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HUMAN DEVELOPMENT INDEX IN PERFORMANCE OF SELECTED ECONOMIES

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ABSTRACT
The actual importance of this objective is the increasing environmental damages resulted by the human activities, therefore the human activity, which is the responsible for the increasing negative impacts on natural environment, should pay more attention to the environmental conservation to mitigate the pollution and waste material generation. The GDP growth and economic development should contribute to create such production technologies decreasing the burden on the natural environment. The correlations of *human development index* with some main economic issues mentioned above are prepared based on the Statistical Program for Social Sciences statistical analyses for all of seven economic variances distributing into two main Components.
Innovative knowledge and the technology and employees in the scientific researching fields should be developed in the selected countries and in wide-side EU-28. From these fields and their development can ensure to extend more environment-friendly technologies in economies of EU in order to mitigate the pollution and waste material. The Human development index and the economic growth including GDP increase and technological development should be harmonized developed with remaining the environmental conservation and natural environment. Waste management should decrease in future.

KEY WORDS: *Environmental conservation, Germany, Statistical analyse, Technology, Waste management*

1. Introduction

The study focuses on the analysing the correlations of *human development index (HDIndex7)* with some main economic issues concerning the GDP growth (GDPgrowth1) at current prices Euro per capita, environmental protection expenditure of the public sector by type % of GDP, namely environmental protection expenditure is the money spent on all purposeful activities (EnviProtExp2), generation of waste by economic activity in tonne, as total amount of waste generated by households and businesses by economic activity(GenWasteMAt3), the share of renewable energy in gross final energy consumption (RenewEn4), also the energy productivity, as the indicator results from the division of the gross domestic product (GDP) by the gross, in Euro per kg of oil equivalent (KGOE), (EnerProduc5) and also the human resources in science and technology (HRST) as a share % of active population (HumReScTech6). The correlations are analysed in cases of four biggest EU-member states, namely Germany, France, Italy and United Kingdom (UK) mostly during the period of 2010 and 2018.

The actual importance of this objective is the increasing environmental damages resulted by the human activities, therefore the human activity, which is the responsible for the increasing negative impacts on natural environment, should pay more attention to the environmental conservation to mitigate the pollution and waste material generation. The GDP growth and economic development

should contribute to create such production technologies decreasing the burden on the natural environment.

The analyses are set up the wide -side international data-base coming mostly from UNDP, United Nations Development Program and reports of Human Development Report Office within the UNDP. Some other data were coming from the Eurostat, as statistical offices of the European Union concerning the above-mentioned economic variances.

2. Material and Methods

The correlations of *human development index (HDIndex7)* with some main economic issues mentioned above are prepared based on the SPSS (Statistical Program for Social Sciences) statistical analyses for all of seven economic variances distributing into two main Components, as Component-1, which includes four economic variances namely GenWasteMAt3, (Minus) RenewEn4, EnerProduc5 and HumReScTech6. The Component-2 consists of the other three economic variances, namely GDPgrowth1, (Minus) EnviProtExp2 and the HDIndex7. This last one is calculated by the internationally accepted methods, which calculation HDIndex7 includes Life expectancy at birth (years) SDG3, expected years ofschooling(years)SDG4.3, mean years of schooling(years)SDG 4.6, gross national income (GNI)per capita(PPP= purchase power parity)SDG 8.5. The study analyses the correlation of HDI with other six economic variances and not inside contenting elements of the HDI. The Minus sign means that the economic variance is in inverse ration to the other economic variances.

Some experts wrote about the SPSS statistical system that "the SPSS is a widely used program for statistical analysis in social science. It is also used by market researchers, health researchers, survey companies, government, education researchers, marketing organizations, data miners, and others. The original SPSS manual [11]has been described as one of "sociology's most influential books" for allowing ordinary researchers to do their own statistical analysis. In addition to statistical analysis, data management (case selection, file reshaping, creating derived data) and data documentation (a metadata dictionary is stored in the datafile) are features of the base software." (see also more detailed in [2]; [10]. Also, the IBM SPSS Modeler supports the complete data-science cycle, from data understanding to deployment, with a wide range of algorithms and capabilities, such as text analytics, geospatial analysis and optimization. (see more detailed in [9]).

3. Literature Review

The HDI (Human Development Index) has important role for the economic growth, the GDP growth and the environmental conservation by three features of this HDI index namely the healthy - life, knowledgeable and standard of living. The improvement of the knowledge of the labour force of this sector strengthens the innovative development for increasing level of the competitiveness of the agricultural industry at the national and international markets. Experts declared that in the early development literature, income per capita was traditionally used to measure development with an assumption that it will directly translate into improved human well-being. For decades, the economic growth paradigm dominated the national development discourse. However, in the 1980s unemployment levels escalated. The access to social services deteriorated in many countries including some industrialized nations while at the same time, economic production was expanding. High rates of economic growth did not automatically translate into improved human well-being. During the same period, some countries were registering improvement in human wellbeing with modest economic growth. These raised questions around the nature, distribution and quality of economic growth. People started realizing that while growth-oriented policies may increase a nation's total wealth, whether or not growth enhances human development depends on how that growth is generated and utilized[1]; [3]; [12]; [13];

Also, they declared that the economic growth paradigm was, thus, believed to have neglected important aspects of development, such as poverty, income inequalities, unemployment, and

disparities in access to public goods and services like health, education, etc and did not capture adequately the multi-dimensionality aspects of development. For economic growth to enhance human development, it should provide an opportunity to enhance workers' knowledge and skills along with opportunities for their efficient use, provide better job opportunities and support greater democracy at all levels of decision-making. [4];[5]; [12].

Some international sources provide wide side definition about the human development index (HDI). According to my opinion there are three main branches are included in the HDI, namely the healthy-life, knowledgeable and the standard of living. These three one is summarized. The more definition about the FED definition can be declared at the beginning, which are as follows [6];[7];[17]:
Lost health expectancy: Relative difference between life expectancy and healthy life expectancy, expressed as the percentage of life expectancy at birth.
Physicians: Number of medical doctors (physicians), both generalists and specialists, expressed per 10,000 people.
Hospital beds: Number of hospital beds available, expressed per 10,000 people.
*Pupil-teacher ratio, primary school:*Average number of pupils per teacher in primary education.
Primary school teachers trained to teach: Percentage of primary school teachers who have received the minimum organized teacher training (preservice or in-service) required for teaching at the primary level.
Proportion of schools with access to the Internet: Proportion of primary and secondary schools with access to the Internet for educational purposes.
Programme for International Student Assessment (PISA) score: Score obtained in testing of skills and knowledge of 15-year-old students in mathematics, reading and science.
Vulnerable employment: Percentage of employed people engaged as unpaid family workers and own-account workers[6];[7];[17].

The German agricultural development proofed the importance of the more concentrated land use to increase the efficiency and productivity in the agricultural production as *farm income by economic farm size accompanying with highly developed educated and skilled human resources according to the human development index either in Germany or in Hungary* [16];[20]. Also, the international compare among the newly joining EU member states in Central-East Europe can demonstrate the more increasing rate of agricultural production in this region than the increasing rate of the EU-28, at all [19].

The degradation of the environment and atmosphere, coupled with significant declines in biodiversity, is linked to other development concerns ranging from declining food and water supplies to losses of livelihood and to losses of life from extreme weather events. This profoundly serious crisis threatens the human development of current and future generations. Business-as-usual approaches must change, with countries at different levels of human development exposed to and contributing to environmental degradation in different ways.

Very high human development countries are the biggest contributors to climate change, with average carbon dioxide emissions per capita of 10,7 tonnes, compared with 0,3 tonne in low human development countries. These averages mask considerable variation: Qatar had the highest carbon dioxide emissions per capita in 2014, releasing more than 45 tonnes per person, while Uruguay, also a very high human development country, released only 2 tonnes per person. Countries with lower levels of human development, especially small island developing states, generally have the lowest emissions but are often the most vulnerable to climate change [14];[17].

Some conclusions were given, that this Update has shown a snapshot of conditions today as well as key trends in human development indices and indicators. Key findings emerge from the analysis, which are as follows [15];[17]: Progress in human development cannot be sustained without addressing environmental degradation and climate change, which the recent progress on the HDI has exacerbated. For human development to become truly sustainable, the world needs to break with business-as usual approaches and adopt sustainable production and consumption patterns.The data about the gas emission show how much mankind and performance of the society are continuously

increasing these kinds of gases without stop, which need for the forceful cooperation to mitigation of gas emissions. In field of the carbon dioxide emissions per capita the global C02 emissions were 4,6 tonnes per capita. The change in forest area by human development group was 14,5% decrease in low human development, 9,7% decrease in medium human development; 1,7decrease in high human development; and 1,1% in very high human development in period of 1990–2015, in % [17].

4. Results and Discussion

The analyses are based on the summarised data from Eurostat for the seven economic variances(Table-1; Table-2). Table-3 shows how the measure of the correlations of HDIndex7 (Human Development Index) has been with the other economic variances. This means that the HDIndex7 has *very strong* correlations with the GDPgrowth1 by 0,980, *strong* with generation of waste by economic activity in tonne, total amount of waste generated by households and businesses by economic activity (GenWasteMAt3) by 0,687,*middle strong* correlations with energy productivity, the indicator results from the division of the gross domestic product (GDP) by the gross, Euro per kg of oil equivalent (KGOE)(EnerProduc5) by 0,565 and human resources in science and technology (HRST) as a share % of active population(HumReScTech6) by 0,531.

In these cases, if the *HDIndex7 increases* the other four economic variances also increase or probably little decrease, or if the *HDIndex7 decreases* the other four economic variances also decrease or probably little increase. This also, shows that the strong development trend of the *HDIndex7* stimulates or leads to increase of GDP growth or the GDP growth impacts on the increasing the HDIndex7. Also, the low level of educated system including in the HDIndex7 provides backwardness for the any possible GDP growth. Therefore, the educated level has an important role in the economic growth additionally to the PPP and the Life expectancy at birth (years).

Also, there is a contradictory correlation for HDIndex7 with an economic-variances as Environmental protection expenditure of the public sector of GDP(EnviProtExp2) by (Minus) 0,544. There is not a considerable contradict correlation between themselves, because if the environmental protection expenditure increases and probably the HDIndex7 decreases in some cases, but it does not mean that this contradictory action can realise. Also, there is a *strong* correlation between HDIndex7 and generation of waste by economic activity in tonne, total amount of waste generated by households and businesses by economic activity (GenWasteMAt3) by 0,687, which means that if the HDIndex7 increases the waste generated by households and businesses increases. Naturally the HDI include the PPP, which shows the increasing income position of population, and consumers, therefore their increasing consumption leads to the increasing trend of the waste generation in the four selected countries in the period of 2010 and 2018.

Also, there is not a considerable correlation of the HDIndex7 with the share of renewable energy in gross final energy consumption (RenewEn4).

There is a *very strong* important contradictory *correlation* betweenshare of renewable energy in gross final energy consumption (*RenewEn4*) and Energy productivity as the indicator results from the division of the gross domestic product (GDP) by the *gross, Euro per kg of oil equivalent KGOE*(*EnerProduc5*) by (Minus) 0,986. This means that if the *share of renewable energy* in gross final energy consumption *increased,* therefore, the *gross, Euro per kg of oil equivalent KGOEdecreased*. Finally, if the renewable energy resource increases in its share from the all energy, the cost of energy use will decrease in *Euro per kg of oil equivalent KGOE*(*EnerProduc5*), therefore, the energy productivity will be more favourable. If the share of renewable energy in gross final energy consumption decreases the cost of energy use will decrease in *Euro per kg*, which means that the energy productivity will be unfavourable. This also means that the *production cost of renewable energy resources* in these four selected developed EU-member states is *less than the production cost of fossil energy resources* in these countries and in the period of 2010-2018 (Table-3;[18]).

Also, there is another very strong correlation between Energy productivity, as indicator results from the division of the gross domestic product (GDP) by the gross, Euro per kg of oil equivalent KGOE(EnerProduc5) and Human resources in science and technology (HRST) as a share % of active

population(HumReScTech6). This means that the cost of energy use, as in Euro per kg will decrease if the share % of active population increases in fields of the science and technology. The more share of population employed in fields of the science and technology can make more population be consciousness to develop the environment-friendly technological development and saving the energy use at levels of the households and businesses.

Also, theGDP growth (GDPgrowth1) can be fixed and more ensured based on the increasing energy productivity (EnerProduc5) by 0,655, and human resources in science and technology (HRST) (HumReScTech6) by 0,687.This means that the increasing HDIndex7 has enough middle strong correlations with the increasing energy productivity (EnerProduc5) by 0,565 and human resources in science and technology (HRST) (HumReScTech6) by 0,531 (Table-3; Code: t2020_rd310, Code: tsc00025). The HRIndex7 has an important role to develop the energy productivity and increasing employed employees in sectors as science and technology.

Naturally the GDP growth has an important negative influence that the waste generated by households and the businesses increases, which can be proofed by the strong correlation between two economic variances namely GDPgrowth1 and GenWasteMAt3 (Table-3;[8]).

	GenWasteMAt3	RenewEn4 (Minus)	EnerProduc5	HumReScTech6	GDPgrowth1	EnviProtExp2 (Minus)	HDIndex7
Line	**Line „X"**				**Line „Y"**		
Germany	10	16,5	18,2	49,3	26,3	0,33	0,939
France	-9	16,6	14,8	52,1	14	0,59	0,891
Italy	3,4	17,8	11	37	8,1	0,88	0,883
UK	14,6	11	32	57,6	22,5	0,91	0,920
EU-28	*3,4*	*18*	*17*	*47,5*	*21,6*	*0,67*	-----

Table-1: Human Development Index with economic and environmental conditions in selected EU member states between 2010-2018, in %

Source: Eurostat, 2019Code: tec00001, Code: ten00049, Code: ten00106, Code: t2020_31, Code: t2020_rd310, Code: tsc00025;[18]

Note: EU-4 has 45,6% of from ton thousands of EU-28, in 2010
EU-4 has 45,9% of from ton thousands of EU-28, in 2016

RANK	Country	HDIndex7 (HDI) (value)	Life expectancy at birth (years) SDG3	Expected years of schooling (years) SDG4.3	Mean years of schooling (years) SDG 4.6	Gross national income (GNI) per capita (PPP) SDG 8.5
4	**Germany**	0,939	81,2	17,1	14,1	46,946
26	**France**	0,891	82,5	15,5	11,4	40,511
29	**Italy**	0,883	83,4	16,2	10,2	36,141
15	**UK**	0,920	81,2	17,4	13,0	39,507

Table-2: 2019 Human Development Index Ranking

Source: Human Development Report Office 2019, (HDI) [highest = 1] (-)
UNDP (UNITED NATIONS DEVELOPMENT PROGRAMME, 2019): Human Development Report Office 2019; [18]

GDPgrowth1= current prices Euro per capita, 2010 = 100, Code: tec00001
EnviProtExp2= Environmental protection expenditure of the public sector by type % of GDP, Environmental protection expenditure is the money spent on all purposeful activities, 2003-2013 Code: ten00049
GenWasteMAt3 = Generation of waste by economic activity Tonne, Total amount of waste generated by households and businesses by economic activity, 2010-2016, 2010= 100, Code: ten00106
RenewEn4= Share of renewable energy in gross final energy consumption % This indicator is based on the definitions included in the, 2010-2018, Code: t2020_31
EnerProduc5= Energy productivity, The indicator results from the division of the gross domestic product (GDP) by the gross, Euro per kg of oil equivalent KGOE, 2010-2017, 2010=100, Code: t2020_rd310

HumReScTech6= Human resources in science and technology (HRST) as a share % of active population, in 2018, Code: tsc00025

HDIndex7= Human Development Index (HDI) [highest = 1] (-)

		GDPgrowth1	EnviProtExp2	GenWasteMAt3	RenewEn4	EnerProduc5	HumReScTech6	HDIndex7
Correlation	GDPgrowth1	1,000	-,519	,618	-,522	,655	,687	,980
	EnviProtExp2	-,519	1,000	,166	-,411	,273	-,113	-,544
	GenWasteMAt3	,618	,166	1,000	-,612	,683	,223	,687
	RenewEn4	-,522	-,411	-,612	1,000	-,986	-,787	-,419
	EnerProduc5	,655	,273	,683	-,986	1,000	,813	,565
	HumReScTech6	,687	-,113	,223	-,787	,813	1,000	,531
	HDIndex7	,980	-,544	,687	-,419	,565	,531	1,000
a. This matrix is not positive definite.								

Table-3: Correlation Matrix[a]

Source: Owned calculation based on the Eurostat, 2019; [18]
Code: tec00001, Code: ten00049, Code: ten00106, Code: t2020_31,
Code: t2020_rd310, Code: tsc00025

The Figure-1 shows the features of the selected four EU-member states, as Germany, France, Italy and UK based on their values in fields of the economic variances. The coordinate system shows difference and similarity of their features from point of view of their local position in the coordinate system. At the line "X" there is the Component-1: GenWasteMAt3, (Minus) RenewEn4, EnerProduc5, HumReScTech6. At the "Y" line the Component-2: GDPgrowth1, (Minus) EnviProtExp2, HDIndex7.

In the second quarter of the coordinate in case of Germany at the line "X, component-1, the waste management (GenWasteMAt3), and Human resources in science and technology (HRST) as a share % of active population (HumReScTech6) decrease or less increase, and the Share of renewable energy in gross final energy consumption (RenewEn4) increases or less decrease. But in Germany the energy cost in Euro per kg of oil equivalent KGOE(EnerProduc5) increased at second highest level after UK within the selected four countries (Table-1). The Minus sign means as opposite trend of this economic variance than the coordinate system originally shows, where the value in the coordinate system is negative as decreasing trend, the value of the economic variance will be positive, as increasing trend (Figure-1).

At the line "Y" component-2, in case of Germany the GDPgrowth1and HDIndex7 increase, while the environmental protection expenditure of the public sector of GDP (Minus) EnviProtExp2, decreases.

In the third quarter of the coordinate in case of the UK at the line "X, component-1, the waste management (GenWasteMAt3), energy cost in Euro per kg of oil equivalent KGOE(EnerProduc5) and Human resources in science and technology (HRST) as a share % of active population (HumReScTech6) increase, and the Share of renewable energy in gross final energy consumption (RenewEn4) decreases.

At the line "Y" component-2, in case of UK the GDPgrowth1and HDIndex7 decrease, while the environmental protection expenditure of the public sector of GDP (Minus) EnviProtExp2, increases.

In the fourth quarter of the coordinate system in cases of France and Italy at the line "X, component-1, the waste management (GenWasteMAt3), energy cost in Euro per kg of oil equivalent KGOE(EnerProduc5) and Human resources in science and technology (HRST) as a share % of active population (HumReScTech6) decrease, and the Share of renewable energy in gross final energy consumption (RenewEn4) increases, similarly to case of Germany.

At the line "Y" component-2, in cases of France and Italy the GDPgrowth1and HDIndex7 decrease, while the environmental protection expenditure of the public sector of GDP (Minus) EnviProtExp2, increases (Figure-1; [18]).

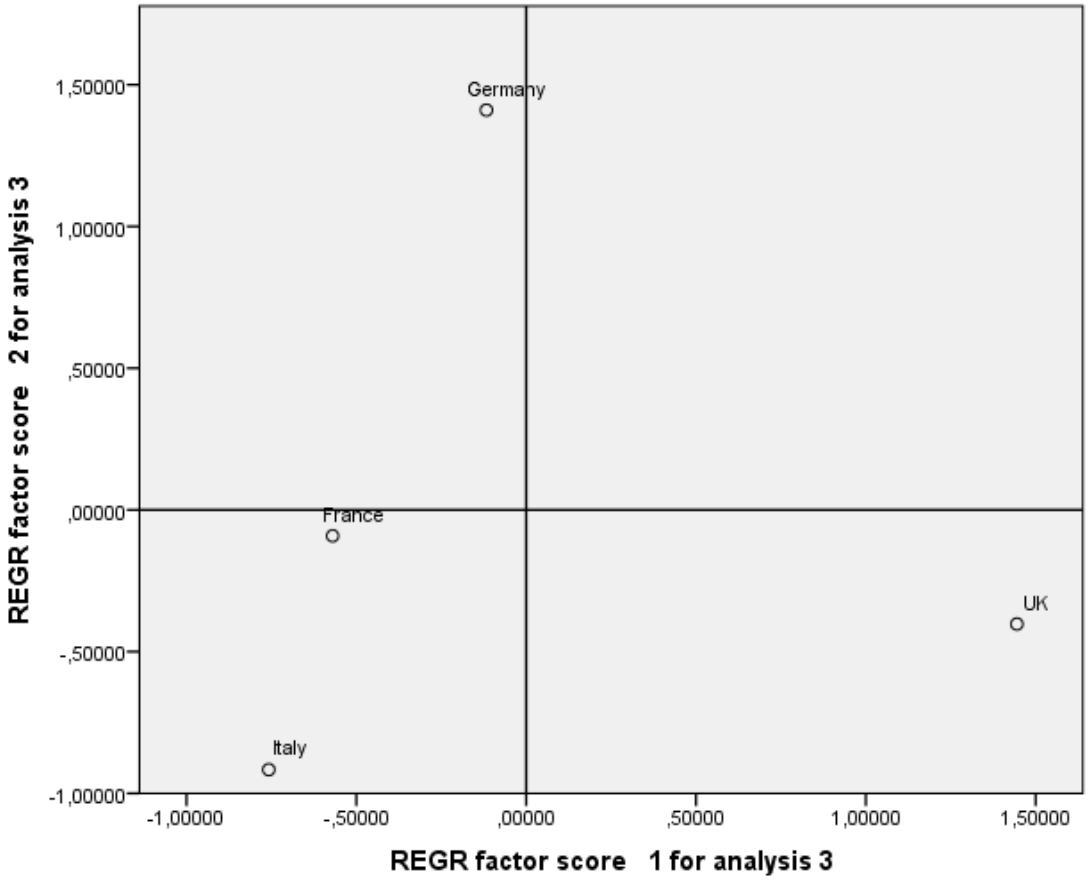

Figure-1: Factor analyses
Source: Owned calculation based on the Eurostat, 2019; [18]
Code: tec00001, Code: ten00049, Code: ten00106, Code: t2020_31,
Code: t2020_rd310, Code: tsc00025

Component-1: GenWasteMAt3, (Minus) RenewEn4, EnerProduc5, HumReScTech6
Component-2: GDPgrowth1, (Minus) EnviProtExp2, HDIndex7

5 Conclusions

Innovative knowledge and the technology and employees in the scientific researching fields should be developed in the selected countries and in wide-side EU-28. From these fields and their development can ensure to extend more environment-friendly technologies in economies of EU in order to mitigate the pollution and waste material. The Human development index and the economic growth including GDP increase and technological development should be harmonized developed with remaining the environmental conservation and natural environment.

Generally, increasing trends are positive, when environmental protection expenditure of the public sector of GDP (Minus) EnviProtExp2,share of renewable energy in gross final energy consumption (RenewEn4), and Human resources in science and technology (HRST) as a share % of active population (HumReScTech6)increases, but decreasing trends are negative, when energy cost in Euro per kg of oil equivalent KGOE(EnerProduc5) and the waste management (GenWasteMAt3) increase in some cases.

Also, the education is important from basic BSc and MSc levels to increase actual levels demanded by the companies for the employed workers and employees to increase the human-labour and input productivity to remain at the market against the market competitive partners. The *Quality of education* and the *Quality of healthy* as both of them are important to keep the competitive level of the labour forces.

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