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GROWING A GREEN ECONOMY

Abstract

In the article, the main concepts and ideas of the "green" economy are analyzed, the current directions of research are determined and the current situation is analyzed. The international concept of the green economy in the world and the conceptual foundations of the green economy are studied. Subindex of growth parameters and indicators of social and economic content and its components are calculated, and subindex of ecological and resource efficiency of the economy of Azerbaijan and its components is calculated.

Keywords: "green" economy, monitoring, sustainable development, long-term developmentб waste.

Intradaction

At the global level, the threat of disruption of the mutual harmony between the economy, the social sphere and the environment forces both developed and developing countries to adopt an agreed joint policy on sustainable development. The new economic model called "green economy" envisages efficient use of natural resources, reduction of carbon emissions, maximum reduction of environmental damage and formation of higher level inclusive social societies. However, it should be taken into account that the concept of "green economy" has not yet been fully formed in the economic literature, and its various aspects are more emphasized by different researchers.

Along with the concept of "green economy" there is a concept of "sustainable development" in the economic literature. There is a need to define the differences between these two concepts. Therefore, in our comparative study, it is intended to clarify several questions. First, a comparative analysis of approaches to the concept of "green economy" in the economic literature is provided. Secondly, there is a need to classify the main differences between the concept of "green economy" and the concept of "sustainable develophment". Later, views in the economic literature on the relationship between the green economy and carbon emission reduction, climate change problems, renewable energy problems, water management, waste management, land management, construction and transportation system will be compared.

Main part

Definitions of "green economy" essentially include several key facts. First, "Green growth" is essential for the sustainability of economic growth and economic development. Second, such growth must be inclusive and ensure the participation of all members of society. Third, "green growth" should not damage the environment and should be realized on the basis of technological innovations that promote the reduction of carbon emissions. Fourth, green growth should involve efficient use of natural resources. Fifth, "green growth" should stimulate the creation of new jobs. Sixth, green growth should expand the use of green technology and green energy.

The concept of "green growth" entered the economic literature earlier than the concept of "green economy" and was the subject of discussion from various aspects. However, in the essence of both concepts, there is a demand to reduce environmental demands on economic activity, including the effects of climate change and environmental pollution. On the other hand, both concepts imply economical and more efficient use of natural resources in economic

activity. Both concepts reflect the application of innovations and new technologies in the economy. However, the differences between these two concepts should be taken into account. Thus, the concept of "green economy" implies the essential renewal of economic activity by reducing the environmental threat and focusing on ensuring economic justice in society and improving social security. Such renewal of the economy is related to the formation and development of a new market related to "green investments", "green jobs", new environmental services. One of the important goals of the green economy is to eliminate poverty and support the development of low-income countries. But for the "green growth" concept, an important goal is the continuation of economic growth. However, unlike classical growth theories, "green growth" supports the provision of such growth as long as environmental requirements are taken into account. The main difference between the concepts of "green economy" and "green growth" is that the former focuses more on population welfare, while the latter focuses more on economic growth. However, the common aspect of both concepts is that environmental requirements are taken as a basis.

The main indicators that essentially relate to the green economy model are classified in five groups of indicators in ARDSK. Each of these groups includes several sub-indicators. These groups are:

1) Growth parameters and socio-economic nature (This group consists of 10 sub-indicators: a) GDP per capita; b) the amount of product prodced by 1 worker in 1 hour; c)GP_t) Level of economic activity of the population of working age (percentage); d) Unemployment level (percentage); e) Special weight of the minimum wage on the average monthly nominal wage (percentage); f) Poverty level (percentage); g) Education level (percentage); h) Population aging rate (percentage); i)Population density (people/km2); j)Life expectancy at birth (for age 0) (age).

2) The environmental and resource efficiency group of the economy includes 15 sub-indicators: a) (ERE_t)Carbon dioxide (CO2) released into the atmosphere from stationary sources (thousand tons); b)Volume of water

consumption for irrigation needs (million cubic m); c)Volume of water losses (million cubic m); d)Volume of water loss during use for irrigation needs (million cubic m); e) Volume of industrial waste per person (kg); f)Volume of solid household waste per person (kg); g)Total final consumption of energy (min net); h)Total final consumption of energy (teracoul); i)Energy capacity (kg of oil equivalent/thousand manats); j)Electricity production (million Kwts); k)Production of renewable energy sources (million Kwts); i)Amount of mineral fertilizers per hectare of cultivated area (kg/ha); m)Amount of organic fertilizers per hectare of cultivated land (kg/ha); n)The share of energy supply from renewable sources in the total energy supply (percentage); o) Value of 1 kg of produced energy product in GDP (1 manat/kg of oil equivalent).

3) group of natural resources (includes 10 sub-indicators: a) Fresh water taken from natural sources (million cubic meters); b) Water consumption (million cubic m); c) Oil production (thousand tons); d) Gas production (thousand tons); e), The structure of the land fund according to its purpose: Total land area of the country - total (thousand hectares); f) Land suitable for agriculture (thousand hectares); g) Non-agricultural lands (thousand hectares); h) Fishing (tons); i) Water resources utilization index (percentage); j) Area covered by forest (percentage).NR_t)

4) The environmental quality of life measurement group (EFL_t) includes 5 sub-indicators: a) Volume of polluting substances released into the atmosphere per person of the population (kg); b) Diseases of respiratory organs (person); c) Patients with acute intestinal infections: children under 0-17 years of age (person); d) People with acute intestinal infections: people over 18 years old (people); e) Sewage discharged without treatment (million cubic m). 5) The group of economic opportunities and tools of the policy () includes 8 sub-indicators: a)EOP_tThe number of foreigners and stateless persons who came to Azerbaijan for the purpose of tourism (people); b) Average annual concentration of ammonium ions (NH4) in rivers: Kura (mg (NH4+)/l); c) Average annual concentration of ammonium

ions (NH4) in rivers: Araz (mg (NH4+)/l); d)Share (percentage) of investments directed to fixed capital for environmental protection and efficient use of natural resources in total investments; e) Share of tourism activity in GDP (percentage); f) Payments for atmospheric air pollution (thousand manats); g) Payments for pollution of water resources (thousand manats); h) Payments for waste disposal (thousand manats).

Using these indicators, the Green Economy Composite Index ($GECİ_t$)()

$$GECİ_t = \frac{GP_t + ERE_t + NR_t + EFL_t + EOP_t}{5} \qquad (1)$$

Note that this composite index can also be expressed as a geometric mean:

$$GECİ_t = \sqrt[5]{GP_t * ERE_t * NR_t * EFL_t * EOP_t} \qquad (2)$$

We will assume that each of these sub-indices characterizing the green economy has the same weight (20%). On the other hand, we will assume that during the calculation of sub-indices, the sub-indices characterizing the sub-indicators included in each group of indicators have the same weight. But in this case, we will use the formula to bring all indicators to the same size. Hence, for each sub-index, the corresponding sub-index after the "normalization" operation is performed $I_i = \frac{X_i - X_{min}}{X_{max} - X_{min}}$

$$Sİ_i = \frac{\sum_{i=1}^n I_i}{n} \qquad (3)$$

will be calculated by the formula.

So 1)Parameters of growth and socio-economic essence for the group of indicators (GP_t)sub-index

$$GP_t = \frac{\sum_{i=1}^{10} I_i}{10} = \frac{I_1 + I_2 + I_3 + I_4 + I_5 + I_6 + I_7 + I_8 + I_9 + I_{10}}{10} \qquad (4)$$

Here,GDP per capita. This indicator is entered with "+" and ;$I_1 - I_{1,min} = 0$; $I_{1,max} = 250000 \, azn$. Data on this indicator are obtained from the national statistical database or the official statistical database of the World Bank.

I_2 −The value of the product produced by 1 worker in 1 hour. This indicator is entered with "+" and$I_{2,min} = 0$; $I_{2,max} = 300 \, azn$. According to this indicator, Luxembourg is currently the leader, and the value of the product per worker in this country is 242 thousand dollars at PPP (PPP) [**Ошибка! Источник ссылки не найден.**].

I_3 −Level of economic activity of working-age population (percentage). This indicator is also entered with "+" and$I_{3,min} = 0$;; $I_{3,max} = 100$

I_4 −Unemployment rate (percentage). This indicator is entered with "-" and$I_{4,min} = 0$;; $I_{4,max} = 100$

I_5 −Specific weight of the minimum wage on the average monthly nominal wage (percentage). This indicator is also entered with "+" and$I_{5,min} = 0$;; $I_{5,max} = 100$

I_6 −Poverty level (percentage). This indicator is entered with "-" and$I_{6,min} = 0$; $I_{6,max} = 100$

I_7 −Education level (percentage). This indicator is also entered with "+" and$I_{7,min} = 50$; $I_{7,max} = 100$.Indicators related to the level of education are obtained from the official database of the World Bank.

I_8 −Population aging rate (percentage). Considering that the scientific justification of the direct effects of this indicator on the green economy is ambiguous, we do not include it in equation (3). Nevertheless, note that$I_{8,min} = 1$; $I_{8,max} = 50$can be taken.Population aging raterelated indicators are obtained from the official database of the World Bank.

I_9 −Population density (people/km^2).Considering that the scientific justification of the direct effects of this indicator on the green economy is ambiguous, we do not include it in the equation (2.2.3). Nevertheless, note thatFor population density $I_{9,min} = 0.01$; $I_{9,max} = 30000$can be taken. It is obtained from the official database of the World Bank.

I_{10} − Life expectancy at birth (for age 0) (age).This indicator is included in equation (2.2.3) with "+" and$I_{10,min} = 20$;; $I_{10,max} = 100$can be taken. Information on this indicator

can be obtained from the official database of the World Bank.

Note that GP_t sub-index

$$GP_t = \sqrt[10]{\prod_{i=1}^{10} I_{it}} \quad (5)$$

We can express who.

"Parameters and socio-economic nature of growth" indicator GP_t calculation of sub-index (4) on the basis of identity is not given in table 1. As we mentioned above, to the identity of (4). I_8 and is not included and and is included

with a minus sign. The time series for sub-indices covers the years 2005-2019. $I_9 I_4 I_6$

$$GP_t = \frac{\sum_{i=1}^{10} I_i}{8} = \frac{I_1 + I_2 + I_3 - I_4 + I_5 - I_6 + I_7 + I_{10}}{8} \quad (6)$$

"Parameters and socio-economic nature of growth" indicator GP_t The calculation of the sub-index (4) on the basis of the sameness shows that the green economy indicator in Azerbaijan has continuously developed according to this sub-index.

Table 1

Growth parameters and socio-economic substance indicator sub-index and its components

	I_1	I_2	I_3	I_4	I_5	I_6	I_7	I_{10}	GP_t
2005	0.005977	0.0054	0.745	0.073	0.243	0.293	0.99	0.655	2.278377
2006	0.008833	0.008	0.731	0.066	0.201	0.208	0.976	0.655	2.305833
2007	0.013186	0.011967	0.72	0.063	0.232	0.158	0.976	0.6625	2.394653
2008	0.018415	0.0167	0.709	0.059	0.273	0.132	0.976	0.6675	2.469615
2009	0.016133	0.014633	0.709	0.057	0.252	0.109	0.976	0.66875	2.470516
2010	0.019012	0.0172	0.701	0.056	0.256	0.091	0.996	0.67	2.512212
2011	0.023012	0.0209	0.694	0.054	0.257	0.076	0.996	0.6725	2.533412
2012	0.023864	0.0216	0.701	0.052	0.235	0.06	0.996	0.67375	2.539214
2013	0.025033	0.023	0.705	0.05	0.247	0.053	0.996	0.6775	2.570533
2014	0.025072	0.022333	0.718	0.049	0.236	0.05	0.996	0.6775	2.575905
2015	0.022826	0.020333	0.717	0.05	0.225	0.049	0.996	0.69	2.57216
2016	0.025078	0.022	0.728	0.05	0.21	0.059	0.996	0.69	2.562078
2017	0.028904	0.025333	0.731	0.05	0.219	0.054	0.996	0.6925	2.588737
2018	0.032625	0.028333	0.734	0.049	0.239	0.051	0.996	0.6975	2.627458
2019	0.033075	0.028667	0.738	0.048	0.394	0.048	0.996	0.705	2.798742

Note: calculated by the author

Environmental and resource efficiency sub-index of the economy as the second important sub-index of the Green economy Index, which we proposed in the previous paragraphs to evaluate the transition to the green economy model (ERE_t) Covers 15 sub-indicators. These indicators are not only ecologically relevant, but also express the efficiency of the use of natural resources. Nevertheless, the 15 sub-indicators can be divided into two groups - environmental and resource efficiency. The main reason for such separation is to take into account whether the effects of these indicators are positive or negative during indexation.

Based on these sub-indicators, the ecological and resource efficiency sub-index of the economy will be calculated:

$$ERE_t = \frac{\sum_{i=1}^{6} E_{it}}{6} \quad (7)$$

will be counted as.

Note that instead of identity (7) we can also take the geometric mean: ERE_t

$$ERE_t = \sqrt[6]{\prod_{i=1}^{6} E_{it}} \quad (8)$$

Each sub-indicator will be given equal weight. However, for each sub-indicator, determining the values of and are the possible minimum and maximum possible values for these sub-indicators. In order to make cross-country comparisons, it would be more accurate to calculate some indicators per capita. $E_{i,min} E_{i,max}$

Thus, the green economy index "for sub-indicators of the ecological and resource

efficiency of the economy" sub-index $E_{i,max}$ and we can define the values as follows. $E_{i,min}$

a) Per capita volume of carbon dioxide (CO2) released into the atmosphere from stationary sources (metric tons)-; (E_1)

ERE_t The second important sub-index of "Production waste volume per person (kg)" is It is clear that as both per capita carbon emissions and per capita production waste increase, there is a shift away from the green model of the economy. Although some of the waste is made recyclable, a significant portion of the waste is not recyclable. Burning or burying some wastes is unavoidable. In countries that apply new technologies, a certain amount of electricity is produced from the burning of waste. In Azerbaijan, electricity is produced by burning a certain part of waste. In our study, we can accept t. for the maximum volume of industrial waste and household waste per person, for the minimum volume. (E_2)" $E_2 = 50$ $E_{2,min} = 0$

One of the most important aspects of the transition to a green economic model is related to the efficient use of drinking water resources. Thus, despite the fact that two-thirds of the Earth is covered by ocean, sea, lake and river water,

the amount of water suitable for domestic use and agriculture is small in most countries, and this amount is gradually running out on a global scale. Azerbaijan's water resources are also small compared to other countries of the region. The main problem is related to the formation of Azerbaijan's water resources in other neighboring countries. Since the main part of the water resources used by Azerbaijan in household and agriculture comes from the territory of Turkey, Georgia, Armenia and Russia, the problem of contamination of these resources with industrial waste deepens the problem of our country regarding water. In particular,

One of the important indicators in the transition model to the Green Economy is the possibility of using renewable energy. Both "production by renewable energy sources (million Kwts). But for cross-country comparisons, "It is more convenient to use the indicator of the share (percentage) of energy supply from renewable sources in the total energy supply. On this indicator, of course (E_6) $E_{6,max} = 100$, can be taken. $E_{6,min} = 0$

Table 2

Environmental and resource efficiency sub-index of Azerbaijan economy and its components

	İ$_1$	İ$_2$	İ$_3$	İ$_4$	İ$_5$	İ$_6$	ERE_t
2005	0.0427	0.0102	0.0043	0.0680	0.0033	0.0013	0.0216
2006	0.0404	0.0093	0.0044	0.0680	0.0033	0.0010	0.0211
2007	0.0346	0.0084	0.0050	0.0600	0.0027	0.0011	0.0186
2008	0.0365	0.0085	0.0048	0.0680	0.0052	0.0010	0.0207
2009	0.0342	0.0087	0.0051	0.0600	0.0034	0.0012	0.0188
2010	0.0318	0.0086	0.0053	0.0560	0.0025	0.0018	0.0177
2011	0.0301	0.0100	0.0050	0.0600	0.0039	0.0013	0.0184
2012	0.0268	0.0102	0.0053	0.0640	0.0048	0.0008	0.0187
2013	0.0321	0.0090	0.0054	0.0640	0.0050	0.0007	0.0194
2014	0.0338	0.0078	0.0050	0.0640	0.0079	0.0006	0.0199
2015	0.0290	0.0082	0.0044	0.0640	0.0127	0.0007	0.0198
2016	0.0306	0.0095	0.0042	0.0640	0.0111	0.0009	0.0201
2017	0.0335	0.0088	0.0040	0.0640	0.0092	0.0008	0.0201
2018	0.0372	0.0094	0.0040	0.0640	0.0152	0.0008	0.0218
2019	0.0317	0.0107	0.0040	0.0680	0.0183	0.0007	0.0222

Note: calculated by the author

Thus, we can calculate the environmental and resource efficiency sub-index of the Azerbaijani economy based on the dynamics of its components for the years 2005-2019 as shown in Table 2. (ERE_t) Note that during the calculation, negative values will be entered into the formula (7), and positive values will be entered into the formula. Due to the fact that the

indicators for Azerbaijan are much weaker, the indicator will be negative. However, the fact that Azerbaijan's indicators on negative components are small in absolute terms has had a positive effect on the final results.$İ_1, İ_2, İ_3, İ_4$ *və* $İ_5 İ_6 İ_6$ ERE_t

Conclusions

Among the definitions of the green economy, one important commonality is the association of the green economy with sustainable development. "Green growth" is essential for the sustainability of economic growth and economic development. Such growth must be inclusive and ensure the participation of all members of society. "Green growth" should not harm the environment and should be realized on the basis of technological innovations that promote the reduction of carbon emissions. "Green growth" should involve the efficient use of natural resources and stimulate the creation of new jobs. On the other hand, "green growth" should expand the development of green technology and the use of green energy. A comparative study of the economic literature shows that the concepts of "green growth", "green economy" are interrelated with the concept of "sustainable development", but they are essentially different. At present, the concept of "green growth" is of great importance in the formation of the concept of "green economy" and the latter concept of "sustainable development".

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РАЗВИТИЕ ЗЕЛЕНОЙ ЭКОНОМИКИ

Резюме

В статье анализируются основные концепции и идеи «зеленой» экономики, определены текущие направления исследований и проанализирована текущая ситуация. Изучена международная концепция зеленой экономики в мире и концептуальные основы зеленой экономики. Рассчитан Субиндекс параметров роста и индикатор социально-экономического содержания и его компоненты, а также рассчитан субиндекс экологической и ресурсной эффективности экономики Азербайджана и его составляющие.

Ключевые слова: «зеленая» экономика, мониторинг, устойчивое развитие, долгосрочное развитие, отходы.

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YAŞIL İQTİSADİYYATIN İNKİŞAFI

Xülasə

Məqalədə "yaşıl" iqtisadiyyatın əsas konsepsiyaları və ideyaları təhlil edilir, cari tədqiqat sahələri müəyyən edilir və mövcud vəziyyət təhlil edilir. Dünyada yaşıl iqtisadiyyatın beynəlxalq konsepsiyası və yaşıl iqtisadiyyatın konseptual əsasları tədqiq edilmişdir. Artım parametrlərinin alt indeksi və sosial-iqtisadi məzmun və onun tərkib hissələrinin göstəricisi, habelə Azərbaycan iqtisadiyyatının və onun tərkib hissələrinin ekoloji və resurs səmərəliliyi alt indeksi hesablanmışdır.

Açar sözlər: yaşıl iqtisadiyyat, monitorinq, davamlı inkişaf, uzunmüddətli inkişaf, israf.

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