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Verification of the Correlation between the Level of National Competitiveness, Quality of Life and Productivity on the Example of the Developed and Developing Countries of the World

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Abstract--- *There is a certain consensus in the economic literature about the problems of the competitiveness of countries in the global economy – factor productivity determines the country's competitiveness, its growth rates and the population's quality of life. Such an approach became the theoretical foundation of a number of generally recognized competitiveness ratings of countries in the global economy (annual studies of the World Economic Forum, the International Institute for Management Development), which determine, in particular, the attractiveness of an economy for foreign investors. Despite the large array of publications devoted to the analysis and interpretation of the theory of national competitiveness, there remains a significant layer of ideas that have not been subjected to verification and critical analysis. Thus, studies on the analysis of the triad: national competitiveness, labor productivity, quality of life, taken over a number of years over a wide sample of countries (taking into account a number of quantitative and qualitative indicators) do not exist. The purpose of this work is to study the correlation between the level of national competitiveness, quality of life of the population and labor productivity, based on the example of 20 developed and developing economies of the world. Based on the data taken from the World Economic Forum reports (2010-2018 period) we verified the hypothesis of the presence of a direct (statistically significant) relationship between the studied indicators, using the methods of economic and mathematical modeling. As a result of the study, it was found that the correlation between the economic national competitiveness, labor productivity and the population's quality of life in this sample of countries and in the long-term timeframe was confirmed for most of the studied economies.*

Keywords--- *Competitiveness, World Economic Forum, Verification, Least Developed Countries, Quality of Life, Correlation, Labor Productivity.*

I. INTRODUCTION

The theory of national competitiveness is pretty much formed at the moment. The core of this theory is a concept of M. Porter, and the whole evolution history of the theory is divided into two large periods: from A. Smith to M. Porter (the classical stage) and the post-porter era.

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The question arises, why precisely M. Porter's theory acts as a new point of bifurcation? The fact is that before the Porter era, the theory of national competitiveness developed exclusively in a theoretical manner (in line with the theories of international trade), and then there was a sharp turn to practice and policy making (with a predominance of the managerial approach).

"An Inquiry into the Nature and Causes of the Wealth of Nations" (1776) by A. Smith was a real revolution in economics. It is not so much about the formation of the identity of a new class of society - entrepreneurs, whose pursuit of profit was justified in this book, it is about a new model of national prosperity based on production. Some economists, however, criticized the author for not saying anything new about international trade and for playing the role of a great plagiarist. But let's not forget that the two key statements he disclosed in his book: labor specialization and free-trade, after more than 200 years later, still remain the starting point for research in this area. That is why A. Smith is considered to be the father of economics and, in particular, the theory of international trade.

The problem is that the modern global economy is too complex and the classical theories of trade, originating from A. Smith, in these new conditions, have lost their explanatory possibilities.

A new revolution in economics (in our area of interest) occurred in 1990 and is associated with the name of M. Porter, who formulated a number of fundamental key statements that became the basis for the latest theories of national competitiveness: 1) competitive companies form competitive economic industries in the country, which, in turn, secure national competitiveness; 2) national competitiveness is not inherited but created, moreover, it is created not by the government but by the national manufacturers; 3) national competitiveness is directly determined by the level of productivity in economics (factor productivity), which comes from how fast the innovations are introduced; 4) the end goal of the national competitiveness growth is the life quality growth of the country's population.

The emergence of the M. Porter theory caused a response in the academic environment. Some representatives of the managerial school criticized the theory of national competitiveness for its excessive enthusiasm for local, internal factors of development, ignoring the opportunities and risks of the global economy, other representatives of "pure economics" completely deny the existence of this concept.

Managerial practitioners tried to expand and overcome the weak points of the Porter theory. Thus, in early 1990s the "double diamond" model of Rugman and D'Cruz (1993) was born, which helped to account for the impact of making the economic activity transnational. The updated model described the competitiveness of large, developed countries well, but could produce incorrect results for developing countries. In 1995, the "generalized double diamond" competitiveness model of Moon, Rugman, and Verbeke was born, which made it possible to correct this downside.

Let us turn our attention to these models, observing their importance for the theory of national competitiveness.

It all started with M. Porter's book "The Competitive Advantage of Nations" (1990), where he explored eight developed and two developing economies (Korea and Singapore). It is with respect to these two small economies that the "diamond competitiveness" model did not work, giving an erroneous result. Porter predicted the rapid growth of the economy of South Korea, which over the next decade was supposed to be among the developed

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countries. On the contrary, Singapore, according to Porter, was expected to stagnate, the country will remain at the stage of the economy, driven by factors of production (factor-driven economy). The problem is that since the publication of the work of M. Porter, Singapore has demonstrated a much higher rate of development than South Korea. This error in the analysis of the competitive advantages of the newly industrialized countries allowed us to doubt the correctness of Porter's "diamond competitiveness".

Moreover, the continued use of "diamond competitiveness" in practice (Porter advised it to the government of Canada and New Zealand) clearly showed the model's vulnerability, which was the excessive orientation to local development factors. Thus, in the case of Canada, Porter failed to adequately take into account the significance of the transnational activities of companies, and in New Zealand, he did not explain the successes of export-dependent and resource-oriented industries [29].

Thus, in the model of M. Porter, the main emphasis was placed on local factors that form competitive advantages, while external factors were practically not considered.

Moon, Rugman, and Verbeke (1995) have shown that for small, open economies, the "generalized double-diamond competitiveness" model is much more important.

For example, companies from small countries such as South Korea and Singapore are focused not only on local, but also on global markets and resources. That is why national competitiveness depends partly on internal factors, and partly on external variables – primarily, foreign direct investment (FDI). In the "generalized double diamond" model, national competitiveness is defined as the ability of value-added companies in a particular industry and in a particular country to support the creation of this value for a long period of time in international competition.

Thus, there are two important differences between the theory of M. Porter and the new model of a "generalized double diamond". First difference – the added value created in a particular country can be the result of activities of both national and foreign firms (in the Porter model the activities of foreign companies were ignored). Second difference – the creation and maintenance of the added value in a particular country may require the involvement of national diamonds of many countries. So, the unique local advantages that arise in different economies can complement each other. On the contrary, in the model of M. Porter, it was argued that the most effective global strategy is to concentrate as much processes and advantages as possible in one country and conquer world markets from the home country.

For Porter, global companies are simply exporters of products, in his theory the organizational complexity of a truly global production process is not taken into account [29]. It was this simplistic view of transnational economic activity that led Porter to underestimate the prospects for the development of the Singapore economy, whose explosive growth was provided by FDI movement from foreign companies located in Singapore (they provided capital and technology inflows) and, in turn, investments by Singaporean companies for abroad (which provided access to cheap resources and labor).

According to Porter, local competition is much more important than global one, which may be true for large countries (such as the United States), but not for small countries (Canada, Singapore, Korea) for which international competition is more important than local one.

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The “generalized double diamond” model expanded M. Porter’s original theory in three directions at once. Firstly, the new model takes into account transnational economic activity. Secondly, the new approach helps to apply this model with respect to an unlimited number of countries. Thirdly, the new model includes the government not as an exogenous, but as an endogenous parameter, which has a direct impact on the 4 determinants of the national diamond competitiveness.

Later, in 2000, the nine-factor model of Dong-Sung Cho appeared (Cho, 2000), which proposed to expand Porter's “competitiveness diamond” by incorporating the human factor. This model opposes and at the same time combines the classic “Porter's diamond”, which reflects the material factors of competitiveness, and 4 groups of factors (employees, politicians, entrepreneurs and specialists) that form the non-material basis of competitiveness (the so-called “human factor”).

Thus, according to Cho, the model becomes more dynamic and makes it possible to take into account the influence of various population groups on the development of national competitiveness. Moreover, the influence of the human factor helps to more deeply reveal the idea of M. Porter that national wealth is not inherited, but is created. An increase in the level of national competitiveness is achieved through the interaction of various groups of the population and material factors. It should be noted that, as in the Rugman’s concept, government activity in this model is considered as an endogenous factor. The ninth factor in Cho’s model is random events, which he sees as an exogenous factor.

So, we can distinguish four significant improvements in the theory of M. Porter, proposed by representatives of the managerial school:

- Recognition of the fact that the state is the most important and integral part of competitiveness relationships (endogenous variable);
- Transfer of emphasis from local factors of competitiveness to global ones (taking into account the influence of transnationalization processes, transparency of borders);
- Expanding the range of factors that determine national competitiveness (the human factor in the Cho model, the activities of foreign companies in the Rugman model);
- Understanding the importance of FDI for the competitiveness growth of countries.

The criticism of the Porter model by the "pure economics" theorists was much harsher. Waverman (1995, Davies and Ellis (2000), Bolto (1996) pointed in their work to the fact that there is no fundamental theory behind the Porter model, it has no predictive capabilities and leads to incorrect interpretation of the classic and the new trade theory. Moreover, the interdependence between the national prosperity, productivity, trade, exports and competitiveness shown in the Porter model is distorted [29].

While the classical and new trade theory explains trade between countries, Porter tries to explain the factors that determine the international competitiveness of a particular country’s firm using the diamond competitiveness model. Thus, the Porter model is a powerful tool for determining the source of local competitive advantages for national companies, but the “competitiveness diamond” has nothing to do with the competitiveness of countries in the global economy.

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In later works we can see at least two more lines of attack on M. Porter's model from the representatives of "pure economics".

Firstly, according to Porter, these are not countries, who compete in the global economy, but firms from these countries for which international trade is a game with a negative amount. Since, in the model of M. Porter, the competitiveness of companies determines the level of national competitiveness, it follows that, for individual countries, trade is a game with a negative amount. This is in sharp contradiction with the consensus established in the theory of trade, according to which international trade is a game with a positive amount.

Secondly, in spite of the fact that in M. Porter's model, the state is an exogenous variable (along with random events), his statement that the government should focus on eliminating the obstacles hindering the increase in factor productivity and development of the cluster initiative was perceived by a number of economists as a call for neoprotection policies.

A review of current publications on the topic of national competitiveness shows that economics is gradually moving away from creating "large theories" to studying particular cases of success or failure of the policy of increasing national competitiveness in a given country.

Thus, in the study conducted by S. O'Donnell and T. Blumentritt (1999) [18], the contribution of foreign companies in the development of national competitiveness of the USA was researched; the work of G. Pisano and W. Shih [19] is dedicated to the American Competitiveness Initiative (ACI) [20]; J. Nahm and E. Steinfeld (2014) [21] analyzed a unique feature of Chinese economy - to create and commercialize manufacturing innovations; J. Ženka, J. Novotný and P. Csank (2014) [22] show the possibilities and limitations in applying Porter competitiveness theory in Central Europe, taking into account specific geographical and institutional contexts.

The second trend of current studies of national competitiveness is the gradual abandonment of free trade/perfect competition model in global markets, recognizing the necessity of taking into account the real economic practice. The aforementioned work of D. S. Cho [23], published in 1998, is noteworthy in this sense; M. Porter (2007) [24] himself talks about the necessary harmonization of industrial and competitive policies of the state; S. Thore and R. Tarverdyan (2016) [25] point to the possibility of environmental preservation and growth of public prosperity amid intense economic competition in the sustainable competitiveness model framework.

Another clear trend in current economic literature on the researched topic is the studz of the role of human capital in building national competitiveness. Thus, J. Sekuloska (2014) [26] notes that it is impossible for national competitiveness to grow without constant development of human capital based on the improvement of education and professional retraining; H. Mihaela, C. Ogrean, L. Belascu (2011) [27] study the connection between national competitiveness and culture and values of the society; T. Hemphill (2009) [28] discusses the need for cooperation of corporate and government interests for the sake of increasing national competitiveness.

II. MATERIALS AND METHODS

The goal of this study if to verify the following hypothesis: there is a direct (statistically significant) connection between the competitiveness level of a country, productivity and quality of life of the population.

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Currently there is a lot of annually published studies concerning the topic of inter-country comparative studies in some way, but there are only two universally accepted reports dedicated exclusively to the national competitiveness problem: Global Competitiveness Report of World Economic Forum (WEF) and World Competitiveness Yearbook of International Institute for Management Development (IMD).

To assess the dynamics of competitiveness of the developed economies in the long-time timeframe, the WEF report was chosen because:

- The report is published annually and has accumulated enormous evidence base over 35 years;
- The study, in contrast to its analog World Competitiveness Yearbook, can be freely accessed.
- It has internal logic, a wide range of the analyzed parameters (more than 100) and countries (135), takes into account the opinion of the local expert community [4].

International statistics and comparative studies of the quality of life evaluation also has a rich history. In 1960, the UN working group has prepared a report on the principles of determining and measuring quality of life indicators at international level. Current researchers interpret the quality of life as a complex descriptor of socioeconomic, political, cultural, ideological, ecological factors and conditions of the existence of an individual, the position of the person in society. [5, p. 70]. The two most important indicators in the evaluation of quality of life of the population in international statistics are: Human Development Index (HDI) and GDP per capita. HDI is a combined indicator of human development in countries and regions of the world. Each year the UNDP experts together with a group of independent international experts that use the statistical data of national institutions and international organizations along with analytical developments in their work publish the Human Development Report, the core of which is the HDI.

Of course, the labor productivity reflects the amount of product created by one employee per unit time. The labor productivity is a ratio of GDP (or GVA) to the number of people employed or the amount of time worked (in hours) [6]. Cross-country comparisons of labor productivity are conducted by a number of international organizations, research companies and institutes, economic departments of state structures such as Organization for Economic Co-operation and Development (OECD), The Conference Board, McKinsley Global Institute (MGI), the U.S. Bureau of Labor Statistics (BLS USA) etc.

Thus, it is possible to confirm or refute a number of statements of the Porter theory by determining the change in the level of national competitiveness for a group of developed and developing countries in a long-time interval and superimposing them on the dynamics of the quality of life and labor productivity indicators in these economies.

Methodological Research Basis

1. The study period is 10 years, long-term (the choice of time interval is due to two factors: research methodology of international organizations is constantly changing, it is necessary to ensure the comparability of the data used, which is possible in a medium and long time interval; this period of time covers the development of the researched economies taking into account the effects of overcoming the global financial crisis).

2. Studied parameters:

- National competitiveness level – Global Competitiveness Index (GCI) (it is calculated annually by the World Economic Forum, the data are given in the Global Competitiveness Report);

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- Quality of life – Human Development Index (HDI) (it is calculated annually by UNDP, the data are given in the Human Development Report);
- Labor productivity – productivity per one employed in prices of 2016 taking into account the purchasing power parity of 2011 (the data on countries are taken from the statistical database The Conference Board, Total Economy Database).

3. Sample of countries: 20 developed and developing countries of the world (1st-3rd quartile of the WEF Global Competitiveness Report of 2017-18).

4. Research methods: to test the hypothesis, a correlation analysis is used. Since the variables in our study are measured on a quantitative scale, it is necessary to use the Pearson correlation coefficient. To calculate the Pearson correlation coefficient, the following conditions must be met:

- The investigated variables should be distributed normally.
- The investigated variables should be measured on an interval scale or a ratio scale.
- The number of values in the studied variables should be the same.

Pearson's correlation coefficient takes a value in the range from - 1 to +1. Negative values indicate the presence of feedback between indicators, positive - a direct link. When the value of the correlation coefficient is 0, there is no connection between the values. To classify the connection by the value of the linear correlation coefficient, the Chaddock scale is used (Table 1).

Table 1: The Chaddock Scale for Correlation Assessment [1]

Value	0 : 0.1	0.11 : 0.3	0.31 : 0.5	0.51 : 0.7	0.71 : 0.9	0.91 : 0.99	0.991 : 1
Correlation	missing	weak	moderate	noticeable	close	strong	functional

The conclusion about the presence or absence of a correlation relationship between the studied parameters can be made only after checking the significance of the correlation coefficient. To assess the significance of the correlation coefficient, we will use Student's criterion. The significance test is related to the fact that the reliability of the correlation coefficient depends on the sample size – a situation where the magnitude of the correlation coefficient is entirely related to random changes in the sample is not excluded. In conducting this study, a significance level of 10% was established to test the significance of the correlation coefficient.

The disadvantages of the Pearson linear correlation coefficient include:

- Instability to emissions;
- When using the Pearson correlation coefficient, only the strength of the linear relationship between variables can be determined, other types of relationships are detected by regression analysis methods.

5. For carrying out the correlation analysis, the study used a programming language for statistical data processing R and a free open-source computing software environment under the GNU license version 3 “RStudio”.

Data for correlation analysis are presented in Table 2.

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Table 2: Data for Correlation Analysis[1] [7-17]

	Values\Years	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18
Switzerland	Competitiveness level, score	5.61	5.60	5.63	5.74	5.72	5.67	5.70	5.76	5.81	5.86
	HDI, index	0.916	0.920	0.932	0.932	0.934	0.936	0.938	0.939	n/a	n/a
	Labor productivity, thous. USD per capita	102962	100204	102970	102110	101365	101955	102529	102241	102192	102408
USA	Competitiveness level, score	5.74	5.59	5.43	5.43	5.47	5.48	5.54	5.61	5.70	5.85
	HDI, index	0.907	0.907	0.910	0.913	0.915	0.916	0.918	0.920	n/a	n/a
	Labor productivity, thous. USD per capita	112998	114090	117663	118601	119376	120386	121672	123473	123502	124442
Singapore	Competitiveness level, score	5.53	5.55	5.48	5.63	5.67	5.61	5.65	5.68	5.72	5.71
	HDI, index	0.887	0.889	0.911	0.917	0.920	0.922	0.924	0.925	n/a	n/a
	Labor productivity, thous. USD per capita	121200	117252	130810	134001	134146	135444	135592	135715	137574	142823
Netherlands	Competitiveness level, score	5.41	5.32	5.33	5.41	5.50	5.42	5.45	5.50	5.57	5.66
	HDI, index	0.906	0.906	0.911	0.921	0.922	0.923	0.923	0.924	n/a	n/a
	Labor productivity, thous. USD per capita	95258	92458	94395	95142	94328	95270	96711	97977	99073	100126
Germany	Competitiveness level, score	5.46	5.37	5.39	5.41	5.48	5.51	5.49	5.53	5.57	5.65
	HDI, index	0.906	0.907	0.912	0.916	0.919	0.920	0.924	0.926	n/a	n/a
	Labor productivity, thous. USD per capita	91624	86455	89588	91673	91240	91223	92212	92738	93225	94162
Hong Kong	Competitiveness level, score	5.33	5.22	5.30	5.36	5.41	5.47	5.46	5.46	5.48	5.53
	HDI, index	0.892	0.894	0.898	0.905	0.907	0.913	0.916	0.917	n/a	n/a
	Labor productivity, thous. USD per capita	100705	99319	106036	108108	107613	108943	111285	112867	115004	117913
Sweden	Competitiveness level, score	5.53	5.51	5.56	5.61	5.53	5.48	5.41	5.43	5.53	5.52
	HDI, index	0.898	0.895	0.901	0.903	0.904	0.906	0.909	0.913	n/a	n/a
	Labor productivity, thous. USD per capita	95919	93200	97839	98349	97351	97623	98778	101742	103263	103596
UK	Competitiveness level, score	5.30	5.19	5.25	5.39	5.45	5.37	5.49	5.43	5.49	5.51
	HDI, index	0.895	0.895	0.902	0.898	0.899	0.904	0.908	0.910	n/a	n/a
	Labor productivity,	86728	84443	85660	86468	86801	87557	88147	88691	89146	89761

[1] Made by the authors

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	thous. USD per capita										
Japan	Competitiveness level, score	5.38	5.37	5.37	5.40	5.40	5.40	5.47	5.47	5.48	5.49
	HDI, index	0.881	0.879	0.884	0.889	0.894	0.899	0.902	0.903	n/a	n/a
	Labor productivity, thous. USD per capita	75511	72527	75981	76131	77768	79000	78922	79726	79778	80302
Finland	Competitiveness level, score	5.50	5.43	5.37	5.47	5.55	5.54	5.50	5.45	5.44	5.49
	HDI, index	0.878	0.874	0.878	0.884	0.887	0.890	0.893	0.895	n/a	n/a
	Labor productivity, thous. USD per capita	95238	89518	92835	94022	91874	91829	91689	91938	93665	96021
Jordan	Competitiveness level, score	4.37	4.30	4.21	4.19	4.23	4.20	4.25	4.23	4.29	4.30
	HDI, index	n/a	n/a	0.737	0.735	0.737	0.737	0.741	0.742	n/a	n/a
	Labor productivity, thous. USD per capita	46611	45890	45078	44683	43943	44153	43053	42816	43224	42816
Colombia	Competitiveness level, score	4.05	4.05	4.14	4.20	4.18	4.19	4.23	4.28	4.30	4.29
	HDI, index	n/a	n/a	0.700	0.707	0.712	0.720	0.724	0.727	n/a	n/a
	Labor productivity, thous. USD per capita	29810	28692	28600	29257	29445	30364	31027	31228	31640	31874
Georgia	Competitiveness level, score	3.86	3.81	3.86	3.95	4.07	4.15	4.22	4.22	4.32	4.28
	HDI, index	n/a	n/a	0.742	0.749	0.755	0.759	0.768	0.769	n/a	n/a
	Labor productivity, thous. USD per capita	17696	16495	17827	18701	19196	19986	20514	20690	21464	22412
Romania	Competitiveness level, score	4.10	4.11	4.16	4.08	4.07	4.13	4.30	4.32	4.30	4.28
	HDI, index	n/a	n/a	0.798	0.797	0.794	0.797	0.798	0.802	n/a	n/a
	Labor productivity, thous. USD per capita	44392	42610	41525	42712	45426	47447	48537	51111	54061	55454
Iran	Competitiveness level, score	n/a	n/a	4.14	4.26	4.22	4.07	4.03	4.09	4.12	4.27
	HDI, index	n/a	n/a	0.745	0.755	0.769	0.770	0.774	0.774	n/a	n/a
	Labor productivity, thous. USD per capita	63429	66247	68598	71364	65298	63581	66310	63321	67320	72212
Jamaica	Competitiveness level, score	3.89	3.81	3.85	3.76	3.84	3.86	3.98	3.97	4.13	4.25
	HDI, index	n/a	n/a	0.722	0.725	0.727	0.727	0.729	0.730	n/a	n/a
	Labor productivity, thous. USD per capita	22308	22354	22654	22893	22693	22617	22353	22344	21966	21924
Morocco	Competitiveness level, score	4.08	4.03	4.08	4.16	4.15	4.11	4.21	4.17	4.20	4.24
	HDI, index	n/a	n/a	0.612	0.623	0.634	0.640	0.645	0.647	n/a	n/a

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	Labor productivity, thous. USD per capita	20967	19648	20188	20193	20859	21571	21998	22925	22797	23333
Peru	Competitiveness level, score	3.95	4.01	4.11	4.21	4.28	4.25	4.24	4.21	4.23	4.22
	HDI, index	n/a	n/a	0.721	0.725	0.731	0.735	0.737	0.740	n/a	n/a
	Labor productivity, thous. USD per capita	19888	19690	20884	21915	22869	23985	24386	25143	25807	25987
Armenia	Competitiveness level, score	3.73	3.71	3.76	3.89	4.02	4.10	4.01	4.01	4.07	4.19
	HDI, index	n/a	n/a	0.729	0.732	0.736	0.739	0.741	0.743	n/a	n/a
	Labor productivity, thous. USD per capita	20127	17722	17868	18867	20247	21077	22415	24460	26138	27061
Croatia	Competitiveness level, score	4.22	4.03	4.04	4.08	4.04	4.13	4.13	4.07	4.15	4.19
	HDI, index	n/a	n/a	0.808	0.815	0.817	0.820	0.823	0.827	n/a	n/a
	Labor productivity, thous. USD per capita	59262	55300	56650	58727	59558	60774	59135	59779	61494	64614

III. RESULTS

Visual analysis of the data is presented in Figures 1-4.

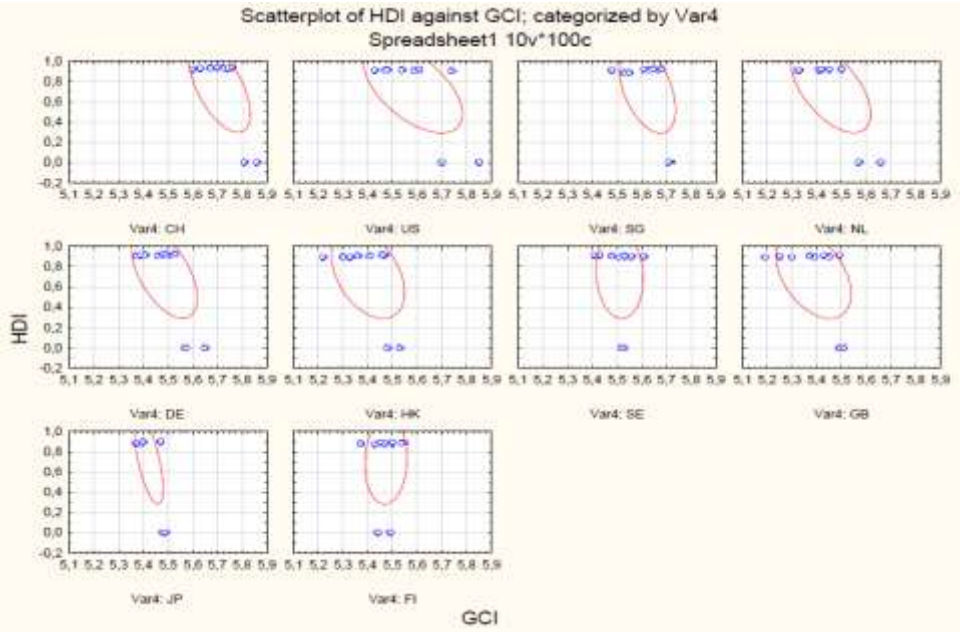

Figure 1: The Scatterplot between the Level of National Competitiveness (GCI) and Quality of Life (HDI)[2] [7-16]

(CH – Switzerland; DE – Germany; FI – Finland; GB – Great Britain; HK – Hong Kong; JP – Japan; NL – Netherlands; SE – Sweden; SG – Singapore; US - USA)

[2] Made by the authors

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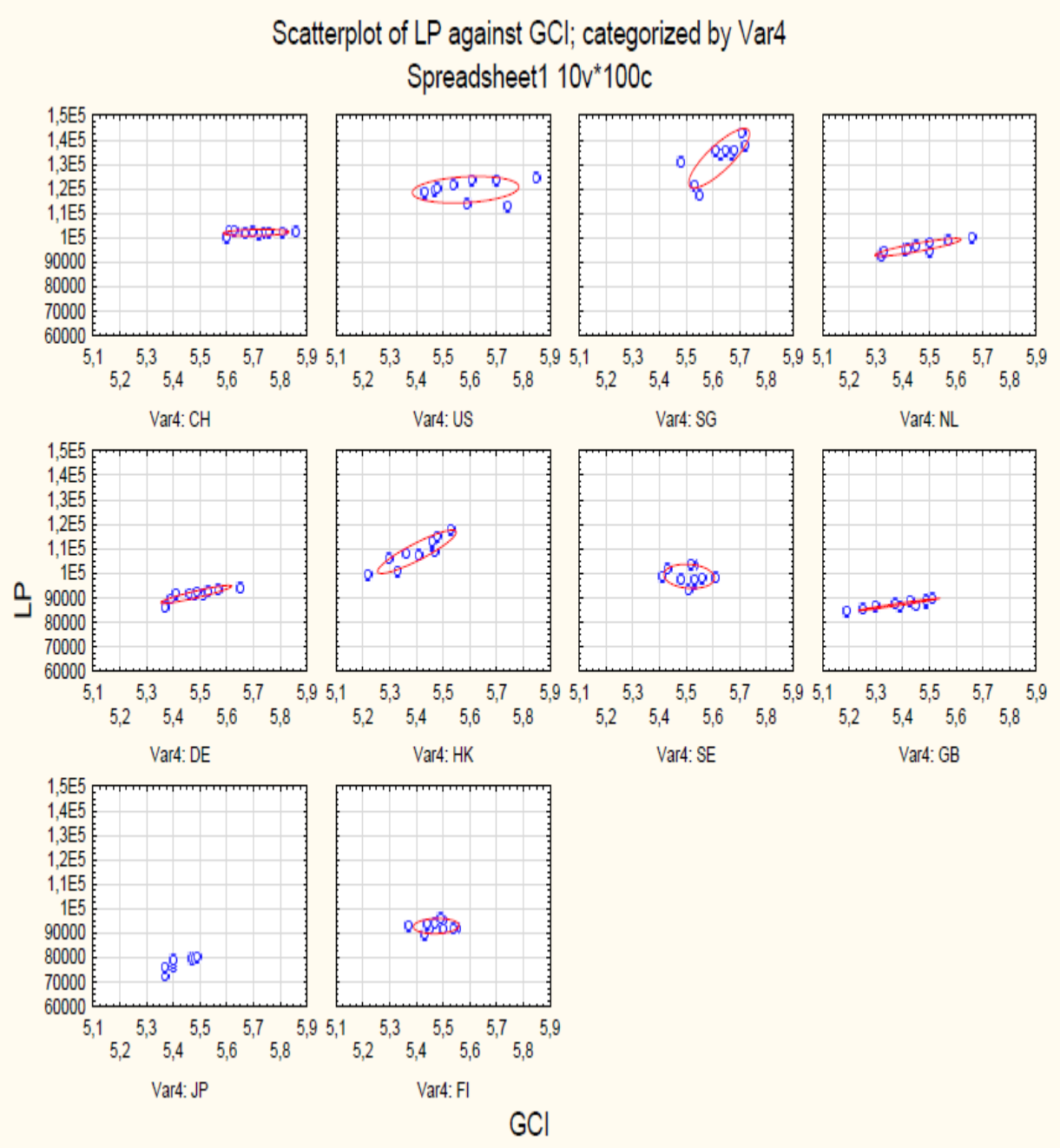

Figure 2: The Scatterplot between the Level of National Competitiveness (GCI) and Labor Productivity (LP)[3] [7-15, 17]

(CH – Switzerland; DE – Germany; FI – Finland; GB – Great Britain; HK – Hong Kong; JP – Japan; NL – Netherlands; SE – Sweden; SG – Singapore; US - USA)

[3] Made by the authors

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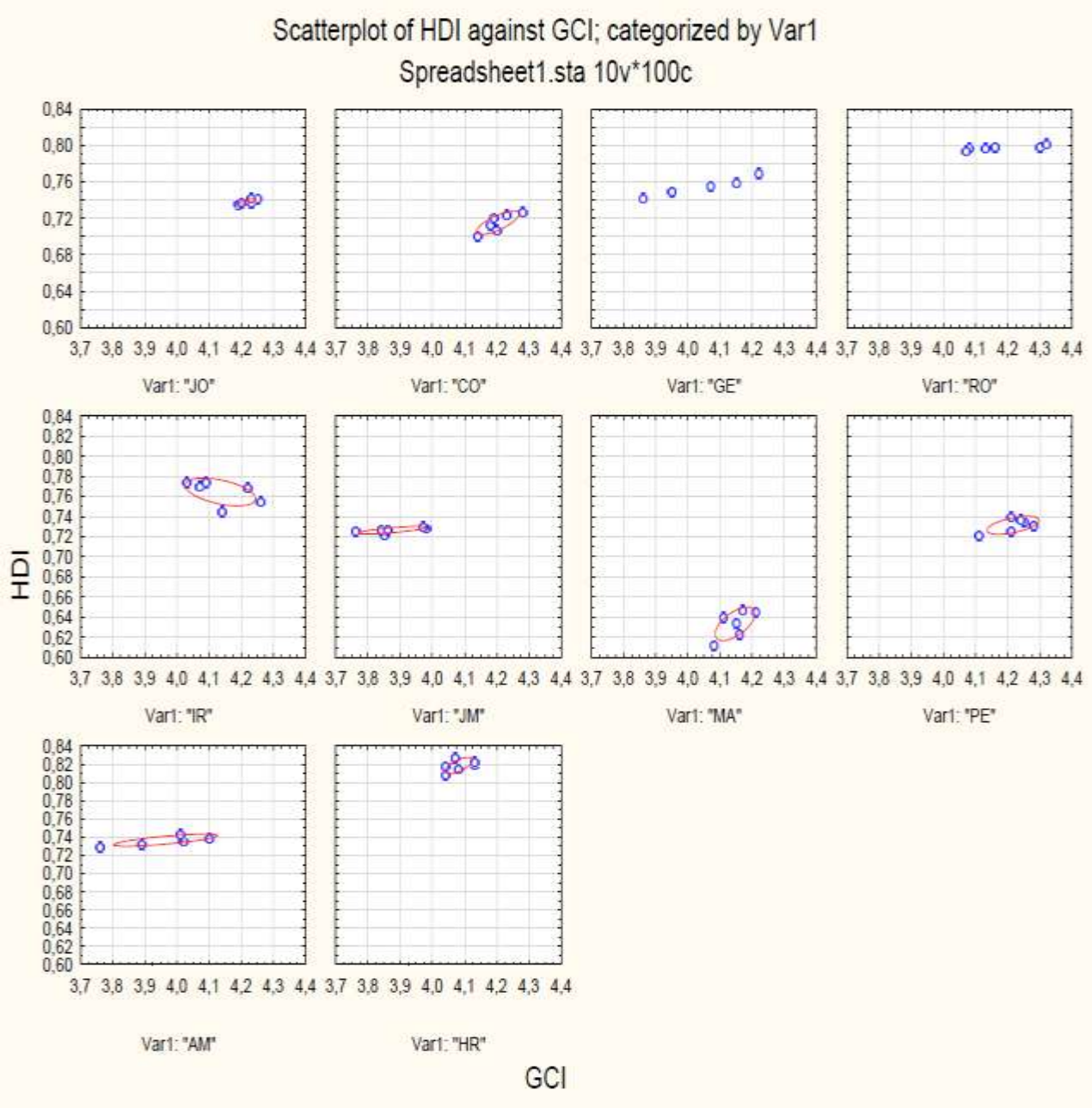

Figure 3: The Scatterplot between the Level of National Competitiveness (GCI) and Quality of Life (HDI)[4] [7-16]

(JO – Jordan; CO – Colombia; GE – Georgia; RO – Romania; IR – Iran; JM – Jamaica; MA – Morocco; PE – Peru; AM – Armenia; HR - Croatia)

[4] Made by the authors

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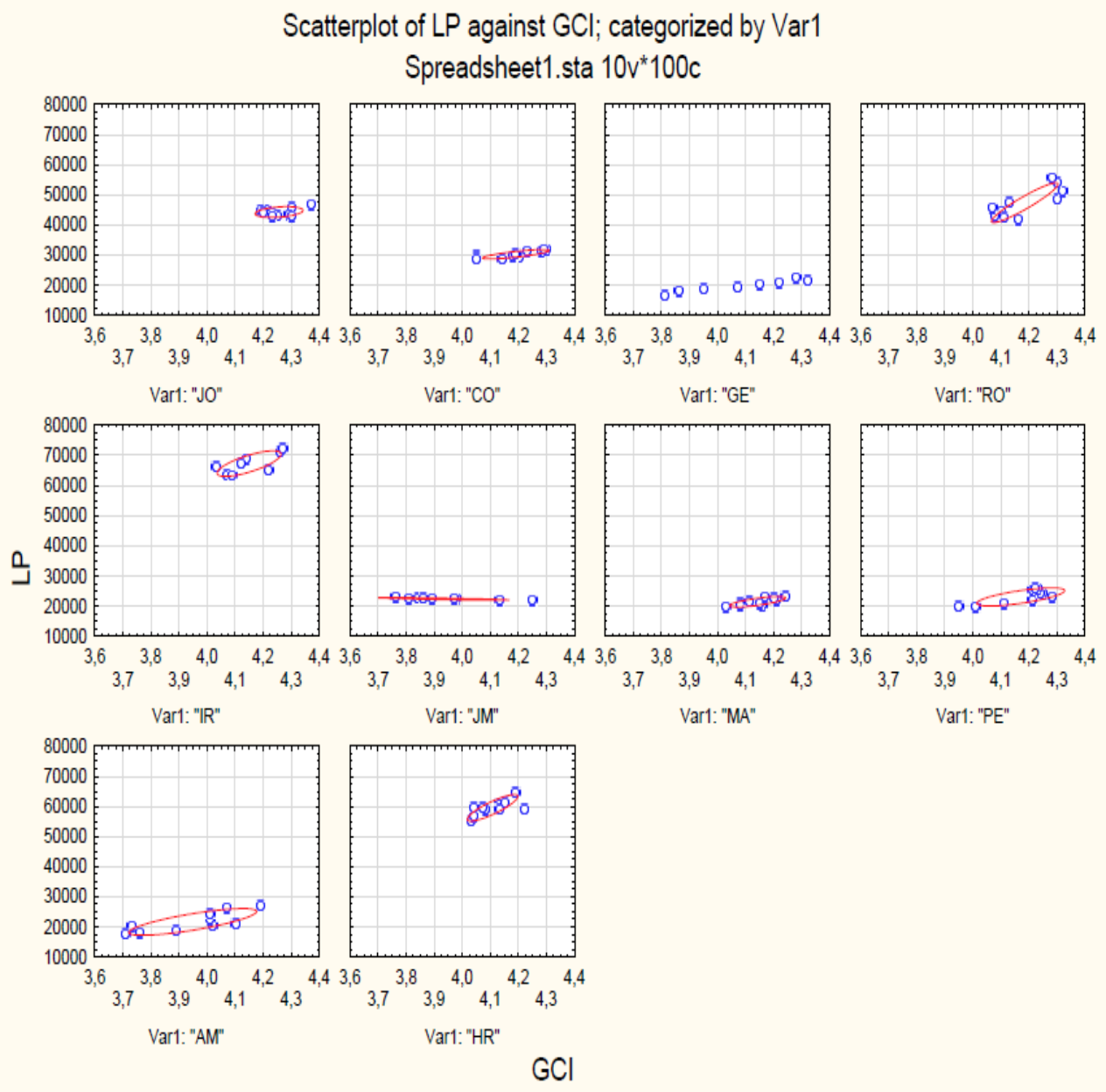

Figure 4: The Scatterplot between the Level of National Competitiveness (GCI) and Labor Productivity (LP)[5] [7-15, 17]

(JO – Jordan; CO – Colombia; GE – Georgia; RO – Romania; IR – Iran; JM – Jamaica; MA – Morocco; PE – Peru; AM – Armenia; HR - Croatia)

Since the analysis of scatterplots didn't identify the presence of any correlation between the studied values, the next step of the research was to build a correlation matrix for the studied countries, the results of the analysis are presented in Table 3.

[5] Made by the authors

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Table 3: Results of Correlation Analysis[6]

Country	Qualitative assessment of the correlation of national competitiveness and	
	labor productivity	quality of life
Switzerland	Missing	Close (0.78)
USA	Missing	Missing
Singapore	Close (0.73)	Close (0.7)
Netherlands	Close (0.89)	Close (0.76)
Germany	Close (0.84)	Close (0.76)
Hong Kong	Missing	Strong (0.91)
Sweden	Missing	Missing
UK	Close (0.89)	Noticeable (0.63)
Japan	Close (0.84)	Close (0.87)
Finland	Missing	Missing
Jordan	Missing	Close (0.80)
Colombia	Close (0.81)	Close (0.86)
Georgia	Strong (0.97)	Strong (0.98)
Romania	Close (0.81)	Close (0.82)
Iran	Close (0.74)	Missing
Jamaica	Close (0.89)	Missing
Morocco	Missing	Missing
Peru	Close (0.79)	Missing
Armenia	Close (0.80)	Close (0.82)
Croatia	Noticeable (0.68)	Missing

IV. DISCUSSION

4.1. Conclusions Drawn on the Developed Countries

4.1.1. The (statistically significant) correlation between the national competitiveness of the economy and labor productivity is observed in 5 out of 10 studied economies: Singapore, the Netherlands, Germany, the UK, Japan.

4.1.2. The (statistically significant) correlation between the national competitiveness of the economy and the life quality is observed in 7 out of 10 studied economies: Switzerland, Singapore, the Netherlands, Germany, Hong Kong, the UK, Japan.

4.2. Conclusions Drawn on the Developing Countries

4.2.1. The (statistically significant) correlation between the national competitiveness of the economy and labor productivity is observed in 8 out of 10 studied economies, and the economy of Jamaica has the inverse correlation!

4.2.2. The (statistically significant) correlation between the national competitiveness of the economy and the life quality is observed in 5 out of 10 studied economies: Jordan, Colombia, Georgia, Romania and Armenia.

V. CONCLUSION

The paper verified the modern theory of national competitiveness, based on the ideas of M. Porter, using the methods of economic and mathematical modeling for a wide sample of countries in the long-term timeframe.

[6] Calculated by the authors

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The correlation between such indicators as labor productivity, quality of life of the population and national competitiveness for a group of developed and developing countries in a long-term timeframe was confirmed.

The results of the study should be interpreted with extreme caution, on the one hand, due to the lack of sampling for the correlation analysis, and on the other hand, to the categorical uncertainty of the studied phenomenon. We hope that this work will activate a new wave of applied research of national competitiveness.

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