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SUSTAINABLE ECONOMIC DEVELOPMENT: MAIN CONCEPT, MEASUREMENT METHODS AND CASE OF AZERBAIJAN

Shahin Bayramov
Doctor of Philosophy in Economics, Associate Professor
Mingachevir State University
shahin.bayramov@mdu.edu.az

Abstract: *The concept of "sustainable economic development" is a part of the broader concept of "sustainable development". It envisages achieving long-term economic growth without depleting natural resources, causing environmental degradation or adversely affecting social well-being. Calculating sustainable economic development through the GPI indicator and comparing it with GDP shows that the economic policy aimed at increasing GDP in the country has a negative effect on people's well-being because it does not take into account the environmental and social impacts. Thus, sustainable economic growth in most cases occurs due to the use of natural resources, as well as increasing working hours and limiting the social welfare of the population. That is why "greening" or "socialization" of economic development in the country is of great importance.*

Keywords: *sustainable development, gross domestic product, income inequality, social indicators, environmental degradation*

In the last 30 years, the concept of "sustainable development" has been widely used in scientific literature. Sustainable development considers the efficient use of resources necessary to meet the needs of the present while taking into account the needs of future generations. This concept involves balancing social, economic and environmental aspects in order to increase the level of human well-being in the long term. "Sustainable development" implies the integration of economic development with environmental protection and social inclusion. Although it is characterized as the integration of three systems, i.e. economic, social and ecological systems, the leading aspect in the concept of "sustainable development" is economic development. That is why, in most cases, when we say "sustainable development", we mean the development of the economy in such a way that such development does not harm the environment and ensures social development. In this sense, sustainable development requires not only the provision of growth in individual sectors of the economy, but also the protection and efficient use of natural resources, the reduction of greenhouse gas emissions, the promotion of the use of renewable energy sources, the protection of biodiversity, the promotion of social inclusion and the protection of human rights.

International agreements and frameworks such as the United Nations Sustainable Development Goals (SDGs) are used as roadmaps to support the concept of sustainable development. These goals include poverty reduction, sustainable food and sustainable energy supply, climate change mitigation, and other diverse areas. In general, the concept of sustainable development involves creating a more sustainable and just future for all by balancing economic, environmental and social aspects. It recognizes that the well-being of people and the planet are interconnected and promotes a holistic approach to development.

The concept of "sustainable economic development" is a part of the broader concept of "sustainable development". It envisages achieving long-term economic growth without depleting natural resources, causing environmental degradation or adversely affecting social well-being. Sustainable economic development is characterized by several indicators for the long term: 1) Gross Domestic Product (GDP); 2) Reduction of unemployment; 3) Productivity increase; 4) Investment

and capital formation; 5) Ensuring a positive trade balance; 6) Achieving innovation and technological progress; 7) Reducing income inequality in Households; 8) Reduction of environmental damage and so on. It is important to note that none of the indicators we have listed indicates the sustainability of the economy in isolation. These and other indicators should be taken into account in a complex case.

Various methods are used to measure the sustainability of the country's economic development, including 1) Genuine Progress Indicator (GPI); 2) Environmental Performance Index (EPI); 3) Human Development Index (HDI); 4) Sustainable Development Goals (SDG) Indicators; 5) Ecological footprint analysis and others. The choice of methodology depends on the specific context and objectives of the assessment. A combination of these methodologies can also be used to gain a more holistic understanding of the sustainability of economic development.

In the last decade, the GPI indicator is often used to assess the level of sustainable economic development. Some researchers consider this indicator to be more accurate than the Gross Domestic Product (GDP) indicator for assessing the country's sustainable development. However, the formation of some indicators in the GPI indicator are based on expert opinion which makes this indicator more subjective and reduces its importance as an objective indicator. In the calculation of the GPI indicator, the presence of indicators related to environmental protection and social welfare, along with economic indicators, makes it a better indicator than the GDP indicator.

The GPI takes into account various factors such as income distribution, education, health, natural resource depletion, pollution, crime rates and volunteer work. It reduces negative impacts such as pollution and crime and adds positive elements such as voluntary work and personal leisure. By considering these broader aspects, the GPI aims to more accurately represent a nation's well-being and resilience. Because GDP fails to take into account factors such as income inequality, social indicators, environmental degradation and overall quality of life, GPI is often considered an alternative or complement to GDP. Proponents of the GPI argue that it provides a more holistic and balanced view of progress, guiding policymakers to make decisions that ensure long-term sustainability and societal well-being.

Twenty-six indicators are mainly used in the calculation of the GPI indicator. During the calculation of the GPI indicator, cost-related ones are included with a negative value, and income-related ones with a positive value. For example, spending on durable goods, crime, divorce, unemployment, and less leisure time are included with a negative value when calculating the GPI. Since these and other indicators have a negative impact on people's well-being, they are included in the GPI calculation with a negative sign. There are other indicators that have a positive effect on well-being. For example, consumer spending and the presence of street and road infrastructure in the country have a positive effect on people's well-being.

Calculating sustainable economic development through the GPI indicator and comparing it with GDP shows that the economic policy aimed at increasing GDP in the country has a negative effect on people's well-being because it does not take into account the environmental and social impacts. Thus, sustainable economic growth in most cases occurs due to the use of natural resources, as well as increasing working hours and limiting the social welfare of the population. That is why "greening" or "socialization" of economic development in the country is of great importance.

The aggravation of global problems, especially climate change and energy security problems, makes the "green economic model" important for every country as an imperative model rather than an alternative. In this regard, the green economic model is also considered an imperative model for ensuring sustainable economic development in Azerbaijan.

Indeed, Azerbaijan is one of the countries rich in hydrocarbon resources. Extraction of these resources undoubtedly creates certain environmental problems. The high income from oil and gas affects the development of other sectors of the economy. On the other hand, there are few drinking water resources and forest massifs in Azerbaijan. Environmental problems are deeper in the territories of Azerbaijan, which were occupied by Armenia for 30 years and were liberated in the
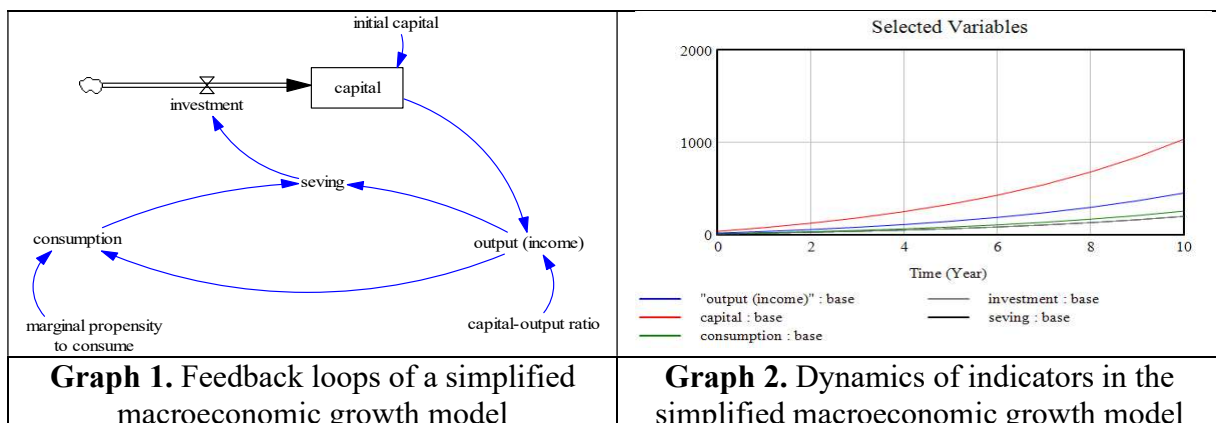
fall of 2020. In order for the people who have been displaced from these lands for many years to return to their homes, the restoration of the infrastructure in the areas requires a large amount of funding. All such costs seriously hinder economic sustainability in the country.

It is possible to use the system dynamics model to assess the current state of sustainable economic development in Azerbaijan and to forecast it for the long term. This model allows to take into account all three aspects that are important for sustainable development in interaction. At this time, environmental and social indicators should be added to the neoclassical economic growth theory. In the system dynamics model, five stocks can be taken as a basis: 1) Capital accumulation in the country's economy; 2) Hydrocarbon reserves; 3) Population; 4) Waste; 5) Waste recycling. According to neoclassical growth theory, the capital stock increases through investment but decreases through depreciation. Hydrocarbon reserves are reduced by being used in the production process. Population increases through births, but decreases through deaths. Waste is collected from the production process, household and other sources. A certain part of the waste can be recycled through a new technological process.

The feedback loops built according to the system dynamics model characterize the relationship between production, consumption, savings and other indicators. Calculations show that the deterioration of environmental indicators affects the population and the volume of crop production. The reduction of hydrocarbon reserves has a negative impact on economic stability for the long term.

The application of the system dynamics model is successful for forecasting the current state of sustainable economic development and for the long term. In this case, modelling in several stages gives good results. So, the main criteria of modelling should be the improvement of social welfare and the provision of economic growth on the condition that environmental problems do not arise. Therefore, 1) Macroeconomic growth model; 2) Physical reproduction model; 3) Social reproduction model; 4) Ecological reproduction model should be used in the modelling algorithm.

Five basic equations should be used in a macroeconomic growth model. These are 1) capital accumulation equation; 2) production function; 3) consumption function; 4) saving function; 5) conditional equilibrium equation. Capital accumulation depends on the initial capital and the volume of investments. As a first approximation, we will assume that the production function depends only on capital. Then, labor will be added to this function. The consumption function depends on the amount of income and the marginal propensity to consume. The accumulation function will be characterized as the difference between the volume of income and the volume of consumption. Thus, the above-mentioned five equations have five unknown indicators (capital, savings, investment, consumption and income) and two constant coefficients (the ratio of capital to income and the coefficient of marginal propensity to consume). "Feedback loops" built on the basis of these equations can be described as in Graph 1. The calculation shows that from 2005-2021, the average value of the marginal propensity to consume in Azerbaijan was 0.563, and the average value of the "capital-output ratio" indicator was 2.3. Since the research covers the years 2005-2021, 33.9393 billion manats were taken as the initial capital volume.

Graph 1. Feedback loops of a simplified macroeconomic growth model	**Graph 2.** Dynamics of indicators in the simplified macroeconomic growth model

It should be noted that the calculations were calculated in current manat. Of course, such calculations significantly distort the real situation because in the structural dynamics model, the natural value of indicators is used more often. However, since it is impossible to express the volume of GDP or capital as a macroeconomic indicator in natural prices, we preferred to evaluate it in current manat. Calculations at these prices show that capital, consumption, GDP volume and savings increased continuously in those years.

According to the algorithm, we can determine the effects of depreciation and hydrocarbon reserves on economic growth by including the main indicators of physical reproduction in a simplified macroeconomic growth model. We do not include the use of renewable resources in the model for simplicity. Depreciation deductions reduce capital. The use of oil and gas resources in the country's economy leads to its depletion. By including these indicators, the model changes slightly. The model includes indicators such as the "rate of crude oil and gas utilization", as well as the initial volume of initial oil and gas reserves. For simplicity, the average value of the "crude oil and gas utilization rate" indicator for the years 2005-2021 will be used. Calculations show that if the average depreciation level is 0.05, "crude oil and gas utilization rate" is 0.3, and the initial hydrocarbon reserves are approximately 700 billion manats, the growth rate of income, consumption, savings and capital volume is gradually decreasing.
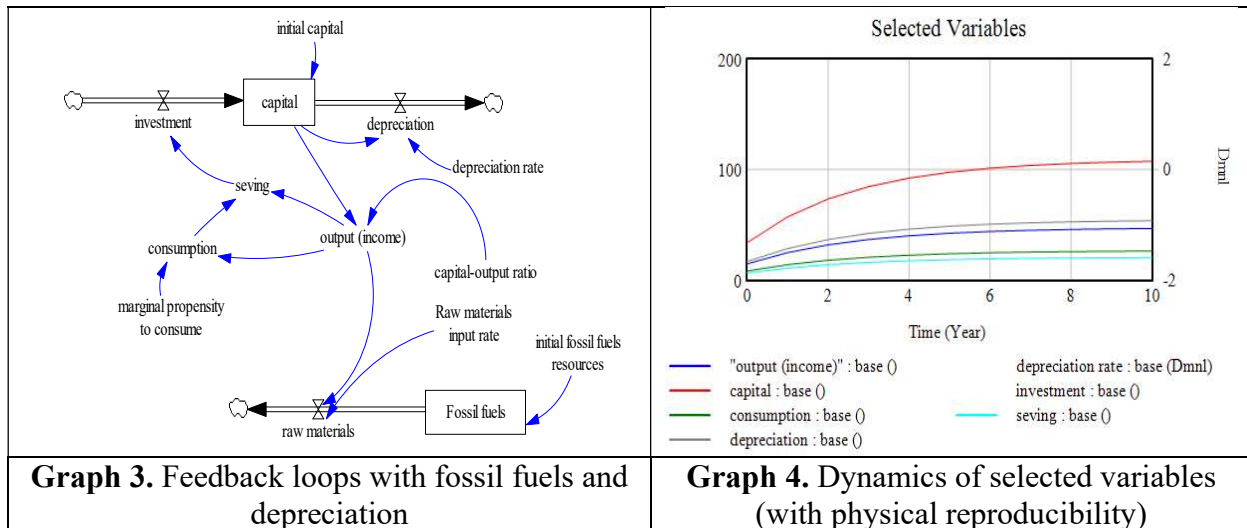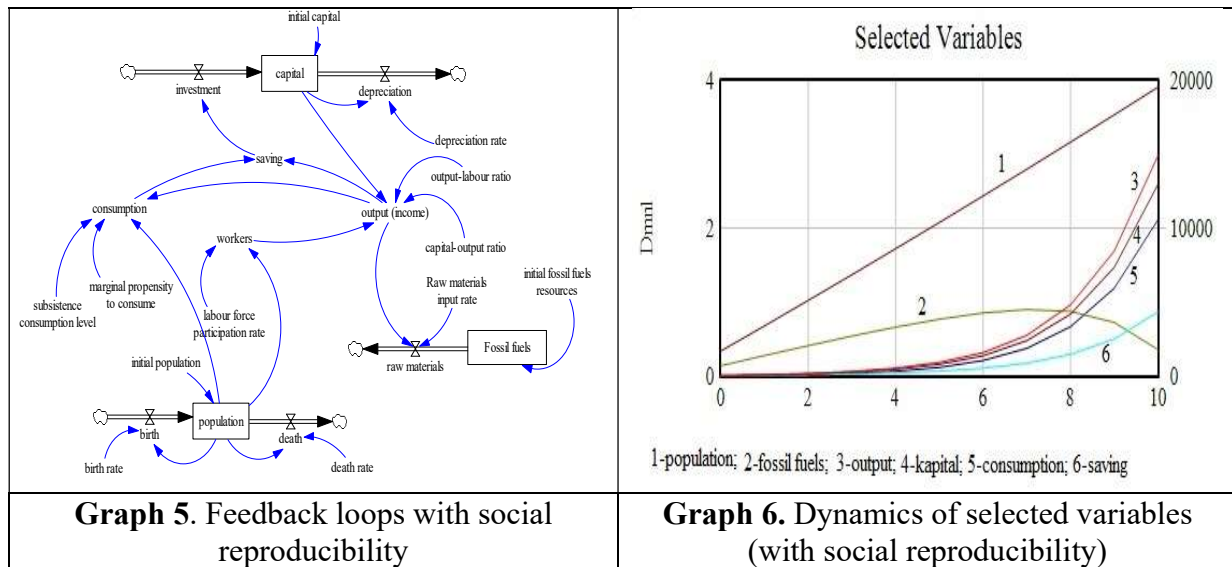
Graph 3. Feedback loops with fossil fuels and depreciation	**Graph 4.** Dynamics of selected variables (with physical reproducibility)

According to the algorithm chosen for the research, it is necessary to add social reproducibility to the model. In this case, population and labor force will be included as key variables. Also, indicators of birth rate, death rate, labor force participation rate, labor productivity, per capita consumption per year will be included. The labor force participation rate tells what proportion of the population is employed. Previous feedback loops did not consider the labor factor in the production function. However, by including this indicator, as well as annual expenses per person in the model, we establish the connection between sustainable development and the well-being of the population. Population growth also increases the level of labor force, but consumption is also increasing.

When adding the income-labor ratio indicator to the model, the Cobb-Douglas production function can be used. Or, by comparing the ratio of the total wage level to income and the ratio of capital to income, the minimum can be accepted for the model. Since this process complicates the model, we will assume the average price of returns. The subsistence minimum is also included in the model. Taking into account that the subsistence minimum has continuously increased in the last 15 years, it is somewhat difficult to include this indicator as a constant in the model. Therefore, we will accept the average price in the period of 2005-2022, i.e. 2907,225 manats, as the subsistence minimum. We will take the volume of consumption as the average price of two indicators (that is,

the average price of the total consumption of the population and the indicator calculated from the macroeconomic aspect).

Graph 5. Feedback loops with social reproducibility	**Graph 6.** Dynamics of selected variables (with social reproducibility)

Calculations show that some indicators change with the inclusion of social reproduction in the model. Continuity of economic growth also occurs in this case, but the reduction of resources is clearly felt. The volume of consumption and the volume of investment are also continuously increasing.

With the inclusion of ecological indicators in the model, the picture changes considerably. Sustainable economic development requires ensuring ecological balance. Our research in this field continues.

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DAVAMLI İQTİSADİ İNKİŞAF: ƏSAS KONSEPSİYA, ÖLÇÜ METODLARI VƏ AZƏRBAYCAN NÜMUNƏSİ

Ş.V.Bayramov
iqtisad üzrə fəlsəfə doktoru, dosent
Mingəçevir Dövlət Universiteti

Xülasə: "Dayanıqlı iqtisadi inkişaf" anlayışı daha geniş "dayanıqlı inkişaf" konsepsiyasının bir hissəsidir. O, təbii ehtiyatları tükənmədən, ətraf mühitin deqradasiyasına səbəb olmadan və ya sosial rifaha mənfi təsir göstərmədən uzunmüddətli iqtisadi artıma nail olmağı hədəfləyir. Davamlı iqtisadi inkişafın ÜDM göstəricisi ilə hesablanması və ÜDM ilə müqayisəsi göstərir ki, ölkədə ÜDM-in artırılmasına yönəlmiş iqtisadi siyasət ətraf mühiti və sosial təsirləri nəzərə almadığından insanların rifahına mənfi təsir göstərir. Belə ki, dayanıqlı iqtisadi artım əksər hallarda təbii sərvətlərdən istifadə etməklə yanaşı, iş vaxtının artırılması və əhalinin sosial rifahının məhdudlaşdırılması hesabına baş verir. Məhz buna görə də ölkədə iqtisadi inkişafın "yaşıllaşdırılması" və ya "sosiallaşdırılması" böyük əhəmiyyət kəsb edir.

Açar sözlər: davamlı inkişaf, ümumi daxili məhsul, gəlir bərabərsizliyi, sosial göstəricilər, ətraf mühitin deqradasiyası

УСТОЙЧИВОЕ ЭКОНОМИЧЕСКОЕ РАЗВИТИЕ: ОСНОВНАЯ КОНЦЕПЦИЯ, МЕТОДЫ ИЗМЕРЕНИЯ И ПРИМЕР АЗЕРБАЙДЖАНА

Ш.В.Байрамов
доктор философии по экономике, доцент
Мингячевирский государственный университет

Концепция «устойчивого экономического развития» является частью более широкой концепции «устойчивого развития». Он предусматривает достижение долгосрочного экономического роста без истощения природных ресурсов, вызывая деградацию окружающей среды или отрицательно влияя на социальное благосостояние. Расчет устойчивого экономического развития по показателю ВВП и сравнение его с ВВП показывает, что экономическая политика, направленная на увеличение ВВП в стране, оказывает негативное влияние на благосостояние людей, так как не учитывает экологические и социальные последствия. Итак, в большинстве случаев устойчивый экономический рост происходит за счет увеличения рабочего времени и ограничения социального благосостояния населения, помимо использования природных ресурсов. Вот почему «озеленение» или «социализация» экономического развития в стране имеет большое значение.

Ключевые слова: устойчивое развитие, валовой внутренний продукт, неравенство доходов, социальные показатели, деградация окружающей среды