European Proceedings of
Social and Behavioural Sciences
EpSBS

www.europeanproceedings.com

e-ISSN: 2357-1330

DOI: 10.15405/epsbs.2020.04.101

PEDTR 2019

18th International Scientific Conference "Problems of Enterprise Development: Theory and Practice"

METHODOLOGY OF MEASURING SUSTAINABLE DEVELOPMENT OF THE REGION: FOREIGN AND DOMESTIC PRACTICE

M. S. Guseva (a)*, E. O. Dmitrieva (b)
*Corresponding author

(a) Samara State University of Economics, 443090, Soviet Army Str., 141, Samara, Russia, gusevams@yandex.ru
(b) Samara State University of Economics, 443090, Soviet Army Str., 141, Samara, Russia, dmitr-el@mail.ru

Abstract

Sustainable development of regional social and economic systems may be viewed on global, national and regional levels. Currently domestic and foreign scientists and people on the ground understand and accept that few general indicators are not sufficient for measuring welfare of a country and regions. The main reason is that these indicators do not cover various social processes, changes in the environment and some phenomena generalized as "sustainability". The presence in the current regulatory documents of a large number of disparate indicators and methods for their determination makes it very difficult to objectively assess the degree of progress of the country and regions towards achieving sustainable development goals. Assessment of sustainable regional development requires elaboration and application of the integral indicator which generalizes traditional system of indicators and is supplemented by the indicators based on the sustainable development concept. The suggested Index of Adjusted Net Savings allows to quite fully assess progress of the region in sustainable development. For calculating the Index of Adjusted Net Savings (IANS) for the Russian regions, gross savings are adjusted for the following values: budget expenditure for human capital development (education, health, fitness and sports); depletion of natural resources; damage from environment pollution; environmental expenses; assessment of specially protected natural areas. At the same time the existing statistical base is not sufficient to define this indicator with objective certainty and accuracy on the regional level in the Russian Federation.

Keywords: Sustainable development, region, methodology, genuine savings, indicators.

https://doi.org/10.15405/epsbs.2020.04.101
Corresponding Author: M. S. Guseva
Selection and peer-review under responsibility of the Organizing Committee of the conference
eISSN: 2357-1330

1. Introduction

Contents of the sustainable development concept in Russia and in the world vary significantly. In the Russian practice sustainability is associated, first of all, with development of the economy and economic growth (Analytical Center under the Government of the Russian Federation, 2015). Global interpretation of sustainable development is much broader which is evident from conceptual documents prepared in the last 20 years by UN, World Bank, OECD, EU is defined as a single system of social, economic and environmental processes.

Analysis and diagnostics of sustainable development of the Russian regions during contemporary transformations are at the initial stage. This explains significant differences in approaches used in conceptual framework, argumentation, measurement methodology and practical scenarios. Generally, "sustainable development of the region" implies balanced economic, social, institutional development and environmental well-being aimed at increase in the present and future potential for satisfying human needs within the acceptable human-induced impact on the biosphere. In this context regional economics acts as a conservation system incorporating environmental, economic, social and institutional components. New challenges before Russian regions and strengthening "anti-sustainable" tendencies in social and economic development determine the need for building regional policy focusing on growth of population well-being with consideration to economic, social and environmental components of quality of life. This implies different logic of developing and measuring social and economic progress and sustainability of the regions.

2. Problem Statement

Currently domestic and foreign scientists and people on the ground are becoming more aware and accepting of the fact that Gross Domestic Product (GDP) and Gross Regional Product (GRP) are not an objective tool for measuring wellbeing of country and regions. The main reason is that these indicators do not cover various social processes, changes in the environment and some phenomena generalized as "sustainability" of development. Alternative is the whole range of indicators from "sustainable criteria of economic wellbeing" to measuring savings and wealth and "green GDP" (Stiglitz, Sen, & Fitoussi, 2016).

The paper highlights that GDP is adequate as the main criterion only for the purposes of short-term development (Bobylev, Zubarevich, & Solovyova, 2015). Using GDP as the main long-term sustainable development indicator is quite problematic. It requires linked indicators additionally reflecting important aspects of mid-term sustainability. Researchers show that GDP does not adequately reflect sustainability of development and its growth does not always attest to positive social and economic processes.

Multiple foreign assessments The World Bank, (1980, 2005); United Nations (2005, 2015) contain practically no measurements complying with the definition of social and economic development accepted in Russia. Concept of sustainable development may be considered as certain equivalent for foreign assessments, but it primarily focuses on the environmental component of development while the assessments as such are disaggregated and represent the systems of indicators.

In recent years development of regional components of federal projects and programmes including those on the municipal level has intensified with adoption of Decree of the President of the Russian Federation No. 204 dated 07.05.2018 On National Goals and Strategic Tasks of Development of the Russian

https://doi.org/10.15405/epsbs.2020.04.101
Corresponding Author: M. S. Guseva
Selection and peer-review under responsibility of the Organizing Committee of the conference
eISSN: 2357-1330

Federation for the Period Until 2024. Decomposed indicators of regional components of federal projects by the subjects of the Russian Federation and municipal formations have been suggested for measuring national goals and tasks. Development of the National Review of Achieving Sustainable Development Goals to 2030, which will be presented within the Political Forum on Sustainable Development in New York in 2020, is an attempt to measure sustainability of development in the Russian Federation. Targets in this document are the indicators included in 13 Russian national projects, though these are limited by 2024 while the Review of Sustainable Development Goals is geared towards 2030. Criteria of attaining sustainable development goals are of an advisory nature and rely on international experience and assessment methods. Currently the assessment of performance of federal and regional executive authorities is clearly correlated with efficiency of achieving the relevant targets of the national projects and priority programs. Having said that, the sustainable development concept is not formally used but in practice its tasks are being implemented. Numerous uncoordinated indicators and methods for defining those complicate the process of objective assessment of progress of the country and regions towards achieving the sustainable development goals.

Researchers demonstrate that there are no indicator sets that are universally accepted, backed by compelling theory, rigorous data collection and analysis, and influential in policy (Parris & Kates, 2003). The papers analyses complex interactions between seventeen sustainable development goals and present those in hierarchic structure using the interpretative structural modelling method (Kumar, Ahmed, Singh, & Sinha, 2018), highlight complementarity of the goals in attaining those (Barbier & Burgess, 2019). Sustainable development measurement approach was developed and tested shifting from deterministic to probabilistic conceptualization (Landerretche, Leiva, Vivanco, & López, 2017).

At the same time, Index of Adjusted Net Savings is successfully applied as integral sustainable development indicator on the country and individual region levels. Calculation of this index is fairly well formalised. E.g., new studies take into account technical progress in the calculations (Mota & Cunha-e-Sá, 2019).

3. Research Questions

Sustainable development concept stems from the overconsumption crisis which escalates the threat of global ecocatastrophe and leads to deepening heterogeneity in development of countries and nations. The notion of sustainable development was introduced scientifically by publication of Our Common Future. The report is based on the idea of sustainable development that implies the model of improving quality of life for the current generation without reducing the possibilities for future ones within the capacity of biosphere. At the same time, we can find some alternative definitions. The outcome documents of Rio+10 (International Atomic Energy Agency, 2001) clarified priorities for building the society of sustainable development: the emphasis has shifted from environmental problems to economic problems. Green economy notion later became the foundation of sustainable development. The new report played an important role in defining contemporary vision of sustainable development (Weizsäcker, Hargrouz, & Smith, 2013).

Choice and justification of sustainable development indicators is quite a complex process methodologically and methodically. Currently western and Russian experts have developed

https://doi.org/10.15405/epsbs.2020.04.101
Corresponding Author: M. S. Guseva
Selection and peer-review under responsibility of the Organizing Committee of the conference
eISSN: 2357-1330

recommendations for methodology of selection of indicators for the systems of various scales: global, regional, national, local and sectoral. Diversified western approach involving special surveys and subjective assessments cannot yet be used as a benchmark by the Russian Federation when assessing the progress in attaining sustainable development goals. At the moment the focus should be on basic problems of sustainable development with consideration to national priorities and regional specifics.

In this connection, the following research questions have been formulated:

- Generalize foreign and Russian practices of measuring sustainable development of countries and regions;
- Adapt methods of calculating the Adjusted Net Savings indicator to the specifics of official statistical recording in the Russian Federation;
- Test the suggested indicator in the specific region in Russia and interpret the results.

4. Purpose of the Study

Purpose of the study is to justify methods of assessing the degree of region's sustainability through generalizing domestic and foreign experiences of building the systems of sustainable development indicators for countries and regions and current restrictions in organization of the official statistical recording system in the Russian Federation. The testing of the proposed indicator to assess the degree of sustainability on the example of a specific region made it possible to use it to measure the achievement of the goals of sustainable development and on the example of other subjects of the Russian Federation. To prepare a proposal on the use in the system of regional monitoring of a methodology for assessing the sustainable development of regions on the basis of the indicator.

5. Research Methods

Research involves both general scientific methods of inquiry such as abstraction, analysis and synthesis, induction and deduction, comparison and analogy, systemic approach and special methods: modelling, economic and mathematical methods, and statistical methods In calculating the Index of Adjusted Net Savings, the authors made a number of assumptions related to the lack of the possibility of calculating a number of indicators based on official statistics. This applies to its individual components, such as consumption of fixed capital (net domestic savings), as well as depletion of energy, mineral and forest resources.

6. Findings

Variety of the existing domestic and foreign indicators for measuring sustainable development of countries and regions enable us to cluster those into four groups:

- Systems of indicators where each one reflects individual aspects of sustainable development. The following subsystems are traditionally allocated: economic, environmental, social and institutional;

https://doi.org/10.15405/epsbs.2020.04.101
Corresponding Author: M. S. Guseva
Selection and peer-review under responsibility of the Organizing Committee of the conference
eISSN: 2357-1330

- Integral indicators aggregating various indicators for obtaining the consolidated index allowing to assess the degree of sustainability of social and economic development. Those are normally aggregated based on three groups of indicators: economic, environmental and social;
- Private indicators such as income, unemployment, mortality, energy consumption, natural resources depletion, fresh water use, greenhouse gas emissions, etc.;
- Indicators obtained through social surveys reflecting attitudes of the public to various sustainable development issues, general life satisfaction, satisfaction with government actions, etc.

Key global systems of social and economic indicators had been developed in 1970s-1980s. Those mainly consist of disaggregated indicators for individual developments areas and problems: income inequality, unemployment, education, various aspects of health and availability of medical services, etc. Main source of information for cross-country comparisons is the International Social Survey Programme – ISSP currently including over 30 countries (International Social Survey Programme, 2018). Data within this programme has been collected since 1985. The most reputable integral indicators of sustainable development regularly computed by international organisations and meanings of those for the Russian Federation are provided in Table 01. Methodology for computing similar indicators for the Russian regions has been adjusted using UNDP and World Bank methodology (Table 01).

Table 01. International integrated indicators of sustainable development and their characteristics

Indicator	Formula
Genuine Savings	GS = GDS - DFC - DNNR - EPC + CE, GS - genuine savings GDS - gross domestic savings DFC - depreciation of fixed capital DNNR - depletion of nonrenewable natural resources EPC - environment pollution coefficient CE - cost of education
Adjusted net savings	ANS = GDS - DFC - ED - MD - FD - CO2D - PMD + CE, GDS - gross domestic savings DFC - depreciation of fixed capital ED - energy depletion MD - mineral depletion FD - forest depletion CO2D - CO2 damage PMD - particulate emission damage CE - cost of education
Human Development	$HDI=\sqrt[3]{(A\times B\times C)}$, A=(X-25)/(85-25), B=(S/15+E/18)/2, C=ln〖(G-ln100)〗/ln〖75000-ln100, A - longevity index B - education index C - income index X - life expectancy at birth S - duration of training E - expected duration of training G - GNI per capita of PPP

https://doi.org/10.15405/epsbs.2020.04.101
Corresponding Author: M. S. Guseva
Selection and peer-review under responsibility of the Organizing Committee of the conference
eISSN: 2357-1330

Environmentally adjusted net domestic product	EDP = (NDP - DPNA) – DGN, EDP - environmentally adjusted net domestic product NDP – net domestic product DPNA - depletion of natural resources (assets) (extraction of oil, minerals, deforestation, etc.) DGNA - damage of natural resources (assets) (air and water pollution, waste disposal, soil depletion, groundwater use)
The Ecological Footprint	EF = (P/Pa)×PF×EF P - amount of produced products or produced waste Pa - average P product production in the country FP and PF – equivalence factor and productivity factor for the country under research and a particular type of water or land use

Source: authors.

For calculating the Index of Adjusted Net Savings (IANS) for the Russian regions, gross savings are adjusted for the following values: budget expenditure for human capital development (education, health, fitness and sports); depletion of natural resources; damage from environment pollution; environmental expenses; assessment of specially protected natural areas. Lack of certain indicators in the statistical base of the Russian Federation does not allow to estimate the Adjusted Net Savings indicator for the Russian regions with sufficient degree of reliability. This factor calls for the need to substantially adapt the methods for calculating the Index of Adjusted Net Savings for the regions in Russia. The formalized index calculation algorithm is presented in Table 02.

Table 02. Methodology for calculating adjusted net savings for the subjects of the Russian Federation

Parameter	Formula	Notation
Index of adjusted net savings (IANS)	$IANS_i = ANS_i/GRP_i \times 100\%$	$IANS_i$ - index of adjusted net savings in the i-th period ANS_i – adjusted net savings in the i-th period GRP_i – gross regional product in current prices in the i-th period
Adjusted net savings (ANS)	$ANS_i=GC_i - IM_i - DPNR_i - DEP_i + BENC_i + EX_i + ASPA_i$	ANS_i – adjusted net savings in the i-th period GC_i –gross fixed capital formation in the i-th period IM_i - investment in fixed assets by "Mining" activity in the i-th period $DPNR_i$ - depletion of natural resources in the i-th period DEP_i - damage from environmental pollution in the i-th period $BEHC_i$ - budget expenditure on development of human capital in the i-th period EX_i – environmental expenditure in the i-th period $ASPA_i$ - assessment of specially protected areas in the i-th period
Natural depletion (ND)	$ND_i = MD_i + FD_i$	ND_i – natural depletion in the i-th period MD_i - mineral depletion in the i-th period FD_i – forest depletion in the i-th period
Damage from environmental pollution (DEP)	$DEP_i = CO_2D_i + DAEP_i$	DEP_i - damage from environmental pollution in the i-th period $CO_2 D_i$ – damage from carbon dioxide emissions in the i-th period $DAEP_i$ - damage from air emissions of pollutants in the i-th period
CO_2 damage (CO_2D_i)	$CO_2D_{i=1}Vlco_{2i} \times Vco_{2i}$	CO_2D_i – damage from carbon dioxide emissions in the i-th period

https://doi.org/10.15405/epsbs.2020.04.101
Corresponding Author: M. S. Guseva
Selection and peer-review under responsibility of the Organizing Committee of the conference
eISSN: 2357-1330

		$Vlco_{2i}$ - volume of carbon dioxide emissions in the i-th period Vco_{2i} - value of moderate measurements of marginal losses from carbon dioxide emissions -20 dollars per 1ton equivalent (measurement of damage from greenhouse gases of the World Bank) in the i-th period
Damage from air emissions of pollutants (DAEP)	$DAEP_i = DAEP_{sti} + DAEP_{mbi}$	$DAEP_i$ - damage from air emissions of pollutants in the i-th period $DAEP_{sti}$ - damage from air emissions of pollutants by stationary sources in the i-th period $DAEP_{mbi}$ - damage from air emissions of pollutants by mobile sources in the i-th period
Damage from air emissions of pollutants by mobile sources ($DAEP_{st}$)	$DAEP_{sti} = E_{condi} \times M_i^a \times C_e^a$	$DAEP_{sti}$ - damage from air emissions of pollutants by stationary sources in the i-th period E_{condi} - economic measurement of air emissions of 1 ton equivalent of pollutants in the i-th period, rub. / ton equivalent M_i^a - reduced mass of air emissions of pollutants in the i-th period, ton equivalent C_e^a - coefficient of the ecological factor and ecological state of the air in the territories of economic regions of Russia. For the Volga economic region, C_e^a =1,9
The reduced mass of air emissions of pollutants (M_i^a)	$M_i^a = \sum_{j=1}^{n} m_{ij}^a \times c_j^a$	M_i^a - reduced mass of air emissions of pollutants in the i-th period m_{ij}^a - mass of air emissions of the j-th pollutant or a group of pollutants in the i-th period t./year c_j^a - coefficient of relative ecological and economic hazard of the j-th pollutant or a group of pollutants
Economic measurement of air emissions of 1 ton equivalent of pollutants (E_{cond})	$E_{cond} = E_{cond1997}^a \times (1+r)^m$	E_{cond} – economic measurement of air emissions of 1 ton equivalent of pollutants in the i-th period $E_{cond1997}^a$ – amount of damage from air emissions of 1 ton equivalent of pollutants, which, in 1997 was 49.3 rubles/ ton equivalent for the Volga economic region r – rate of inflation m - number of years
Damage from air emissions of pollutants by mobile sources in the i-th period ($DAEP_{mb}$)	$DAEP_{mbi} = DAEP_{sti} + Sh_{mbi}$	$DAEP_{mbi}$ - damage from air emissions of pollutants by mobile sources in the i-th period $DAEP_{sti}$ - damage from air emissions of pollutants by stationary sources in the i-th period Sh_{mbi} - share of emissions by mobile sources in total emissions in the i-th period
Environmental expenditure (EE)	$EE_i = CEE_i + CAEE_i$	EE_i – environmental expenditure in the i-th period CEE_i – current environmental expenditure in the i-th period $CAEE_i$ – capital environmental expenditure in the i-th period
Assessment of specially protected areas (ASPA)	$ASPA_i = GRP_i / (100\% - ShASPA_i) \times ShASPA_i \times 100\%$	$ADSPA_i$ - assessment of specially protected areas in the i-th period GRP_i – volume of gross regional product in the i-th period; $ShASPA_i$ –share of ASPAs' areas in the total area (%) in the i-th period

Source: authors.

https://doi.org/10.15405/epsbs.2020.04.101
Corresponding Author: M. S. Guseva
Selection and peer-review under responsibility of the Organizing Committee of the conference
eISSN: 2357-1330

The presented methodological approach was tested on statistical data of Samara region for 2008 – 2017. It is important to note certain provisions and assumptions attached to these methods for calculating the Index of Adjusted Net Savings for Samara region:

1. Only official data has been used for building the index, which enables transparency of the calculations but reduces the degree of relevance as statistical figures are not published promptly enough;

2. Due to unavailability of data on consumption of fuel by the region for its own need and estimate of carbon dioxide emissions from using individual types of fuel, the calculations do not include components of "damage from carbon dioxide emissions";

3. When determining the value of damage from air pollution the authors have distinguished between the damage caused to environment by stationary sources and mobile sources. In Russia, proportion of emissions from the mobile sources account for about 40 %. In Samara region, proportion of emissions from the mobile sources has been traditionally higher than Russian average and accounted for over 52% in 2017;

4. No modern methods for comprehensive monetary assessment of all environmental consequences from business operations have been developed in the Russian Federation so far. Damage from emissions by stationary sources have been estimated based on the provisional guidelines.

Breakdown of calculation of the Index of Adjusted Net Savings for Samara region and its components is presented in Table 03.

Table 03. Index of Adjusted Net Savings for Samara region and its components

Indicator	Years				
	2008	2010	2012	2014	2017
Gross capital formation	21,8	23,0	23,6	28,7	28,7
Investments in fixed assets by "Extraction of minerals" activity	1,5	1,8	2,3	2,7	2,7
Natural depletion	9,8	11,2	13,6	13,4	13,3
Damage from environmental pollution Without taking into account CO_2 damage)	1,0	1,3	1,1	0,7	0,7
Budget expenditure on development of human capital	5,2	5,0	6,5	6,5	6,0
Environmental expenditure	1,1	1,0	1,1	1,1	1,3
Specially protected natural areas	5,2	5,2	5,2	5,2	5,2
Adjusted net savings	20,9	19,8	18,7	23,0	24,4

Source: authors.

Estimate of the Index of Adjusted Net Savings for Samara region demonstrates deviation between the traditional economic indicators and environmentally adjusted ones. Gross savings of the Samara region for 2008-2017 increased from 21,8% to 28,7% GRP while Index of Adjusted Net Savings for Samara region was estimated at about 20,9% - 24,4% GRP. Adjustment of gross savings were significantly affected by assessments of natural resources depletion which increased from 9,8% to 13,3% GRP respectively in 2008-2017. With relatively constant level of gross savings, expenses for education and environmental damage, it is the energy rent with consideration to raw-material orientation of the Samara region that defines value of the Index of Adjusted Net Savings. In this case, Samara region's gross savings were cleared of the funds allocated for development of resource based industries leading to increase in extraction of mineral resources

https://doi.org/10.15405/epsbs.2020.04.101
Corresponding Author: M. S. Guseva
Selection and peer-review under responsibility of the Organizing Committee of the conference
eISSN: 2357-1330

in future and therefore to further reduction of resources for future generations. Within the period in question, investments in fixed assets by "Extraction of minerals" activity in the Samara region tripled in absolute terms and accounted for 2.7% GRP in 2014.

Slowdown in economic growth leads to growth of the Index of Adjusted Net Savings, which is a consequence of decreasing adverse environmental effect of business operations. Absence of negative values of the index within the period in question manifests generation of "sustainable" type of development in the Samara region, which ultimately leads to improvement of wellbeing of people residing in the region.

7. Conclusion

Measuring sustainable development is a complex issue requiring large volumes of statistical information. Variety of indicators in the system complicates use of those in many countries due to lack of the required statistical data. Foreign systems of indicators have various degrees of complexity but enjoy clear target or structural function. Set of Russian indicators is mostly only justified structurally, methods rely on the principle of coverage of the key components rather on priorities of development.

Assessment of sustainable regional development requires development and application of the integral indicator which generalizes traditional system of indicators and is supplemented by the indicators based on the sustainable development concept. The suggested Index of Adjusted Net Savings allows to quite fully assess progress of the region in sustainable development. At the same time the existing statistical base is not sufficient to define this indicator with objective certainty and accuracy on the regional level in the Russian Federation. This pertains to such individual components as consumption of fixed assets and depletion of energy, mineral and forestry resources. Unified and fairly simple methodology for calculating the index of genuine savings, with appropriate official statistics available, will allow to use it for conducting cross-region comparative analysis of sustainable development in the Russian regions.

References

Analytical Center under the Government of the Russian Federation (2015). Human development report in the Russian Federation. Human development in the context of economic instability. Retrieved from: http://ac.gov.ru/files/publication/a/14681.pdf. Accessed: 12.12.2019.

Barbier, E. B., & Burgess, J. C. (2019). Sustainable development goal indicators: Analyzing trade-offs and complementarities. *World Development, 122,* 295-305.

Bobylev, S. N., Zubarevich, N. V., & Solovyova, S. V. (2015). Crisis challenges: How to measure sustainability of development. *Issues of Economics, 1*, 147-160.

Decree of the President of the Russian Federation of 05.07.2008 No. 204 "On national goals and strategic objectives of the development of the Russian Federation for the period until 2024". Retrieved from: https://www.nso.ru/page/36465 Accessed: 12.12.2019.

International Atomic Energy Agency (2001). RIO+10. Retrieved from https://www.iaea.org/newscenter/news/rio-10 Accessed: 12.12.2019.

International Social Survey Programme (2018). Methodology. Retrieved from http://w.issp.org/about-issp/methodology. Accessed: 12.12.2019.

Kumar, P., Ahmed, F., Singh, R. K., & Sinha, P. (2018). Determination of hierarchical relationships among sustainable development goals using interpretive structural modeling. *Environment, Development and Sustainability, 20(5)*, 2119-2137.

Landerretche, O., Leiva, B., Vivanco, D., & López, I. (2017). Welcoming uncertainty: A probabilistic approach to measure sustainability. *Ecological Indicators, 72*, 586-596.

Mota, R. P., & Cunha-e-Sá, M. A. (2019). The role of technological progress in testing adjusted net savings: Evidence from OECD countries. *Ecological Economics, 164, 106382*.

Parris, T. M., & Kates, R. W. (2003). Characterizing and measuring sustainable development. *Annual Review of Environment and Resources, 28*, 559-586.

Stiglitz, J. E., Sen, A., & Fitoussi, J.-P. (2016). *Misjudging our lives. Why does not GDP make sense?* New York: The New Press.

The World Bank (1980). World development report. Retrieved from http://documents.worldbank.org/curated/en/430051469672162445/World-development-report-1980 Accessed: 12.12.2019.

The World Bank (2005). Indicators of "The little green data book". Retrieved from http://siteresources.worldbank.org/INTEEI/936214-1146251511077/20916992/LGDB2005.pdf Accessed: 12.12.2019.

United Nations (2005). Millennium development goals (MDGs) of the UN. Retrieved from https://unstats.un.org/unsd/mi/pdf/MDG%20Book.pdf Accessed: 12.12.2019.

United Nations (2015). Millennium development goals (MDGs) of the UN. Retrieved from https://www.un.org/millenniumgoals/2015_MDG_Report/pdf/MDG%202015%20rev%20(July%201).pdf Accessed: 12.12.2019.

Weizsäcker, E. U., Hargrouz, K., & Smith, S. (2013). *Factor five. The formula for sustainable growth: A report to the Club of Rome.* Moscow: AST-PRESS BOOK.