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The Concept of Smart Economy as the Basis for Sustainable Development of Ukraine

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ABSTRACT

The relevance of the research is closely connected with the need to develop effective instruments for sustainable development of Ukraine. The purpose of the article is to generalize theoretical foundations of analysis of the concept of reasonable economy to determine strategic measures aimed at maintaining sustainable development of Ukraine and its empirical verification. The leading method of the research is the usage of the Pressure-State-Response (PSR) model for analysis of interaction of indicators common in characterization of smart economy and sustainable development. The indicators were selected taking into account the specific character of modern economic development of Ukraine. This approach is based on the concept of sustainable development considered in the context of smart economy. Using multiple regression analysis the impact of smart economy’s factors is evaluated, sorted according to the PSR model, on the total greenhouse gas emissions (dependent variable) in Ukraine. The results of the model evaluation allowed to identify two factors that have the greatest impact on the total greenhouse gas emissions in Ukraine: Gross domestic product per employed person and the level of energy intensity of primary energy. It allowed to justify the priority of such strategic means as the stimulation of innovations, the smart economy and the promotion of green economy. They are the general indicators of the smart economy and affect the sustainable economic development of Ukraine nowadays. The research findings have the practical value for those who determine policies aimed at resolving problems of sustainable development at the appropriate level.

Keywords: Smart Economy, Sustainable Development, Innovation Network, Ukraine
JEL Classification: F4

1. INTRODUCTION

The level of smart economy based on the Industry 4.0, Smart Grid, innovation networks, high technology production, high comfort level of mankind and environment is a key criterion for sustainable development and international competitiveness of a country nowadays (Mazurenko, 2014). The success of countries with emerging economies (including Ukraine) is based on the latest stage of agricultural and industrial or traditional industrial development. The largest problem of such countries is institutional obstacles to the implementation of transformation of the economic system from industrial and agricultural economy to smart economy and high technology production. Therefore, the theoretical analysis of the concept of smart economy for determining strategic measures aimed at ensuring sustainable development of Ukraine and their empirical verification is a relevant scientific task of great importance.

An example of Ukraine showed the inability to achieve a sustainable development due to distortions of market instruments and this is a result because of extractive institutional and regulatory framework. The economy of Ukraine is based on the out-of-date technology entailing the low efficiency of the use of material, energy and labour resources. Production is accompanied by the environmental pollution and accumulation of large amounts of waste. The level of social welfare is low and declining.

There is a need in a new model of socioeconomic development founded on smart economy based on innovation, high technology, resource efficient, environmentally friendly production and a high level of social welfare including the balance of interests of all stakeholders.

The role of the concept of smart economy as a tool for sustainable development and success of the national economy should be under discussion. The aforementioned justifies the relevance, timeliness and novelty of analysis of the concept of smart economy as a basis for sustainable development of Ukraine.

2. THEORETICAL BACKGROUND

A number of researchers concentrate on the employment of information and telecommunication technologies used in various urban functional systems and the overall economic sectors, and namely the employment of ICT, as a means to ensure economic development and the competitiveness, is distinguished as the smart economy characteristics and allows to separate it from the digital economy.

In many cases, the concept of the smart economy is used as innovative economy based on the Industry 4.0 and different networks. So Bakici et al. (2013) claimed that smart economy involves the establishment of innovation clusters and mutual cooperation between enterprises, research institutions and the citizens in order to develop, implement, and promote innovation through these networks. Anttiroiko et al. (2014) approve that smart economy is a networking economy developing new cooperation models in production, distribution and consumption. Stognii et al. (2012) noted about the main provisions of the concept of "reasonable efficiency" and policies to implement Smart Grid concept and features of the evolution of smart grids, advanced forms and directions of development of Smart Grid technologies and their implementation in leading countries and in Ukraine.

In others cases concept of smart economy is used as sustainable development with such definitions as "green economy," "green industry" used for describing the modern effective economy. UNEP defines a green economy as one that results in "improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities" (UNEP, 2011). The UN Environment Program shows that "green" economy becomes a new engine of growth, promotion for creation decent jobs and a vital factor in eliminating chronic poverty. Davies and Mullin claimed that smart economy is a green economy; it encourages reduction of the amount of carbon dioxide in industry and suggests investing in the "clean economy" (Davies and Mullin, 2011).

There are many concepts of the use of "smart" environments in a variety of subject areas: Projects smart transportation system, smart manufacturing, smart buildings (houses), smart cities, etc. (Knyayginin et al., 2012). Many researchers consider smart economy especially in the context of smart city economy. The International Telecommunication Union's (ITU) Focus Group on Smart Sustainable Cities has been prepared the Technical Report with the aim of establishing a concrete definition for smart sustainable cities, which can be used worldwide. Core themes for SSC include: (1) society, (2) economy, (3) environment, and (4) governance (ITU, 2014). Abdoullaev noted that the smart city concept is the new socio-technological paradigm and advanced economic model for sustainable growth in the 21st century, the century of cities (Abdoullaev, 2013).

Bruneckiene and Sinkiene (2014) argued of generally distinguish common characteristics of the smart economy, which as a set allows revealing its specificity:

- Innovation and knowledge economy: Implementation of innovation, increasing productivity and reducing costs, in all sectors of the economy;
- Learning economy: The learning is the most important process in all spheres of economy;
- Digital economy: Widespread employment of information and telecommunication technologies in the economy;
- Competitive economy: The ability to compete globally and be open. Employing knowledge and innovation, a competitive battle is going on, based on higher profits, productivity, quality, resources cost efficiency and cost (especially overhead cost) and waste reduction;
- Green economy: Implementation of the sustainable development principles, focus on creating a free of pollution "clean" economy and the efficient consumption of energy resources;
- Network economy: Development of the competencies networking between universities, business and government;
- Socially responsible economy: Enterprises and organizations are characterized by economic, ethical, legal and philanthropic responsibility. Studies have revealed the different definitions of the smart economy in the scientific literature and in various strategic documents.

Identification of strategic measures is able to provide more environmentally friendly and more economically viable solutions to some of the problems of emerging economies such as Ukraine. The aim of the paper is to analyze theoretically the concept of smart economy for identification of strategic measures aimed at sustainable development of Ukraine and their empirical verification.

3. METHODOLOGY

The purpose of the article is to generalize theoretical basis of the analysis of the concept of "smart economy" to determine strategic measures aimed at ensuring sustainable development of Ukraine and their empirical verification.

To accomplish a certain goal, the following objectives have been set up and accomplished: To make theoretical analysis of scientific literature on smart economy and identify the key factors that are common characteristics of smart economy and sustainable development for the current period of development of Ukraine; on the basis of empirical studies to identify the key factors influencing sustainable development of the Ukrainian economy and to justify the priority of strategic measures to achieve sustainable development.

31 indicators have been selected to reflect the trends and patterns of environmental significance (i.e., indirect influence and/or related to driving forces); interactions between the Ukrainian economy and the environment, innovation network, information and communication technologies including positive and negative effects of economic activity on the environment

(i.e., direct influence on the total greenhouse gas emissions); economic relations between the economy and the environment as well as political considerations (i.e., environmental damages and costs, degradation of environment, economic and financial instruments such as the total rent of natural resources or the level of energy intensity of primary energy). The estimation of the model's indicators is based on a sample of 19 observations. Each observation determines the annual quantitative estimation for the period from 1996 to 2014.

Our methodology consists of five parts. In the first part, the grouping of factors smart economies established to identify their interaction with aspects of sustainable development of Ukraine. They are sorted depending on the model Pressure-State-Response (PSR). We set indicators which are common characteristics of the smart economy:

- Innovation and knowledge economy: Gross domestic product (GDP) per person employed, the share of enterprises that implemented innovations, introduced new technological processes, including less wastes resource-saving, introduced production of innovative products, part of new vehicles types, share of sales of innovative products for industry.
- Learning economy: Graduated of vocational schools, the amount of graduates, postgraduate students and doctorate students by sector.
- Digital economy: Internet users.
- Competitive economy: Electric power consumption per capita, energy use per capita, cereal yield, food production index, high-technology exports, fuel exports, merchandise exports, ores and metals exports, merchandise imports, merchandise trade, energy imports, gross capital formation, imports of goods and services, GDP deflator, GDP growth, total natural resources rents, foreign direct investment (IEA, 2016).
- Green Economy: CO_2 emissions per capita; total greenhouse gas emissions, renewable electricity output, energy intensity level of primary energy.
- Network economy: Compensation costs to employer and university for the job of unemployed at public expense, the cost Public Private Partnership, the cost of the State Regional Development Fund to finance infrastructure projects network of industrial parks.
- Socially responsible economy: Labour force, inflation (consumer prices), GDP per capita growth, unemployment, average monthly total expenditure per one household.

The second stage is the adaption of PSR model to study the concept of how smart economy can make a contribution to sustainable development of Ukraine. Based on PSR model this concept is seen how a smart economy can make a contribution to sustainable development of Ukraine, taking into account the interaction of environmental aspects, socio-economic and technological indicators that determine the policies to solve the problem at the appropriate level.

- In the third stage correlation analysis is used to determine the nature and closeness of interrelation between selected factors.
- In the fourth stage the multiple regression model for the estimation of the impact of key factors on sustainable development of smart economy of Ukraine is developed and estimated.

In the fifth stage the interpretation of the results and strategic measures is made.

4. RESULTS AND DISCUSSION

Features of the perspectives smart economy Ukraine are that this country has low technological structure of economy (metallurgical, chemical, agriculture, petrochemicals, outdated energy, heavy engineering), lost control of the Crimea (with gas fields of Black Sea shelf and tourism segment) and a large part of the industries Donbass. The level of sustainable development displayed the value of the specific share technological structure of the economy Ukraine. Ukraine's economy is low-competitive due to high energy costs and resources. Under resources usage there are considerable losses caused as outdated technology and inefficient pricing (particularly for those entities that use them in the production process, and end users) (Innovative Ukraine 2020, 2015). Ukraine is a one of Europe's country largest air pollutants. So in 1990 total greenhouse gas emissions in Ukraine amounted to 16.7% of EU's indices (share Ukraine's GDP was 1.1% of EU). Their share fell to 8.6% in 2012 (share Ukraine's GDP was 0.6% of EU), but this is very important because of the difference in GDP. An important driving force of the smart economy is a complex policies and measures aimed on energy intensity reduction. Clean energy includes energy efficiency and clean energy supply options like highly efficient combined heat and power as well as renewable energy sources.

Compared with the developed countries, energy intensity of Ukraine's GDP is very high, determines the low competitiveness of the economy. Efficient use of natural resources in Ukraine is very low. The issue of energy saving in Ukraine is extremely relevant, because the level of energy intensity of GDP in Ukraine is 2.5-3 times higher than in most European countries and of the developed world, due to the predominance of primary processing industries, technical and technological backwardness of fixed assets the most energy intensive sectors industry. The level of energy intensity of GDP: Japan - 0.11; United Kingdom - 0.14; Germany and France - 0.18, USA - 0.21; kg of oil equivalent per US dollars GDP at purchasing power parity (National Report on the State of Environment in Ukraine, 2013; National Report on the State of Environment in Ukraine, 2014). The level of energy intensity of GDP is 0.31 in Ukraine 0.31 kg of oil equivalent per US dollars GDP (2010) at purchasing power parity.

The problems of the Ukrainian economy show features data on innovation for the years 2000-2015 (Figure 1).

The share of sales of innovative products for industry decreased by 3.8 times. The share of high-technology exports does not exceed 4.7% for 14 years in total exports of Ukraine. Information Technology (IT), innovative network created between universities, business and government are developing in Ukraine. "Trends in the global IT market is to spread the so-called "third platform" that has manifested in the use of cloud technologies; dissemination of technology "internet of things;" the widespread use of mobile devices; the spread of 3D-printing; the increasing role of software; increasing demand for analysts, conducted in real time; dissemination of data visualization; progress in the application of IT in medicine, logistics, etc.)" (Galperina et al., 2015). Effectiveness of "third platform" is low because of a weak institutional framework in Ukraine. Introduced production of innovative products (the names) decreased by 4.9 times.

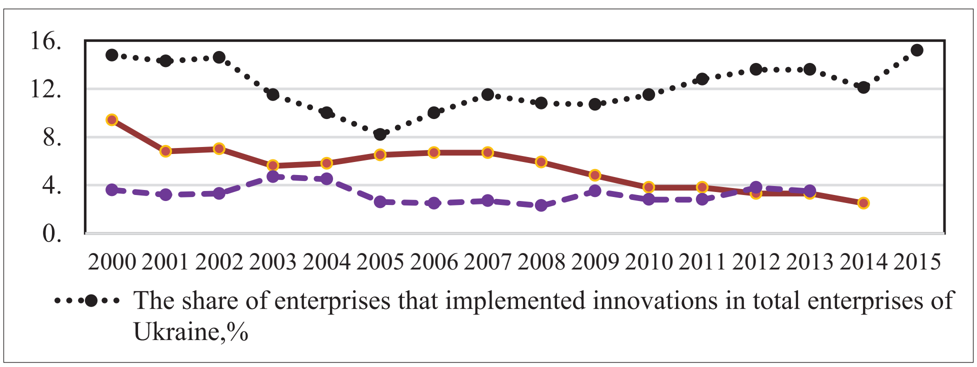
The PSR model by OECD provides a means of selecting and organising data/indicators of sustainable development in a useful way for decision-makers and the public. The major interest of this study incorporates the common characteristics of the smart economy and the relationships between the environment, social, technology and economic dimensions for sustainable development of Ukraine. The PSR model by OECD adapted to incorporate the common characteristics of the smart economy for sustainable development of Ukraine (Figure 2).

We selected as the indicators of "Pressure" are indicators of output and foreign trade, IT, investment and innovate. We have specified the total greenhouse gas emissions as the main indicator of the level of environmental problems. The Indicators of "State" characterizes intensity of use of ecosystems and quality of environmental components. We selected, as the indicators of "State" are the total greenhouse gas emissions and emission CO_2. The indicators of "Response" are productivity, intensity and efficiency which show the extent to which society (Government, local authorities, households, enterprises, NGO, international organizations) responds to environmental concerns through environmental, general economic, social, technology and industrial policies. The indicators of the PSR model for analysis of interaction of indicators common in characterization of smart economy and sustainable development are listed in Table 1.

To establish the positive or negative direction and the density of connection between all the listed indicators, we have carried out a correlation analysis and verification of the significance of the obtained correlation coefficients using the SPSS Statistics 17 (Statistical Package for the Social Sciences). Calculation of the correlation matrix allowed to identify the relationship between indicators of smart economy, sustainable development and the environment. The matrix of inter correlations calculated for all possible predictor variables and allowed to select variables for multiple regression model in which the dependent variable is the indicator of "State" total greenhouse gas emissions.

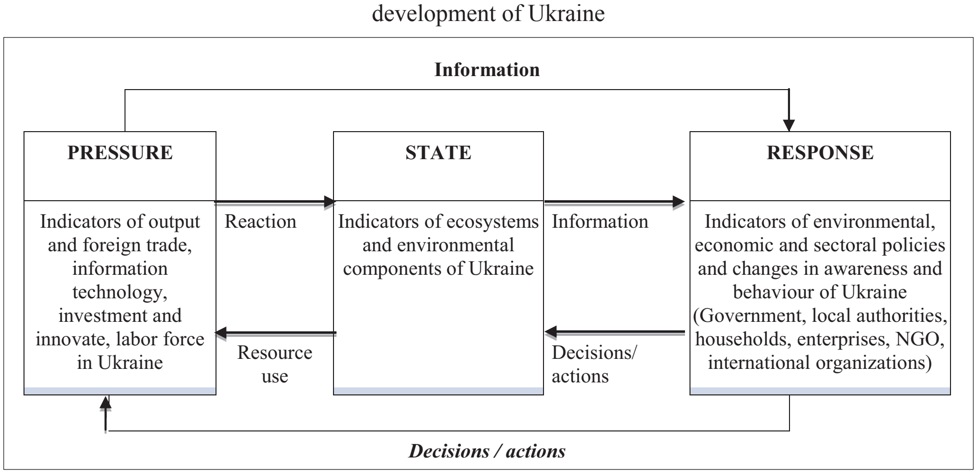
The bests and significant (a = 0.000) predictor of total greenhouse gas emissions were Energy imports, net (% of energy use) with a correlation coefficient of 0.886, energy intensity level of primary energy with a correlation coefficient of 0.883 and Labor force with a correlation coefficient of 0.802. Other relatively high correlation coefficients included: GDP per person employed (−0.795), internet users (−0.763), merchandise exports (−0.739), high-technology exports (−0.722), merchandise imports (−0.702), total natural

Figure 1: Innovation in Ukraine, 2000-2015



Source: Authors calculations based on the State Statistics Service of Ukraine (2016) and World Bank (2016)

Figure 2: The Pressure-State-Response model by OECD adapted to incorporate the common characteristics of the smart economy for sustainable development of Ukraine



Source: Authors elaboration based on the Pressure-State-Response model by OECD

Table 1: The indicators of the PSR model for analysis of interaction of indicators common in characterization of smart economy and sustainable development

Pressure	State	Response
	Innovation and knowledge economy	
		GDP per person employed, the share of enterprises that implemented innovations, introduced new technological processes, including less wastes resource-saving, introduced production of innovative products, part of new vehicles types, share of sales of innovative products for industry
	Learning economy	
		Graduated of vocational schools, the amount of graduates, postgraduate students and doctorate students by sector
	Digital economy	
Internet users		
	Competitive economy	
Electric power consumption per capita, energy use per capita, cereal yield, food production index, high-technology exports, fuel exports, merchandise exports, ores and metals exports, merchandise imports, merchandise trade, energy imports, imports of goods and services, GDP growth		GDP per capita growth, GDP deflator, total natural resources rents, gross capital formation, foreign direct investment
	Green Economy:	
	CO_2 emissions per capita; total greenhouse gas emissions, renewable electricity output	Energy intensity level of primary energy
	Network economy	
		Compensation costs to employer and university for the job of unemployed at public expense, the cost Public Private Partnership, the cost of the State Regional Development Fund to finance infrastructure projects network of industrial parks
	Socially responsible economy	
Labour force, unemployment		Inflation (consumer prices), average monthly total expenditure per one household

GDP: Gross domestic product, PSR: Pressure-State-Response

resources rents (−0.681), CO_2 emissions per capita (0.668), cereal yield (−0.648), food production index (−0.714), electric power consumption per capita (−0.664), Foreign direct investment, net inflows (−0.662).

The multiple regression analysis is accomplished by the following equation (1):

$$Y_{CO_2} = a_0 + a_1x_1 + a_2x_2 + a_3x_3 + a_4x_4 + a_5x_5 + a_6x_6 + a_7x_7 + a_8x_8 + a_9x_9 \quad (1)$$

The multiple regression analysis is accomplished after calculated matrix of intercorrelations of all possible predictor variables for selection predictor variables. The dependent variable Y_{CO_2} - Total greenhouse gas emissions (kt of CO_2 equivalent);

Undependent variables:

x_1 - Energy intensity level of primary energy (MJ/constant 2011 US dollars PPP);
x_2 - GDP per person employed (constant 2011 US dollars PPP);
x_3 - Merchandise exports (current US dollars);
x_4 - Merchandise imports (current US dollars);
x_5 - High-technology exports (current US dollars);
x_6 - CO_2 emissions (metric tons per capita;
x_7 - Food production index (2004-2006 = 100);
x_8 - Energy imports, net (% of energy use);
x_9 - Cereal yield (kg per hectare).

Regression weights a_i (i=0,1,…,9) - estimates of the parameters model to be measured quantitatively based on the specified of empirical data (World Bank, 2016). Estimation of model parameters based on the sample of 19 observations. Each observation determines the annual quantitative assessment for 1996-2014 years.

The model is statistically significant (Table 2). The Durbin-Watson test is 2.054 that is not detect the presence of autocorrelation. Since test is 2.054, that approximately to 2, (d = 2 indicates no autocorrelation). The unadjusted multiple R for this data is 0.992 and the unadjusted value R^2 is 0.984, the adjusted multiple R^2 is

0.964. This is not large change. Note also that these variables in combination do significantly (Sig. F change = 0.000) predict total greenhouse gas emissions.

The "Sig." column in the Table 3 table presents the statistical significance of that variable given all the other variables have been entered into the model. Five variables are statistically significant (sig. <0.05) in this table: Energy intensity level of primary energy sig. =0.002; GDP per person employed (0.005), merchandise exports (0.009), merchandise imports (0.024), high-technology exports (0.032) and constant (0.011). Four variables are not statistically significant: CO_2 emissions per capita (0.118), cereal yield (0.086), food production index (0.551), energy imports (0.095).

The interpretation of the results of a multiple regression analysis consists is in the fact that the impact on total greenhouse gas emissions on such factors: Energy intensity level of primary energy; GDP per person employed, merchandise exports, merchandise imports, high-technology exports.

Total greenhouse gas emissions are indicators of environmental component are closely related to production and consumption patterns. The state concerning the environment indicators (merchandise exports, merchandise imports, high-technology exports) have relations between the environment, social, technology and economic dimensions of sustainable development of Ukraine and also relate to the indicators of environmental pressures. Energy intensity level of primary energy and the GDP per person employed are the examples of indicators of societal responses. They are show the extent to which society responds to environmental concerns through environmental, general economic, social, technology and industrial policies and through changes in awareness and behaviour. The estimation of model parameters and coefficients are represented in the Table 3.

There is now a further need to be measured quantitatively based on the specified of empirical data. The regression weights merchandise exports, merchandise imports, high-technology exports are very small in that we will not take them into account.

Estimation of two model parameters (Energy intensity level of primary energy, GDP per person employed) are based on the sample of 19 observations.

The model is statistically significant (Table 4). The Durbin-Watson test is 1.637 that is not detect the presence of autocorrelation (Durbin-Watson test statistic is compared to lower (0.105) and upper (2.47) critical values). The unadjusted multiple R for this data is 0.970 and the unadjusted value R^2 is 0.941, the adjusted multiple R^2 is 0.933. This is not large change. Note also that these variables in combination do significantly (Sig. F Change = 0.000) predict total greenhouse gas emissions.

The "Sig." column in the Table 4 presents the statistical significance of that variable given all the other variables have been entered into the model. All variables are statistically significant (sig. <0.05) in this table: Energy intensity level of primary energy sig. =0.000; GDP per person employed (0.000) and constant (0.002).

The multiple regression analysis is represented in the model (2):

$$Y_{CO_2} = -512492.112 + 26893.394 \cdot x_1 + 30.828 \cdot x_2 \quad (2)$$

The estimation of model parameters and coefficients are represented in the Table 5.

Dependent variable Y_{CO_2} - total greenhouse gas emissions (kt of CO_2 equivalent); x_1 - Energy intensity level of primary energy (MJ/US dollars 2011 GDP PPP); x_2 - GDP per person employed (constant 2011 PPP dollar per capita).

The interpretation of the results of a multiple regression analysis consists is detected the estimation of parameters and coefficients of the model. The regression weights Energy intensity level

Table 2: Model summary (The model of the relationships of 9 undependent variables with the dependent variable: Total greenhouse gas emissions)

Model	R	R^2	Adjusted R^2	Standard error of the estimate	Change statistics					Durbin-Watson
					R^2 change	F change	df1	df2	Sig. F change	
1	0.992	0.984	0.964	8208.41302	0.984	48.484	9	7	0.000	2.054

Source: Analyses by SPSS 17 software

Table 3: Estimation of model parameters and coefficients

Model	Unstandardized coefficients		Standardized coefficients	t	Sig.
	B	Standard error	Beta		
Constant	−977396.273	283695.865		−3.445	0.011
Energy intensity level of primary energy	36202.889	7838.249	4.088	4.619	0.002
GDP per person employed	52.058	12.925	3.699	4.028	0.005
Merchandise exports	−8.769E-6	0.000	−4.202	−3.572	0.009
Merchandise imports	4.274E-6	0.000	2.647	2.882	0.024
High-technology exports	4.200E-5	0.000	0.618	2.676	0.032
CO_2 emissions	17342.533	9730.737	0.263	1.782	0.118
Food production index	371.389	593.667	0.114	0.626	0.551
Energy imports, net	−3480.014	1806.511	−0.466	−1.926	0.095
Cereal yield	20.690	10.355	0.263	1.998	0.086

Source: Analyses by SPSS 17 software, GDP: Gross domestic product

Table 4: Model summary (The model of the relationships of two undependent variables[a] with the dependent variable: Total greenhouse gas emissions)[b]

Model	R	R^2	Adjusted R^2	Standard error of the estimate	Change statistics					Durbin-Watson
					R^2 change	F change	df1	df2	Sig. F change	
1	0.970[a]	0.941	0.933	111740.12078	0.941	1120.624	2	14	0.000	1.637

[a]Predictors: (Constant), GDP per person employed (constant 2011 dollar per capita PPP), Energy intensity level of primary energy (MJ/US dollars 2011 GDP PPP), [b]Dependent Variable: Total greenhouse gas emissions (kt of CO_2 equivalent), GDP: Gross domestic product

Table 5: The estimation of parameters and coefficients of the model (Dependent variable: Total greenhouse gas emissions)[a]

Model	Unstandardized coefficients		Standardized coefficients	t	Sig.
	B	Standard error	Beta		
Constant	−51249.21	13162.810		−3.894	0.002
Energy intensity level of primary energy	26893.394	3125.785	3.037	8.604	0.000
GDP per person employed	30.828	4.968	2.191	6.206	0.000

[a]Dependent variable: Total greenhouse gas emissions (kt of CO_2 equivalent), GDP: Gross domestic product

of primary energy is 26893.394, GDP per person employed is 30.828. It means that total greenhouse gas emissions will increase by 26893.394 kt of CO_2 equivalent if Energy intensity level of primary energy is increased by unit of MJ/US dollars 2011 GDP PPP. Total greenhouse gas emissions will increase by 30.828 kt of CO_2 equivalent if GDP per person employed is increased by unit of constant 2011 PPP US dollar per capita). Total greenhouse gas emissions will decrease by 51249.21 kt of CO_2 equivalent if none of the other independent variables.

Energy intensity level of primary energy, GDP per person employed and total greenhouse gas emissions in Ukraine are much lower than in Europe and Central Asia and the EU (World Bank, 2016).

5. CONCLUSION

We have assessed and interpreted the impact of factors of smart economy on sustainable development of Ukraine. Indicators, common for smart economy and sustainable development, were sorted according to the PSR model and take into account peculiarities of the Ukrainian economy.

The total greenhouse gas emissions is a dependent variable closely connected with the models of production and consumption and have relationship with environmental, social, technological and economic dimensions of sustainable development of Ukraine. The results of the multiple regression analysis have made it possible to identify two factors that have the greatest impact on the total greenhouse gas emissions (dependent variable) in Ukraine: The GDP per person employed and the level of energy intensity of primary energy. The GDP per person employed is one of indicators characterizing smart economy as "innovation and knowledge economy increasing productivity in all sectors of economy." The level of energy intensity of primary energy is one of indicators characterizing smart economy as the "green economy, implementation of sustainable development principles aimed at creating the economy free of pollution and with the efficient energy consumption."

The total greenhouse gas emissions is indicator of "State" in the PSR model. The GDP per person employed and the energy intensity of primary energy are the indicators of "Response" in the PSR model.

The research findings prove the need for implementation of such strategic measures as stimulation of innovation and knowledge economy and promotion of green economy which are characteristic indicators of smart economy and influence on sustainable development of the Ukrainian economy nowadays.

The findings confirm the hypothesis that aimed at sustainable development one should reduce the energy intensity in the GDP of Ukraine and ensure the growth of green productivity of economy.

The calculations show that none of the indicators of innovation networks and digital economy influence on emissions in Ukraine. However, their implementation may increase the productivity and therefore sustainable development of the Ukrainian economy.

Innovation and knowledge economy and green economy are the general characteristics of smart economy having the greatest impact on sustainable development of the Ukrainian economy nowadays.

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