gross Value Added (GVA), Annual/monthly work productivity per industry (W_i), Social productivity ($\hat{W}$), Share of EP out of total population, Share of industry GVA out of total economy.*

We took into account four industries as presented in CAEN, Rev. 2 - National Classification of Economic Activities in Romania, the Romanian version of NACE Rev. 2 (1 - Agriculture, 2 - Manufacturing, 3 - Construction and 4 - Services).

We applied a set of methodological statistical and econometric tools and analyzed these macroeconomic indicators in terms of both real dynamics and

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correlation, across the four industries of the national economy in the period 2000-2015.

Thus, we were interested into testing the following three research hypotheses:

H_1: The work productivity dynamics (W) overtakes the dynamics of GDP, as a prerequisite for sustainable economic development.

H_2: The ranking of the national economy's industries in terms of work productivity (W) is as follows: I. Services, II. Construction, III. Industry and IV. Agriculture, as it is usually the case for modern economies.

H_3: The link between GVA and the employed population is strong, but varies across industries. Thus, we could expect GVA is negatively related to employed population in manufacturing and agriculture, while it is positively related to employed population in construction and services.

All research hypotheses have been tested as follows:

H_1: The work productivity dynamics (W) overtakes the dynamics of GDP, as a prerequisite for sustainable economic development.

In Table 1 we presented the level and dynamics of GDP per capita and work productivity Romania, in the period 2000-2015. By comparing the numbers in the last two columns of the table, we found that our first hypothesis is partially validated, as generally, W dynamics overtakes *GDP* dynamics. *There are exceptions (years 2007-2008, and 2012-2013) with different causes. While the first deviation has easily identifiable causes (economic and financial crisis and Romania's integration into the European Union), the second one requires a more in-depth analysis of the domestic context.*

This first finding shall be later on linked to other information to see to what extent the influences are prevailingly quantitative or qualitative.

Table 1. Level and dynamics of GDP per capita and work productivity in Romania,in2000-2015 period

Year	GDP per capita (EUR/capita)	Social productivity GDP/EP (W) (EUR/pers.)	Real dynamics vs. 2000 in %	
			GDP per capita	W
2000	1784.3	4719.7	-	-
2001	1993.2	5309.6	111.7	112.5
2002	2142.6	5863.1	120.1	124.2
2003	2326.5	6372.2	130.4	135.0
2004	2703.3	7449.4	151.5	157.8
2005	3538.5	9554.9	198.3	202.4
2006	4352.3	11624.9	243.9	246.3
2007	5546.9	14362.8	310.9	304.3

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2008	6310.9	16279.0	353.7	344.9
2009	5344.8	14325.0	299.5	303.5
2010	5631.1	15072.9	315.6	319.4
2011	5928.5	15939.7	332.3	337.7
2012	5953.6	15591.2	333.7	330.3
2013	6439.4	16910.1	360.9	358.3
2014	6723.1	17828.8	376.8	377.8
2015	7191.4	19227.3	403.0	407.4

Source: Authors' processing of http://statistici.insse.ro/shop/, accessed January 2017Note: 2015 GDP forecast

H_2: The ranking of the national economy's industries in terms of work productivity (W) is as follows: I. Services, II. Construction, III. Industry and IV. Agriculture, as it is usually the case for modern economies.

In figure 1, we presented work productivity dynamics, per total and per each of the four economic industries.

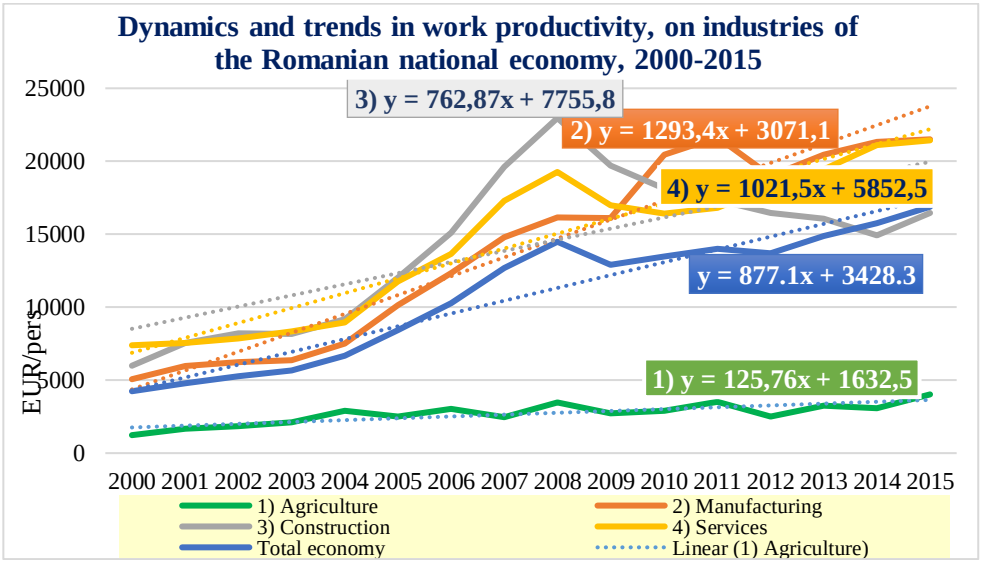

Figure 1: Dynamics and trends in work productivity, on industries of the Romanian national economy, 2000-2015
Source: Developed by authors, after processing data fromhttp://statistici.insse.ro/shop/, accessed January 2017

This graphical representation shows the influence of the economic crisis on annual work productivity across all industries; none of the industries under review

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has yet managed to recover to the level of the work productivity before 2008. We can also observe a slow, almost flat evolution in Agriculture compared to the higher boosts in Construction, and the efforts deployed in Construction and Manufacturing to make a more efficient use of human resources.

Therefore, despite some, sometimes significant, fluctuations of the data, we believe that the trend of this indicator at the overall economy, as well as on branches is positive, and our second research hypothesis *is thus confirmed.*

H_3: The link between GVA and the employed population is strong, but varies across industries. Thus, we could expect GVA is negatively related to employed population in manufacturing and agriculture, while it is positively related to employed population in construction and services.

We had this hypothesis in mind, because of the principle of substitution between labor and capital (technology) in the production process.

For *the correlation between GVA and civilian EP on industries of the national economy in the period 2000-2015,* the calculations made are captured in figure 2.

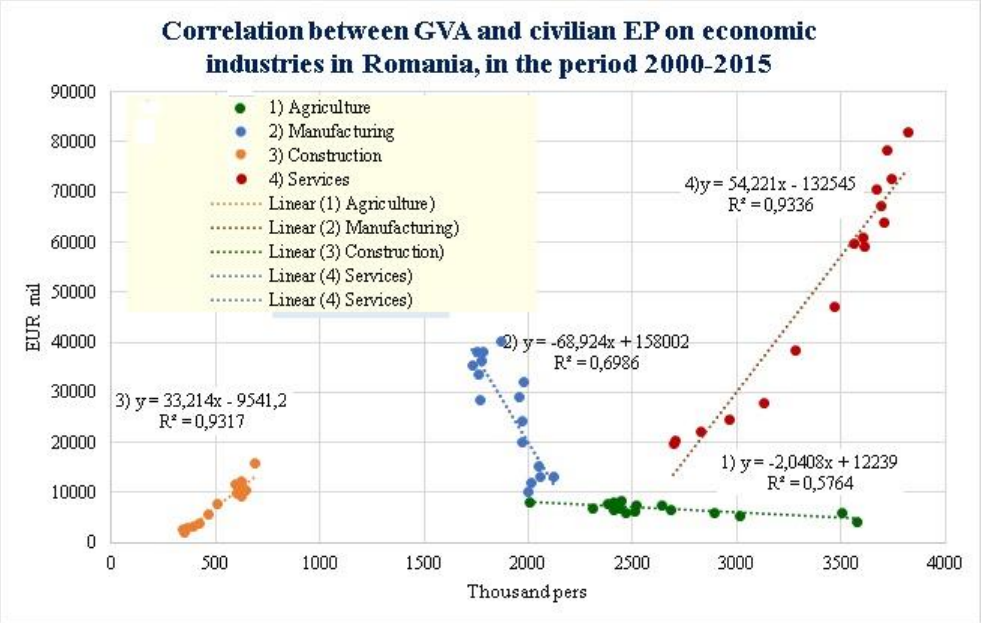

Figure 2: Correlation between GVA and civilian EP on economic industries in Romania, in 2000-2015 period

Source: Developed by authors, after processing data from http://statistici.insse.ro/shop/, accessed January 2017

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The parameters of regression equations and the correlation ratio validate the hypothesis for all four branches under review, for the values of the correlation coefficients: -0.8359 for Industry; - 0.7592 for Agriculture; 0.9625 for Construction; and 0.9662 for Services.

Relying on these results, the Hypothesis III is thus *validated.*

According to the determined parameters, the linear regression functions across the industries of the national economy look as follows:

Table 2.Regression equations between GVA and EP on industries and at national level in the 2000-2015 period

INDUSTRIES of the national economy	Regression function	Determination ratio	Correlation coefficient
Agriculture	$Y_x = -2.0408X_{agr} + 12239$	$R^2 = 0.5764$	-0.7592
Manufacturing	$Y_x = - 68.924X_{ind} + 158002$	$R^2 = 0.6986$	-0.8358
Construction	$Y_x = 33.214X_{const} – 9541.2$	$R^2 = 0.9652$	0.9317
Services	$Y_x = 54.221X_{serv} - 132545$	$R^2 = 0.9336$	0.9662
Total national economy:			
Simple regression	$Y_x = 52.126X - 349064$	$R^2 = 0.0436$	0.2089
Multiple regression	$Y_x= 1.78x_{agr} -18.81\ x_{ind}+ 167.80x_{const} + 38.457x_{serv} - 95945.38$	$R^2 = 0.9703$	0.9850

Software used: Data Analysis, Microsoft Excel 2013

We also determined the multiple correlation of GVA and civilian EP on industries of the national economy; in this way, we found a positive correlation in case of three industries (all, except for *manufacturing, -18.81401*). The results thus obtained are included in the table below:

Table 3. GVA and employed population regression onindustries of national economy, in the period 2000-2015

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.985033
R Square	0.970291
Adjusted R Square	0.959487
Standard Error	7476.414
Observations	16

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ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	4	20081093855	5020273464	89.8133166	0.0000000
Residual	11	614864367.4	55896760.67		
Total	15	20695958222			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	-95945.38	133038.5	-0.7	0.5	-388761.1	196870.3
X Variable 1 Agriculture	1.780613	14.487	0.123	0.904	-30.11	33.67
X Variable 2 Manufacturing	-18.81401	24.715	-0.761	0.463	-73.21	35.58
X Variable 3 Construction	167.8086	64.702	2.594	0.025	25.40	310.22
X Variable 4 Services	38.45721	27.703	1.388	0.193	-22.52	99.43

Software used: Data Analysis, Microsoft Excel 2013

3. Results and Discussion

The macroeconomic context of Romania appears highly complex and demands the simplest possible explanation. Thus, we noticed that our macroeconomic analysis revealed an economy that is dependent on an essential input (human resources), and that can be predictable using econometric models under the impact of statistical simplexity.

During the reference period, the *employed population* in various industries of the national economy followed different trends. The graphical representation below allows us to draw a comparative picture, and thus to notice a substantial shift of the population towards *Services* (mobility).

The data analysis of the employed population in the four industries highlighted a negative situation in *Agriculture*, where reduction of the employed population is still happening, while we cannot speak about a spectacular mechanization or automation of the work. The imbalance in this industry is driven by the fact that while, on average, it accounted for 31.14% of the employed population during the reference period, it managed to generate only 7.4% of the GDP, while *Services* accounted for 39.99% of the employed population and contributed 55.34% to the GDP. This gap between the indicators in *Agriculture* and *Services* tends to deepen in time.

The industries *Manufacturing* and *Construction* have had periods of both weak growth and decline.

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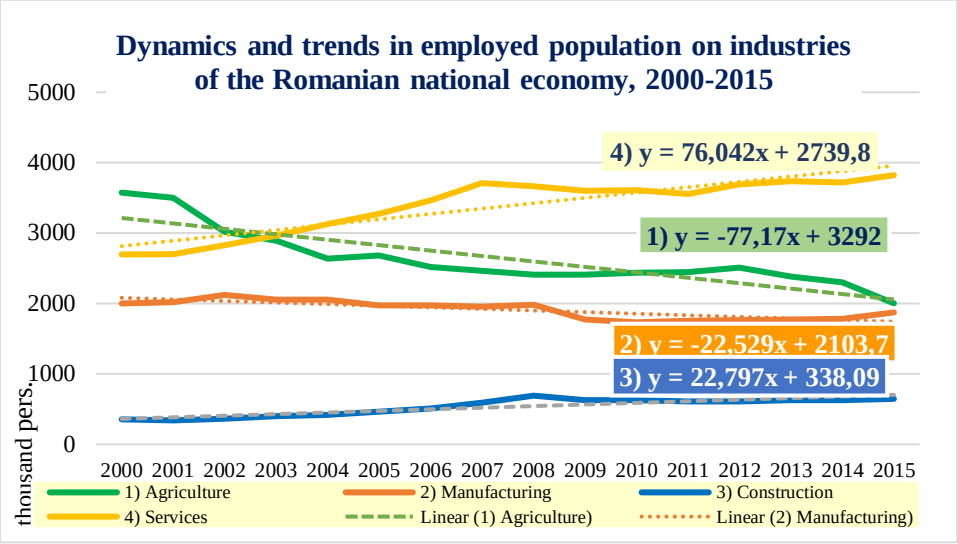

Figure 3: Dynamics and trends in employed population, on industries of the Romanian national economy, 2000-2015

Source: Developed by authors, after processing data from http://statistici.insse.ro/shop/, accessed January 2017

We also determined the correlation coefficients for inter-industry civilian employed population, in the period 2000-2015, as shown in Table 4.

Table 4. Correlation coefficients for inter-industry civilian employed population, 2000-2015

Industries of national economy	Agriculture	Manufacturing	Construction	Services	Total
Agriculture	1.0	0.591	-0.872	-0.935	0.144
Manufacturing		1.0	-0.767	-0.738	-0.047
Construction			1.0	0.965	0.248
Services				1.0	0.162
Total					1.0

Software used: Data Analysis, Microsoft Excel 2013

We found a moderate positive correlation between the employed population in *Manufacturing* and in *Agriculture* (0.591), and a high positive correlation in the case of *Construction* and *Services* (0.9650). We could also notice the strong negative correlations between the employed population in *Agriculture*

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and in *Construction*(-0.872); in *Agriculture* and in *Services* (-0.035) in *Manufacturing* and in *Services* (-0.738).

As regards the analysis of the *effort* factor, we need to dig deeper in the *Gross Value Added* for each industry, which is the *newly created value* in the production process. The share of *Services* in the GDP is 58.18%, followed by *Manufacturing* (28.59%), *Construction* (7.51%) and *Agriculture* (only 5.72%).

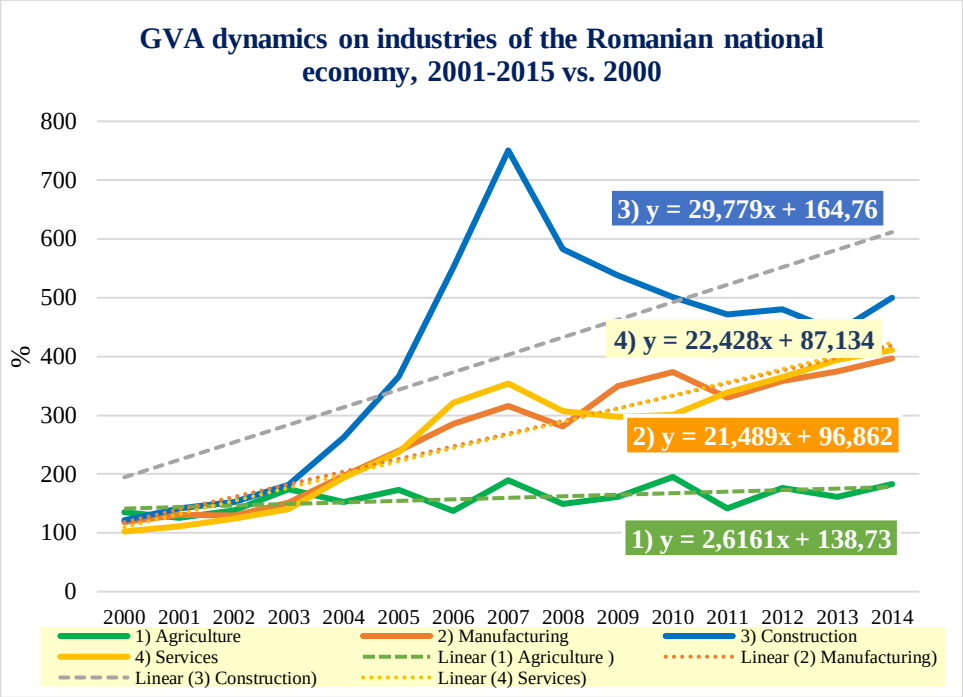

Figure 4: GVA dynamics on industries of the Romanian national economy, 2001-2015 vs. 2000

Source: Developed by authors, after processing data from http://statistici.insse.ro/shop/, accessed January 2017

The linear trend adjustment function of GVA dynamics compared to 2000 shows highly diverse coefficients, from 2.61 in Agriculture to 29.77 in Construction. The gap is significantly lower in Manufacturing and Services (22.42 and, respectively, 21.48), as shown in figure 5.

The analysis of *monthly work productivity in various industries of the national economy* required information and running of calculations that would support a comparative assessment, thus, we could highlight a positive trend.

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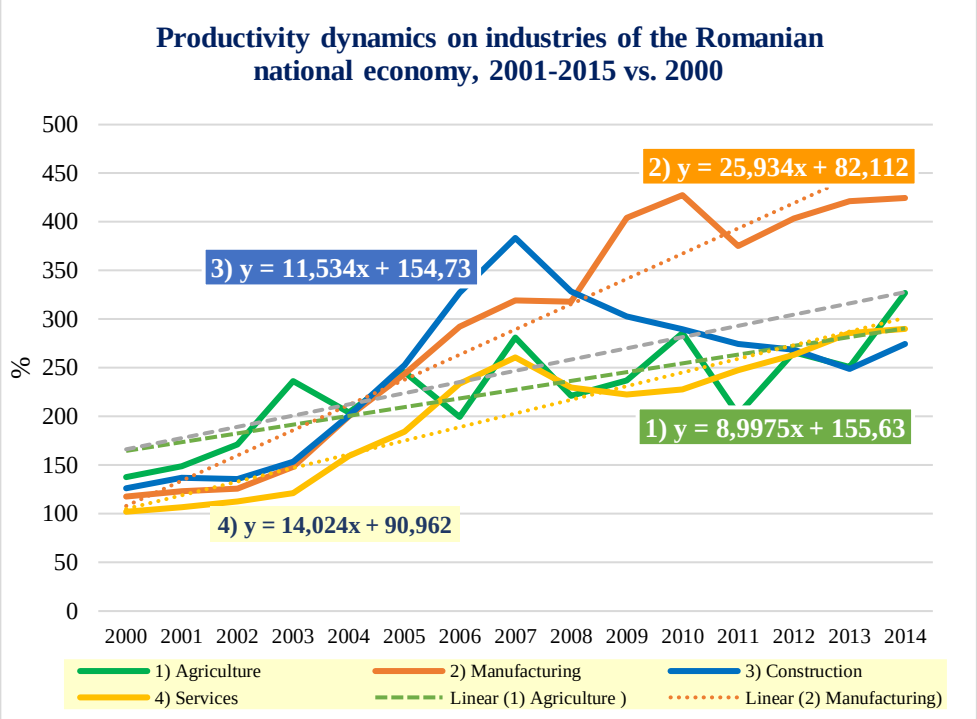

Figure 5:Productivity dynamics of industries of the Romanian national economy, 2001-2015 vs. 2000

Source: Developed by authors, after processing data from http://statistici.insse.ro/shop/, accessed January 2017

Conclusions, Limitations and Further Research

Economic growth and development of a country are influenced by numerous direct and indirect factors. As part of our approach, we assessed the *economic development* of Romania by statistically processing a comprehensive database containing *the GDP, the GVA, and the employed population* during 2000-2015. We selected the data for calculation building on the idea that employees are a decisive factor for economic development.

After testing our hypotheses, we can draw some useful conclusions for projection of a balanced and optimal development:

✓ *Romania's economy has experienced a favorable evolution, with GDP and W growing year-by-year*. The drivers of productivity growth require an in-depth analysis so that we become more prudent and do not necessarily assess the productivity growth as positive when it is exclusively caused by a reduction of the employed population;

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- ✓ *GDP per capita and social productivity follow a positive trend*, which is a good sign for the Romanian economy;
- ✓ The analysis of the *GVA* dynamics across the four main industries places *Manufacturing* in a better position. Thus, *GVA in Manufacturing overtakes the level and dynamics of the GVA in Agriculture and Construction*. It is worth running a comparative analysis of *GVA* levels across industries in Romania and in other countries so that we can set higher objectives and find ways to attain them;
- ✓ *The faster growth of productivity compared to the growth of GDP* is another positive finding of our analysis. We should keep in mind, however, that this result was driven by adverse events, such as the economic crisis;
- ✓ During the reference period, the employed population decreased, except for Services. The future projections should not overlook the need to foster the employed population's growth;
- ✓ The levels and dynamics of annual productivity are not steadily higher in a given industry.

The analysis of indicators in real terms allowed us to draw a series of conclusions useful when building development strategies focused on optimality and inter-industry equilibrium.

The diagnosis of work productivity gave us the opportunity to look at the state of the national economy and highlight, for the four industries of the economy, the correlations between the *effect* (GVA) and *effort* (civilian employed population).

The medium timeframe taken into account for our research(16 years, 2000-2015), which *renders* this analysis highly *practical*, gives a statistical certification to the trend-based nature of our results and allows drawing up medium and long term economic evolution scenarios.

Nevertheless, the reference period is characterized by a sequence of particular situations, the effects of which influenced the normality of the set of indicators used in the research. The years in question are 2005-2008, characterized by economic growth and high accessibility of financial resources, and the economic crisis in 2008-2011, the effects of which caused shifts in the production processes.

Another limitation of the results obtained was in connection with the way all the activities specific to the national economy have been grouped under the four industries. The classification criteria have been changed over time, depending on the nature and weight of the resources used, the outputs seen as products and services obtained, or the productivity of the processes. This diversity of criteria has set the premises for classification changes, which cannot be quantified through the values of the statistical indicators.

The absence of similar studies in other states with similar economic potential and resources is another limitation of or research. The impossibility to run comparisons on the set of data used and the results obtained renders the conclusions limited in an international context.

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This work advances and supports solutions to control certain models that may be simple or complex in nature (for instance, social productivity); we expect that many other useful macro and microeconomic models could emerge in the future as exogenous variables are turned into endogenous ones, and vice-versa.

With the aid of econometric modeling, this paper showed which are the inter-industry ratios and relationships in terms of employed population and their productivity in practical terms, for the specific case of Romania.

The usefulness of the results obtained could be further enhanced by developing new research directions through which we could supply alternative support tools to develop optimal strategies for resource allocation, and further mitigate vulnerabilities and foster sustainable economic development. This new research direction should consider the dynamics of the creative economy, seen as the fifth industry, the potential of which has been insufficiently quantified and put to good use in terms of resources and results.

Sustainable economic development is achievable by means of a balanced approach to the resources allocated to all the economic industries. Therefore, it is important to consider the context and particularities at the system level, the contribution in terms of outputs and productivity of each industry and sub-industry (field), with convergent objectives, in both quantitative and qualitative terms.

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