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From the Territory of Recovery to Sustainable Development: a Methodological Concept of Effective Socio-economic Development of Ukraine after the War Development

Od obszaru odbudowy do zrównoważonego rozwoju: koncepcja metodologiczna efektywnego rozwoju społeczno-gospodarczego Ukrainy po wojnie

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Abstract

The article is devoted to substantiating theoretical and methodological foundations and developing practical approaches to effective socio-economic development of Ukraine after the war, based on the concept of sustainable development. The study substantiates the need to build a fundamentally new economic model of post-war development of the territories of Ukraine, based on the rejection of raw material exports. It is proved that sustainable development forms the conceptual basis in the post-war economy of Ukraine. The concept of conversion of territories is proposed and the reasons are given for the need for their distribution according to the added value and quality of life of the population. The practical value of the matrix method in the division of territories according to their functional purpose is substantiated. Sets of estimated indicators of economic and social results and effectiveness of Ukraine's recovery after the war for *territories to be restored* and *territories of sustainable development* have been developed. The procedure for assessing the effectiveness of socio-economic development of Ukraine after the war is structured. The expediency of interpreting an integral indicator based on the generalized Harrington desirability function is justified.

Key words: sustainable development, territories to be restored, territories of sustainable development, efficiency of restoration of territories, socio-economic development, war

Streszczenie

Artykuł jest poświęcony uzasadnieniu podstaw teoretycznych i metodologicznych oraz wypracowaniu praktycznych podejść do efektywnego rozwoju społeczno-gospodarczego Ukrainy po wojnie, w oparciu o koncepcję zrównoważonego rozwoju. Opracowanie uzasadnia potrzebę zbudowania zasadniczo nowego modelu gospodarczego powojennego rozwoju terytoriów Ukrainy, opartego na odrzuceniu eksportu surowców. Udowodniono, że zrównoważony rozwój stanowi podstawę pojęciową w powojennej gospodarce Ukrainy. Zaproponowano koncepcję przekształceń obszarów oraz uzasadniono potrzebę ich podziału zgodnie z wartością dodaną i jakością życia ludności. Udowodniono praktyczną wartość metody macierzowej w podziale obszarów ze względu na ich przeznaczenie funkcjonalne. Opracowano zestawy szacunkowych wskaźników skutków ekonomicznych i społecznych oraz skuteczności odbudowy Ukrainy po wojnie dla obszarów do odbudowy i obszarów zrównoważonego rozwoju. Procedura oceny efektywności społeczno-gospodarczego rozwoju Ukrainy po wojnie jest uporządkowana. Celowość interpretacji wskaźnika całkowego na podstawie uogólnionej funkcji pożądalności Harringtona jest uzasadniona.

Słowa kluczowe: zrównoważony rozwój, obszary odbudowy, obszary zrównoważonego rozwoju, efektywność odbudowy obszarów, rozwój społeczno-ekonomiczny, wojna

1. Introduction

The events of the last decades in Ukraine allow us to conclude that the country is at a fundamentally new stage of its development. This tendency is associated with a number of trends, including both global transformations and local changes: reorientation of the entire world community to the Sustainable Development Goals, 4th Industrial Revolution and as a result digitalization of social life, two *maidans*, the COVID-19 pandemic, a full-scale war with Russia, started on February 24, 2022. All this significantly affected not only the change in Ukrainian realities, but also reflected on the European foundations. The dependence and subordination of processes taking place in Ukraine with other European countries is reflected in statements, interviews, articles of politicians, scientists, experts in the field of economics, sociology, ecology, etc. Thus, according to Deputy Chairman of the European Commission Josep Borrel: *the war in Ukraine not only took thousands of lives, but also caused serious economic damage to the whole world. We will have to cope – both inside and outside the EU – with the consequences of this third in the last 15 years asymmetric shock* (Borrell, 2022).

Despite serious challenges, Ukraine continues to integrate systematically into the European space. The government makes maximum efforts to accelerate the country's entry into the EU. Among the recent achievements, we can note the adoption by the Parliament of the law on media. This is a historical decision, since Ukrainian legislation, despite its 30-year Independence, functioned under the conditions of *slightly improved post-Soviet legislation*. The Parliament supported the law on improving the procedure for competitive selection of candidates for the position of Judge of the Constitutional Court of Ukraine.

It is impossible not to note the significant progress in the field of sustainable development. In this regard, since 2015, A Sustainable development strategy has been developed and implemented in Ukraine. In 2017, the National basic report *Sustainable Development Goals: Ukraine* was adopted, which nationalized the global goals of the SDGs. Resolution No. 686-p of the Cabinet of Ministers of Ukraine dated August 21, 2019 on the issue of data collection for monitoring the implementation of sustainable development goals (hereinafter referred to as the SDGs) approved a nationalized list of SDG indicators that form the basis of the author's proposals. In addition, starting from 2019, the State statistics service of Ukraine has the authority to provide conditions for the collection and publication of these data and coordinate the development of metadata by indicators. Moreover, in 2020, the State statistics service of Ukraine, together with the independent analytical platform VoxUkraine, with the support of UNDP in Ukraine, conducted a pilot project to measure progress in achieving SDGs in Ukraine using the methodology of the UN Economic and social commission for Asia and the Pacific (hereinafter referred to as ESCAP) and on the basis of a Voluntary national review of SDG (Shevtsova, 2020).

For the purpose of effective post-war recovery of Ukraine, on April 21, 2022, the president of Ukraine signed an order to form a National council for the recovery of Ukraine from the consequences of the war, and on May 2, a recovery plan was presented to the Committee on economic development of the Verkhovna Rada (National Council for the Recovery of Ukraine from the Consequences of War, 2022). In this regard, Ukraine has begun to activate all the processes associated with the post-war recovery, in particular, the loss of the economy due to war is already being monitored, according to which, as of the beginning of October 2022, direct losses from the war amounted to 1 127.4 billion US dollars (destruction and damage of physical assets). Indirect losses were estimated at another 1 161.8 billion US dollars (loss of income and additional expenses) (Economic losses due to war, 2022).

Within the framework of the event *Results of 2022* held by the ad hoc think tank *Assistance*, the agenda of which was called: *According to what principles Ukraine should live in 2023 for effective recovery and sustainable development*, the participants unanimously voiced the acute need for joint cooperation of EU countries not only during the period war in Ukraine, but after its end (Mazur, 2023).

The need to search for new approaches to the restoration of Ukraine, taking into account its integration into the European space, as well as further joint sustainable development of the EU countries, was discussed within the framework of a large-scale event led by the scientific community of Ukraine, an expert discussion *Strategy for the post-war restoration of Ukraine*, conducted at the initiative of the Department of economics of the National Academy of Sciences of Ukraine (hereinafter referred to as NASU) on the basis of the National Institute for Strategic Research (National Institute of Strategic Studies, 2022). As a result, scientists determined key vectors and terms of post-war recovery of Ukraine, including: *restoration of the pre-war level of quality of life of the population by 2027; achievement of the main socio-economic parameters of Eastern European countries by 2032* (Presentation of the post-war recovery strategy from NISD, 2022). The directions of the most relevant areas of scientific research for the future period are outlined, among them: the study of the effectiveness of post-war recovery, the development of a set of evaluation indicators, the formation of monitoring, as well as the development of methodological recommendations for assessing the effectiveness of post-war recovery.

Being interested in successful liquidation of the war consequences and further development of the country as a part of the European Union, scientists of the Institute for Economic and Legal Research of the National Academy of Sciences, in the framework of the research 0122U002121 *Development of priority development territories under the conditions of the armed conflict: results and efficiency evaluation*, are working on the creation of a method to assess efficiency of reconstruction of the affected territories; intermediate results are presented in the text of this article. The proposed conceptual approach, according to the authors, ensures sustainable development of the country in the post-war period by creating a strong, socially responsible, modern open competitive economy of equal opportunities, comfortable for people's lives, strategically and fully integrated into the European and global economic environment capable of forming a reliable financial, economic and defensive potential sufficient to repel any type of military and economic aggression.

In this regard, the **study purpose** is the substantiation of theoretical and methodological foundations and development of practical approaches to effective socio-economic development of Ukraine after the war based on the concept of sustainable development.

This goal made it necessary to solve a number of tasks: to substantiate the expediency of building a fundamentally new economic model of post-war development of the territories of Ukraine, based on the rejection of raw materials exports, to form conceptual provisions regarding the state regional policy and the policy of restoring regions and territories on the basis of sustainable development, to expand the scientific vision of the theory of efficiency taking into account sustainable development, to develop effective applied tools for assessing the effectiveness of socio-economic development of Ukraine after the war in the context of sustainable development.

The object of the study is the effective socio-economic development of Ukraine after the war based on the concept of sustainable development.

The subject of the study is theoretical, methodological and practical approaches to the effective socio-economic development of Ukraine after the war based on the concept of sustainable development.

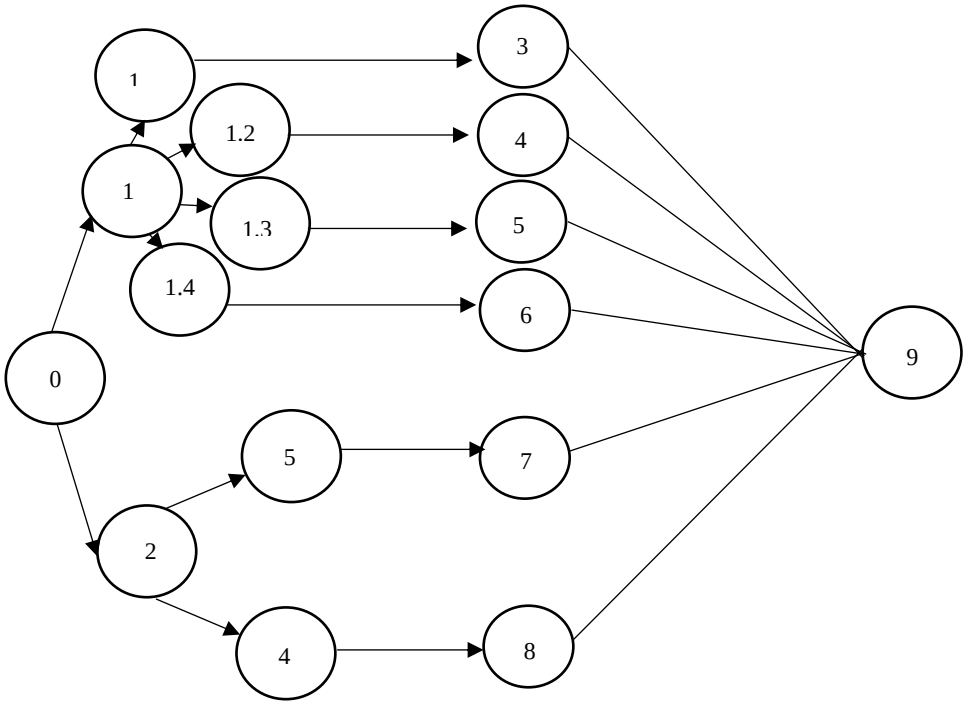
2. Methodology and previous results

It should be noted that the scientific results presented for consideration are a continuation of the study started in June 2022, the methodological basis of which was a set of methods of scientific knowledge, general scientific and special methods. The study procedure is shown in (Fig. 1).

The authors have previously formed a theoretical and methodological basis based on fundamental provisions of economic theory, regional economics, regional management, scientific papers of domestic and foreign scientists on sustainable development of regional economies, which allowed to establish a co-subordination of the categories *of result, effect, efficiency, effectiveness* and are reflected in the previously published article *From result to efficiency: the socio-economic context of the priority development territories* (Martynovych, 2022). This also allowed us to form our own vision of the essence of the category *effective restoration of territories*, under which the authors understand not only the return to pre-war state, but full development and integration into the European community on the basis of sustainable development. Consequently, sustainable development is the basis for the post-war recovery of the Ukrainian economy.

Conceptual provisions of defining the social optimum, the essence of which is to combine the well-being of society with the rational placement of resources, technologies, production processes, etc., described in the papers of V. Pareto and D. Synok, allowed us to come to a conclusion about the feasibility of considering the category *effective socio-economic development of territories* through the state, and not the attitude, as is accepted in the theory of economic efficiency. This approach allows us to move away from the traditional understanding of the essence of

efficiency, due to which the *consumer* society focused on economic benefits for many years while ignoring the social and environmental aspects, slowing down the transition to sustainable development.



0	Study procedure	
1	Theoretical basis:	
	Method	Result
1.1	Historical and logical method	3. Subordination of the categories *result, effect, effectiveness, efficiency* has been established.
1.2	Generalization	4. The essence of the concepts of *effective restoration of territories, effective socio-economic development of territories* has been defined.
1.3	Analysis, synthesis, induction, deduction	5. The expediency of building a fundamentally new economic model of post-war development of the territories of Ukraine, based on the rejection of raw material exports, has been substantiated.
1.4	Systematization	6. Complexes of indicators for assessing the result and effectiveness of socio-economic development of the territories of Ukraine after the war have been formed.
2	Empirical basis:	
	Method	Result
2.1	Description	7. Conceptual provisions regarding the state regional policy and the policy of restoring regions and territories based on the principles of sustainable development have been formed.
2.2	Comparison	8. Effective applied tools for assessing the effectiveness of socio-economic development of Ukraine after the war in the context of sustainable development have been developed.
9	Conclusions	

Figure 1. Procedure for studying the effective socio-economic development of Ukraine after the war in the context of sustainable development, source: own elaboration

Key conclusions regarding the effectiveness of Ukraine's socio-economic development after the war are based, among other things, on methodological guidelines for measuring the effectiveness of the economy and social progress developed by Nobel Prize winners Joseph Stiglitz, Amartya Sen and Jean-Paul Fitoussi, who concluded that *well-being includes both economic resources, income and non-economic aspects of people's lives (what they do and what they can do, how they feel, what kind of natural environment they live in). The sustainability of these levels of well-being depends on our ability to pass on to future generations the accumulated assets that are important for our lives (natural, physical, human, social ones). Therefore, it is important to distinguish between the assessment of current well-being (which the authors consider as a result) and the assessment of its stability over time* (this is efficiency) (Report of France, 2011). This idea, combined with the judgments of V. Pareto and D. Synok allowed us to conclude that the socio-economic state of development before and after the introduction

(implementation) of restorative measures should be understood under the effectiveness of Ukraine's development after the war (compiled by the authors). At the same time, this condition is determined by evaluating not individually, but in the totality (as a single set) of indicators (see clause 3.2).

Moreover, the developments of Joseph Stiglitz, Amartya Sen and Jean-Paul Fitoussi, namely their proposals for changing the statistical accounting system and the role of GDP in the assessment of *our life*, allowed us to argue the concept of territory conversion and form sets of indicators for each type. Considering fair doubts about GDP as an indicator of the well-being of society, which does not take into account the economic inequality or consequences of economic decisions for the environment, but is focused only on economic growth, in work, the distribution of territories by their functional purpose, it is proposed to take into account such indicators as added cost and quality of life of the population by region (see clause 3.1).

The urgency of creating new measurement systems was noted in 2012 at the Conference of the United Nations Organization for sustainable development in Rio de Janeiro. In clause 12 of the Draft resolution presented by the president of the General Assembly *The future we want* states that humanity needs to move to new indicators of measuring human progress *We have fulfilled the decision to take urgent steps to ensure sustainable development. Therefore, we confirm our commitment to sustainable development, an assessment of the progress made to date (...) and declare our readiness to resist new and emerging challenges* (Draft resolution *The future we want*, 2012).

The information base of the research was the legislative norms of Ukraine and the countries of the European Union, the research of domestic and foreign scientists, in terms of normalizing the effective socio-economic development of territories. In particular, the main methodological and applied developments are based on the law of Ukraine *On amendments to certain legislative acts of Ukraine concerning the principles of state regional policy and the policy of restoring regions and territories* (The official portal of the Verkhovna Rada of Ukraine, 2022), Resolution of the Cabinet of Ministers of Ukraine *On approval of the procedure for developing, conducting public discussion, approving programs for the comprehensive restoration of the region, the territory of a territorial community (its part) and making changes to them* (Cabinet of Ministers of Ukraine, 2022), Order of the Cabinet of Ministers of Ukraine *Issues of data collection for monitoring the implementation of the Sustainable Development Goals* (Cabinet of Ministers of Ukraine, 2019), Order of the Ministry of Economy *On approval of methodological recommendations for calculating indicators of resource intensity of gross domestic product at the level of the national economy for the main groups of resources, labour productivity at the level of the national economy, regional level and by types of economic activity and the coefficient of return of fixed assets at the level of the national economy and by types of economic activity* (Order, 2019), Order of the Ministry of Environmental Protection and Natural Resources of Ukraine *On approval of the methodology for determining the amount of damage caused to land and soils as a result of emergency situations and/or armed aggression and military operations during martial law* (Order, 2022), Resolution of the Cabinet of Ministers of Ukraine *On the implementation of a pilot project to monitor the damage and destruction caused to the regions of Ukraine as a result of the armed aggression of the Russian Federation on the basis of a geographic information system* (Cabinet of Ministers of Ukraine, 2022), Resolution of the Cabinet of Ministers of Ukraine *On the procedure for determining damage and losses caused to Ukraine as a result of the armed aggression of the Russian Federation* (Resolution of the Cabinet of Ministers of Ukraine No. 326, 2022), Resolution of the Cabinet of Ministers of Ukraine *On approval of the procedure and methodology for monitoring and evaluating the effectiveness of the implementation of state regional policy* (Resolution of the Cabinet of Ministers of Ukraine No. 856, 2022), the Draft resolution *The future we want*. Methodological materials of the Vienna Institute for International Economic Research (WIIW) were used (Astrov V., Ghodsi M., Grieveson R., Holzner M., Kochnev A., Landesmann M., Pindyuk O., Stehrer R. and Tverdostup M., 2022), as well as the *Draft plan for the restoration of Ukraine* of the National Council for Reconstruction, *Essays on the restoration of Ukraine* of the Center for Economic Policy Research (CEPR, 2022).

3. Findings and Discussion

3.1. Territory conversion concept

The quintessence of the author's proposal is that the sets of indicators (see clause 3.2) are constructed taking into account different types of territories that are provided for in the Law of Ukraine *On amendments to certain legislative acts concerning the principles of state regional policy and the policy of restoration of regions and territories* (Cabinet of Ministers of Ukraine, 2022). The proposed approach allows us to take a substantive approach to determining the priorities of post-war development, since territories differ from each other, both in basic conditions and development opportunities, and in the degree of destruction as a result of military operations. As a tool for dividing territories by functional purpose, in order to further rank them and compare them in the obtained system of final results, we suggest using the matrix method, a schematic representation of which is shown in (Fig. 2).

It is worth noting that the concept of territory conversion is based on the matrix of the Boston Consulting Group proposed in 1968 by the founder of the BCG, Bruce D. Hendersen, which is a tool for strategic analysis and planning (Henderson, Bruce, 2008) having two indicators: 1) market share and 2) production scale effect. The essence of this concept is that depending on the time and effort of investors, the state, business and

ordinary citizens, the values of indicators will change, thereby causing conversion (from Latin conversio – transformation) of territories. So, for example, thanks to the complex actions of these entities, *territories to be restored* can move into the category of *regional growth poles*, or immediately evolve into a quadrant – *territories of sustainable development* (fig. 2). In other words, it is not necessary that the *territories to be restored* must go through the entire cycle. Each territory that can evolve as quickly and efficiently as possible, or vice versa, is not effective. This dependence shows the effectiveness of restoration, in which *territories of sustainable development* are a kind of *standard*, a vector that determines the most desired degree of efficiency.

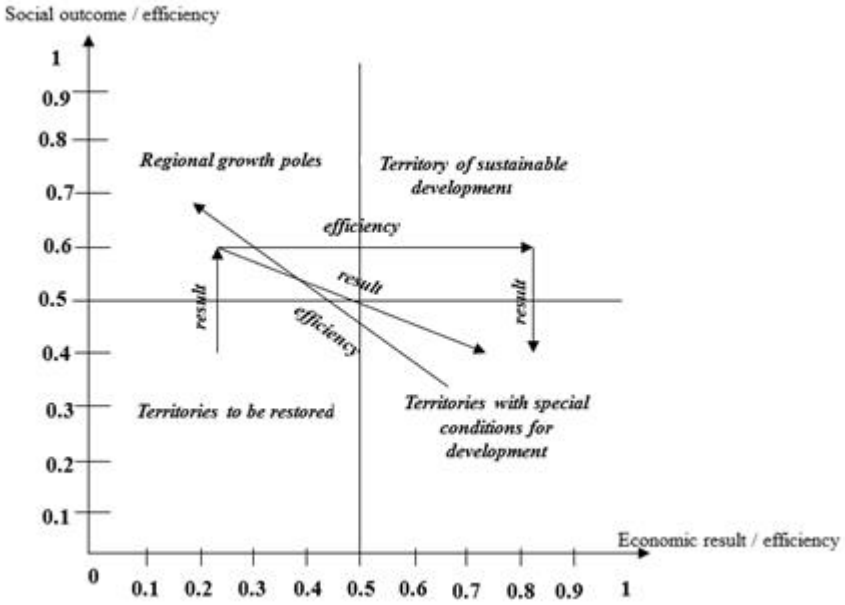


Figure 2. Territory conversion concept. Source: compiled by the author on the basis of (Henerson, Bruce 2008)

The advantage of the matrix method is its versatility – this explains the popularity of its use in the EU countries. So, in particular within the framework of the regional policy of the EU countries (Europa. Overviews. Regional Policy, 2022) based on the matrix method, territories are typologized and separated by development periods (stages of the life cycle of territories). European classification is based on 2 indicators – output per capita and population density of the territory (Europa. Overviews. Regional Policy, 2022). This allows making comparisons with other countries and identifying which category they belong to – developed or developing.

Taking into account the purpose of the study, we consider it appropriate, when dividing territories according to their functional purpose, to use such indicators as:

1) Added cost (X-axis), which includes labour remuneration, depreciation and profit, allows us to answer the question: who creates goods and who makes a profit from them? That is, we can reflect the economic essence without ignoring the social component, which is not included in the GDP indicator. A similar point of view is reflected in the papers of Gregor Linden, Jason Dedrick and Kenneth Kraemer, who investigated global value chains using the example of Apple's iPad and iPhone, counting the number of people directly involved in the design, manufacture, transportation and sale of the iPod, while establishing a significant difference in wages for certain groups of workers (Kenneth L. Kraemer, G. Linden and J. Dedrick, 2011). Thus, we conclude that in the context of sustainable development, it is the added cost that allows us to draw objective conclusions about the effectiveness of the development of the territory's economy.

2) The second indicator, on the basis of which we can determine the social component in terms of the quality of life of the population (Y-axis) – an integral indicator that is used in interstate comparison and measurement of the standard of living, literacy, education and longevity, as the main social characteristics of the territory under study. Thus, the distribution of territories based on these indicators will reflect the degree of compliance with the level of human life expectancy, the level of well-being and development of each member of society achieved by the national economy at a certain point in time.

As the initial information base for the distribution of territories according to their functional purpose, are the reports of the Ministry of development of communities and territories of Ukraine, in particular: *Analysis of socio-economic development of regions and the Kyiv city, Rating assessment of regions*, data from the State statistics service of Ukraine.

It is worth paying attention to the fact that the indicators *value added cost* and *quality of life of the population* have different units of measurement. This requires bringing them to a common dimension. With this in mind, we propose to translate them into relative ratings using the same procedure that is proposed below for building ratings

(formulas 1-3). After that, the territories are distributed according to their functional type and the effectiveness of socio-economic development is directly evaluated.

3.2. Indicators of territories to be restored and territories of sustainable development

In this section, two of the four sets of assessment indicators are proposed: *for territories to be restored* and *territories of sustainable development*, which form the basis of the methodology for assessing the effectiveness of socio-economic development of Ukraine after the war. A set of assessment indicators is a set of indicators built according to certain principles that reflect social and economic results and contribute to establishing the causes and consequences of (not) effective restoration of territories (compiled by the authors). It should also be noted that the author's developments are based on a comprehensive, security-oriented approach. It is based on a number of principles that you can get acquainted with (Martynovych, 2022).

According to the law of Ukraine *On amendments to certain legislative acts of Ukraine concerning the principles of state regional policy and the policy of restoration of regions and territories*, territories to be restored (hereinafter referred to as TR) are micro-regions, territorial communities on the territory of which military operations took place and/or which were temporarily occupied, and/or territories, the critical infrastructure, social infrastructure, housing stock facilities of which were destroyed as a result of military operations, as well as which are characterized by a sharp deterioration in the level of socio-economic development and significant movement of the population to other regions and/or other states (Cabinet of Ministers of Ukraine, 2022). As we can see, in this definition, the emphasis shifts towards a sharp deterioration in the socio-economic situation due to the destruction of infrastructure facilities and the outflow of the population precisely because of the war. In this regard, the key indicators will be the rate of restoration of infrastructure facilities and the rate of migration (return) of the population (table 1).

Table 1. A set of estimated indicators of socio-economic results of the development of territories to be restored, Source: compiled by the authors

Value	Indicator
Social result	
NP – the number of permanent population, thousand people (by region (estimated) as of February 1, 2022 and the average number in January 2022, excluding the temporarily occupied territory of the Autonomous Republic of Crimea and Sevastopol city, as well as the temporarily occupied territories of Luhansk and Donetsk regions; NEP – the number of employed population, thousand people	WM_{pop} – share of the migration flow of the population to the territory to be restored
Economic result	
Transport infrastructure: K_r – restoration of roads of various categories (cost/million US dollars/km), K_b - restoration of bridges (cost/million US dollars/lin. m), $K_{railway}$ – restoration of the railway infrastructure and urban electric transport facility (cost/million US dollars/km), K_a – restoration of airports (cost/million US dollars), K_{rw} – runways (cost/million US dollars/km). Energy infrastructure: K_{en} – restoration of power supply lines, electric networks (cost in million US dollars), KTPP – restoration of TPP facilities, KG – restoration of gas supply networks (cost in million US dollars/km). Municipal infrastructure**:** K_{ef} – restoration of education facilities, K_{hf} – restoration of healthcare facilities, K_{cf} – restoration of culture facilities, K_{sf} – restoration of sports facilities, K_{ab} – restoration of administrative buildings, K_{sc} – restoration of shopping centres. Production infrastructure**:** K_{if} – restoration of industrial facilities, NSE – number of small enterprises, units. NEE – the number of employees employed in small enterprises, thousands of people by industry.	WB_{in} – pace of restoration of infrastructure facilities

It shall be noted that in case of territories to be restored, we are talking about evaluating the result, not efficiency, which is due to the author's understanding of these categories, as mentioned earlier (see methodology and previous results).

Territories of sustainable development (hereinafter referred to as TSD) are defined as self-sufficient micro-regions, territorial communities with the existing socio-economic potential of territories that are capable of balanced development in the economic, social and environmental spheres (Cabinet of Ministers of Ukraine, 2022). This type of territory is considered the most *ideal, reference, highest* due to the fact that the TSD, unlike other types, has the necessary conditions and opportunities for effective functioning. Accordingly, the ultimate goal of other functional types is to achieve the TSD type through conversion.

The complex was formed by selecting a limited number of indicators according to the principle of *required volume*, as follows: five in the economic and institutional component and six in the social and environmental component, which offer from one to eight values and indicators (table 2).

Table 2. A set of indicators for assessing socio-economic results and effectiveness of the development of territories of sustainable development, source: compiled by the authors on the basis of (Order of the Cabinet of Ministers of Ukraine No. 686, 2019)

Sustainable Development Goal	Value	Indicator
Economic and institutional component		
1. Decent work and economic growth	FVGDP – physical volume of GDP, million UAH; E_{hl} – export of goods using high-level technologies, million UAH; R_{fa} – return of fixed assets; $EP_{20\text{-}64}$ – employment of the population aged 20-64, thousand people; NY – the number of young people who do not work, do not study, do not acquire professional skills, thousand people; E_{hw} – the number of employees engaged in work with harmful working conditions, persons; E_{SBE} – number of employees in SBE, million persons; VAC_{pcSBE} – value added cost for production costs of SBE, UAH.	IPVGDP – index of physical volume of GDP,%; WE_{hl} – share of exports of goods using high-level technologies, in total exports %; CR_{fa} – coefficient of return on fixed assets; W $EP_{20\text{-}64}$ – share of employment of the population aged 20-64, %; WHM – share of young people who do not work, do not study, do not acquire professional skills, %; WE_{hw} – share of employees engaged in work with harmful working conditions,%; WE_{SBE} – share of working employees in SBE, million people; WVAC-pcSBE – share of value-added cost in terms of production costs of SBE, %.
2. Industry, Innovation and infrastructure	DFS_{FEA} – depreciation of fixed assets FEA. To types of economic activity *Transport, warehouse management*, million UAH; ET_{dom} – electric transport in domestic traffic, units; VACP – value-added cost of production of the enterprises, million UAH; NE_{in} – number of employees of enterprises belonging to, thsnd. persons; ERD – expenses for research and development, million UAH; SIP – sold innovative products, million UAH; IS – coverage of the population with internet services, thsnd. persons.	I DFS_{FEA} – level of depreciation of fixed assets acc. To types of economic activity *Transport, warehouse management*, %; WET_{dom} – share of e electric transport in domestic traffic, %; WVACP – share of value-added cost of production of the enterprises, %; WEE_{in} – share of employees of enterprises belonging to, %; WERD – share of expenses for research and development in the GDP, %; WSIP – share of sold innovative products in the industrial volume, %; WIS – share of coverage of the population with internet services, subscribers per 100 citizens.
3. Peace, justice and strong institutions	RFT – risks of financial terrorism, quantity; $HATP_{fp}$ – financial provision of regional human anti-trafficking programmes.	WPFT – share of high-level risks in the system of countering financial terrorism, %; $WHATP_{fp}$ – financial provision of regional human anti-trafficking programmes.
4. Partnership for sustainable development	PMT – private money transfers from abroad, million UAH; CI – capital investment (in actual prices), billion UAH; VDI – volume of direct investment (share capital), million US dollars USA.	RPMTGDP – ratio of private money transfers from abroad to GDP, %; NIFDI – net inflow of foreign direct investment, million US dollars. USA.
5. Agricultural development	PAP – production of agricultural products, ton; PFP – production of food products, ton.	WAP – share of agricultural products, %; WFP – share of food production, %; WFAE – share of food production and processing of agricultural raw materials in export, %.
Social component		
1. Overcoming poverty	AMSL – actual minimum subsistence level, thousand UAH SSS – state social support, thsnd. UAH FC – annual total food costs of a household, thousand UAH.	WAMSL – share of population, whose average costs per capita are lower than the actual minimum subsistence level, %; WSSS – share of the poor covered by state social support, %; WFC – share of food costs in total expenses of a household, %
2. Overcoming hunger	$MC_{1\ person}$ – meat consumption per person, kg/year; $CM_{1\ person}$ – consumption of milk and milk products per 1 person, kg/year; $FC_{1\ person}$ – fruit consumption per person, kg/year.	FCI – food consumption index by type (meat, milk, fruit).
3. Good health and well-being	MM - maternal mortality, thousand people; IM - infant mortality, thousand people; R_1 – cases of diseases registered for the first time, thousand - total; P_{HIV} – the number of HIV patients registered; P_{AIDS} – the number of AIDS patients registered; P_t - the number of tuberculosis patients registered; C_c - current health care costs; C_b – budget health care costs, million UAH	N_{mm} – the number of cases of maternal mortality per 100 thousand live births; N_{cm} – children mortality under 5 years old, cases per 1000 live births; L_{exp} – life expectancy at birth, both sexes, years; N_{HIVp} – registered HIV patients per 100 thousand population; N_{AIDS} - registered AIDS patients per 100 thousand population; N_{tub} – egistered tuberculosis patients per 100 thousand population; N_{cm} – controlled mortality of the population of the territory that can be prevented (indicator of controlled mortality), for a separate minimum list of causes, per 100 thousand population; C_{be} – coefficient of budget expenditures on healthcare, % to GDP.

Sustainable Development Goal	Value	Indicator
4. Quality education	N_cPSI – number of children aged 5 covered by pre-school institutions, persons; NI_{12} – number of the population that used the Internet in the last 12 months, persons; NM_{ts} – number of men among teaching staff, persons; NGSEIi – number of general secondary education institutions in rural areas with Internet access, persons; $NGSEI_{c-}$ number of general secondary education institutions in rural areas where computers are used, persons.	WN_cPSI – share of children aged 5 covered by pre-school institutions, %; WFNF – share of population participation in formal and non-formal types of education, %; W NI_{12} – share of the population that used the Internet in the last 12 months, %; WNM_{ts} – share of men among teaching staff, %; $WNGSEI_i$ – share of general secondary education institutions in rural areas with Internet access, %; WNGSEIc – share of general secondary education institutions in rural areas where computers are used, %.
5. Gender equality	Nlr – number of laws and regulations revised or adopted for gender equality, units; Ncdv – number of complaints about domestic violence, thousand; NwVR – number of women among deputies of the Verkhovna Rada of Ukraine, persons; NwdRC – number of women among deputies of regional councils and city councils of cities of regional significance, persons; Nb_{20} – number of births under the age of 20; Sw – average salary of women, thousand UAH; Sm – average salary of men, thousand UAH; $NEW_{25\text{-}44}$ – number of employed women aged 25-44 with children aged 3-5, %.	Wlr – share of laws and regulations revised or adopted for gender equality, %; Wcdv – share of complaints about domestic violence, %; WwVR – share of women among deputies of the Verkhovna Rada of Ukraine, %; WwdRC – share of women among deputies of regional councils and city councils of cities of regional significance, %; Cb_{20} – coefficient of births under the age of 20, per 1000 women aged 15-19; CraSwm – ratio of the average salary of women and men, %; $WEW_{25\text{-}44}$ – share of employed women aged 25-44 with children aged 3-5, %.
6. Reducing inequality	$NAHH_{ems}$ – number of agricultural housholds which suffered due to poor provision of emergency medical services, units; $NAHH_{mi}$ – number of agricultural housholds which suffered due to the absence of medical institutions nearby, units; $NAHH_{tc}$ – number of agricultural housholds which suffered due to the lack of transport communication, units.	$WNAHH_{ems}$ – share of agricultural housholds which suffered due to poor provision of emergency medical services, %; $WNAHH_{mi}$ – share of agricultural housholds which suffered due to the absence of medical institutions nearby, %; $WNAHH_{tc}$ – share of agricultural housholds which suffered due to the lack of transport communication, %; CamS – correlation of the average monthly salary (income) of the 10th and 1st decile groups of employees (decile coefficient), times; CaP,S – correlation of the average pension and the average salary in the economy, %.
Environmental component		
1. Clean water and proper sanitation	NRP_{cws} – number of rural population having access to the central water supply, persons; NUP_{cws} – number of urban population having access to central water supply, persons; VD – volume of discharges of contaminated wastewater into water bodies, million m^3; $WCGDP_{uw}$ – water capacity of GDP, used water, m^3.	WRP_{cws} – share of rural population having access to the central water supply, %; WUP_{cws} – share of of urban population having access to central water supply, %; WVD – discharges of contaminated wastewater into water bodies in total, %; CWCGDPuw – coefficient of water capacity of GDP m^3 to used water per 1000 UAH of GDP; CWCGDP – current water capacity of GDP, % up to the level of 2015.
2. Affordable and clean energy	EP – electricity production, billion kWh; TC_{drn} – technological costs of electric energy in distribution electric networks, million UAH; I_{per} – import of primary energy resources from one country, million UAH; NS_{nf} – number of suppliers on the nuclear fuel market, units; AE_{rs} – the amount of energy produced from renewable sources, units.	WTC_{drn} – share of technological costs of electric energy in distribution electric networks, %; I_{perva} – maximum share of import of primary energy resources from one country, %; WNS_{nf} – share of one supplier in the nuclear fuel market, %; WAE_{rs} – energy produced from renewable sources, %; EIGDP – energy intensity of GDP, kg of oil equivalent per international $ at the current rate of exchange in 2011.
3. Sustainable development of cities and communities	CAH – coverage of territorial units of Ukraine (regions), programs for providing affordable housing for various categories of citizens, units; NRS – number of regions that have approved regional strategies of development and general development plans, units; NC – number of cities where the average annual concentration of contaminating substances exceeds the limit, units.	WCAH – share of coverage of territorial units of Ukraine (regions), programs for providing affordable housing for various categories of citizens, %; WNRS – of regions that have approved regional strategies of development and general development plans, in total, %.

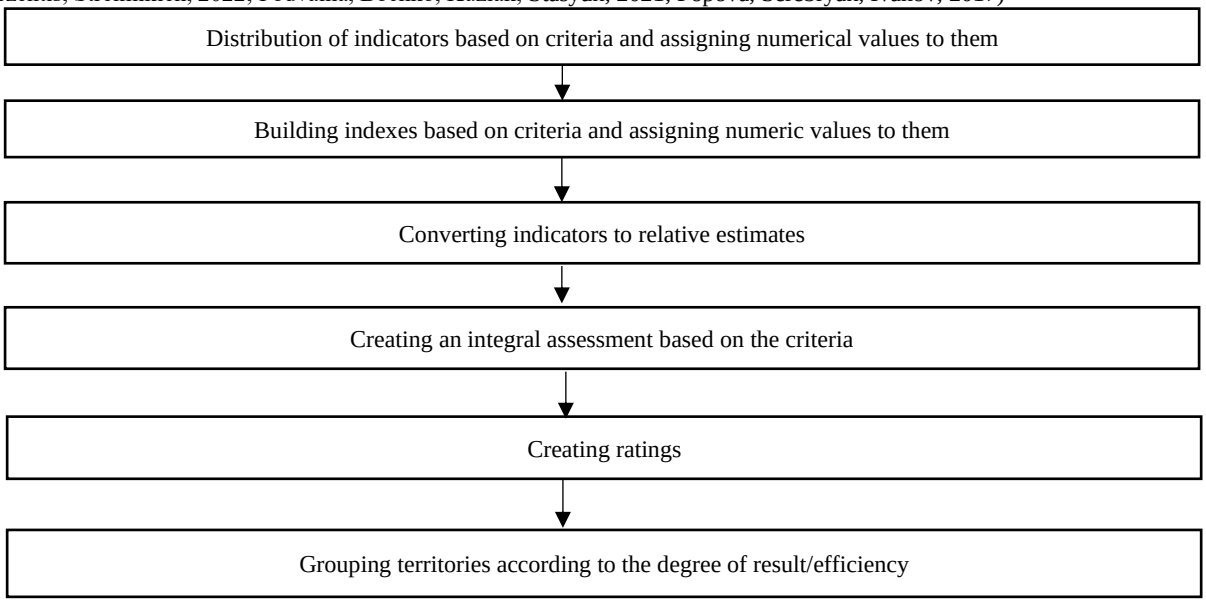
Sustainable Development Goal	Value	Indicator
4. Responsible consumption and production	NRU – number of resources used in kind or in monetary terms; NPM – number of products manufactured over a certain period of time in kind or in monetary terms; NIDW – number of incinerated and disposed waste, units; VCMRM – volumes of materials/raw materials consumed by economic sectors, units.	Resource capacity of GDP, % to the level of 2015; the volume of waste generated by all types of economic activity per unit of GDP, kg per 1000$ at the current rate of exchange in 2011; WNIDW – share of incinerated and disposed waste, %.
5. Conservation of marine resources	NDCWW – number of discharges of contaminated wastewater, units; SMR_{NRF} – area of territories and objects of nature reserve fund of maritime regions, m^2; $SBAS_{NRF}$ – area of territories and objects of nature reserve fund in the waters of the Black and Azov seas, thousand hectares; VP_{ABR} – volumes of production of aquatic bioresources in the marine economy zone, thousand tons.	WNDCWW – share of discharges of contaminated wastewater, %; $WSMR_{NRF}$ – of the area of territories and objects of nature reserve fund of maritime regions, %; $WSBAS_{NRF}$ – of the area of territories and objects of nature reserve fund in the waters of the Black and Azov seas, thousand hectares.
6. Protection and restoration of land ecosystems	SNRF – area of territories and objects of the nature reserve fund, thousand hectares; SNEN – area of territories of the national ecological network, thousand hectares; WR – wood reserves in forests, million m^3; SAL – are of arable land, thousand hectares; SOP – area of land occupied under organic production, thousand hectares; SAL_{ext} – area of agricultural land of extensive use, thousand hectares.	WNRF – share of territories and objects of the nature reserve fund, in the total volume, %; WNEN – share of the area of territories of the national ecological network, %; million m^3; WAL – share of the area of arable land in the total territory of the country, %; WOP – share of the area of land occupied under organic production in the total territory of the country, %; WAL_{ext} – share of the area of agricultural land of extensive use, %

3.3. Evaluation procedure of efficiency of socio-economic development of Ukraine after the war

As an evaluation method, we suggest using one of the most compact, simple, clear, informative tools for comparative analysis – rating or rating (index) assessments. The popularity of this method is evidenced by the fact that the number of international ratings conducted by various international organizations and participating countries has increased. The list of ratings as of 2019 included 94 indexes, including (World Economic Outlook Database) the IMD World Competitiveness Rankings, index of the Boston Consulting Group (SEDA), the Heritage Foundation Index of Economic Freedom, The Human Development Index, the index of Doing Business, Satisfaction with Life Index, Education Index, Press Freedom Index, etc. under the participation of 170 countries on average (Country ratings, 2023).

The urgency of using the rating (index) assessment method in the post-war period was particularly noted by V. Geiets and D. Boyarchuk, in the framework of the expert discussion *Strategy for the post-war reconstruction of Ukraine*. Scientists noted the benefits of indicator planning, which worked in Japan, France and other countries, noting that *the most likely scenario is improvisation based on the best examples of domestic and foreign progressive practice* (Expert discussion, 2022). Fully agreeing with the above, we propose the evaluation procedure presented on fig. 3.

Figure 3. Stages of assessing the efficiency of socio-economic development of Ukraine after the war. Source: compiled by the authors on the basis of (Erina, 2016; Kostash, Havrylenko, Fed'kovych, Plekan, Breus, 2020; Nestorenko, Morkūnas, Volkov, Baležentis, Štreimikien, 2022; Podvalna, Bochko, Kuziak, Stasyuk, 2021; Popova, Serebryak, Ivanov, 2017)



The distribution of indicators by criteria and assignment of numerical values is based on the analysis of statistical bulletins, by selecting them for each criterion, value and indicator. As a result, we get the initial base for further rating evaluation. Given that values have different units of measurement, it is necessary to bring them to a single format, i.e. translate them into relative values using formulas (1-3): for stimulating values that help improve efficiency, Formula 1 is used:

$$z_j = \frac{x_j - x_{j(min)}}{x_{j(max)} - x_{j(min)}} \quad (1)$$

where x_j - value of the j-th indicator;
$x_{j(min)}$ - the minimum value of the j-th indicator to be evaluated;
$x_{j(max)}$ - the maximum value of the j-th indicator to be evaluated.
For indicators – where stimulants that negatively affect effectiveness Formula 2 is used:

$$z_j = \frac{x_{j(max)} - x_j}{x_{j(max)} - x_{j(min)}} \quad (2)$$

Further, based on the obtained relative estimates, the average indicator for each group for each region has been calculated.
Average indicator $\overline{Z_{ij}}$ for each group is calculated as follows:

$$\overline{Z_{ij}} = \frac{\sum_{i=1}^{n} K_n}{n} \quad (3)$$

Calculating the average values of regulatory indicators for each of the criteria makes it possible to obtain an integral assessment for each individual territory. A rating scale is built based on the calculation results. It is worth noting that the proposed approach is actively used in the diagnosis of socio-economic processes by Ukrainian scientists, such as: I. Bakhov, E. Boichenko (Bakhov, Boichenko, Martynovych, 2019), E. Libanova, O. Osaulenko, L. Cherenko (Ministry of Community and Territorial Development of Ukraine, 2021), A. Erina (Erina, 2016). In particular, this approach is used to assess the investment attractiveness of territories; global human, innovative, sustainable development; regional human development in Ukraine, etc.
Formation of assessment scales of the efficiency of socio-economic development of Ukraine after the war, interpretation of the data obtained. One of the most convenient ways of reflection (interpretation) of an integral exponent is a generalized Harrington desirability function (Harrington, 1965). The construction of this function is based on transformation of natural values of individual indicators of different physical nature and dimension into a single dimensionless desirability scale. The Harrington desirability scale is a universal psychophysical verbal-numerical scale. This scale is defined by the Harrington desirability function (desirability curve), which establishes a correspondence between the natural values of indicators on physical scales and psychophysical parameters – subjective linguistic estimates of the *desirability* of these values for a function, object, system, or person (Harrington, 1965). It is worth noting that there are two approaches to choosing a scale with a one-way and two-way restriction (table 3).
The table shows the relationship between quantitative values of a dimensionless scale and a person's psychological perception. If the overall characteristic improves only by unidirectional changes in the indicator (decrease or increase), the restriction is one-way and can be described as follows: $y_{and} \leq y_{max}$ or $y\ and \geq y_{min}$ (Harrington, 1965). If a change in the indicator is likely in both directions from the optimal value, then the restriction is two-way and is described as: $y_{min} \leq y_{and}. \leq y_{max}$ (Harrington, 1965).
With a one-way restriction, the desirability value of 0.37 corresponds to y_{min} or y_{max} (given a lower or upper bound, respectively), for a two-way restriction - both as y_{min} and y_{max}. For a one-way restriction in the case of *positive* changes in indicators, which are characterized by a monotonous and increasing dependence of desirability on their numerical values, the Harrington function has a sigmoidal form and is defined by the formula:

$$d = \exp(-\exp(-y')), \quad (4)$$

where y' - scale of encoded values of partial indicators y,
d - desirability scale.
From table 3 it can be seen that the desirability function of the site is *satisfactorily* close to linear, and its nonlinearity is manifested in the desire regions close to 0 and 1. That is, its sensitivity in these regions is significantly lower than in the middle zone, which is quite consistent with Weber Fechner's law. The interval from -2 to 5 on the scale of encoded values of partial indicators is the interval of effective values.
In a two-way restriction, the desirability function is described by the formula:

$$d = -\exp(-|y'|^n), \quad (5)$$

Where y' is the encoded value of the private parameter y,
n - positive number (not necessarily an integer).
Given the purpose of the study submitted for consideration, we consider the verbal-numerical Harrington scale with a two-way restriction to be more relevant and representative, since changes in indicators are likely in both directions from the optimal value. Thus, the formed theoretical and methodological basis allows us to move on to the development of practical tools for assessing the effectiveness of socio-economic development of Ukraine after the war with a focus on sustainable development.

Table 3. Harrington verbal and numerical scale (Harrington, 1965)
a) one-way restriction

Linguistic estimate of desirability	Value intervals of desirability functions
Low	0.00 - 0.37
Satisfactory	0.37 - 0.69
High	0.69 - 1.00

b) two-way restriction

Linguistic estimate of desirability	Value intervals of desirability functions
Very high	0.8 - 1.0
High	0.63 - 0.8
Satisfactory	0.37 - 0.63
Low	0.2 - 0.37
Very low	0.0 - 0.2

4. Conclusion

Thus, based on the generalization of the theoretical and methodological basis, the scientific problem of the conceptual foundations of effective socio-economic development of Ukraine after the war on the principles of sustainable development has been solved. This made it possible to form a number of conclusions and proposals, the main ones of which are as follows:
Generalization of the regulatory, theoretical and methodological framework allowed us to conclude that it is necessary to build a fundamentally new economic model of post-war development of the territories of Ukraine, based on the rejection of raw material exports. It is proved that sustainable development forms the conceptual basis in the post-war economy of Ukraine. Conceptualized conversion (transition) of territories, which is based on the functional types outlined in the law of Ukraine *On amendments to certain legislative acts, regarding the principles of state regional policy and the policy of restoration of regions and territories* and arises due to the complex actions of subjects, the territorial system, ensuring the transition from one state to another (from territories to be restored to territories of sustainable development).
The practical value of the matrix method is substantiated, the essence of which is the possibility of determining the rating of territories, both by individual indicators and by a set of indicators, taking into account sustainable development. When dividing territories according to their functional purpose, two indicators are proposed: value added cost (X-axis), quality of life of the population (Y-axis), which will reflect the degree of compliance with the level of human life expectancy, the level of well-being and development of each member of society achieved by the national economy at a certain point in time, enriching the theoretical and methodological basis of sustainable development.
Based on the proposals of the Centre for economic policy research (CEPR), a list of national indicators of the sustainable development goals, a set of estimated indicators of economic and social results and the effectiveness of Ukraine's recovery after the war was formed for two types of territories. It is proved that when evaluating *territories to be restored*, only the result can be evaluated, while *territories of sustainable development*, which are a kind of standard, allow us to draw conclusions about efficiency.
The procedure for assessing the effectiveness of socio-economic development of Ukraine after the war is structured, which is based on rating (index) assessments and provides for the following stages: distribution of indicators by criteria and assigning them numerical values, construction of indices by criteria and assigning them numerical values, translation of indicators into relative estimates, formation of an integral assessment, determination of rating, interpretation of results.
The expediency of interpreting an integral indicator is substantiated based on the generalized Harrington desirability function, which allows converting natural values of indicators of different physical nature and dimension into a single dimensionless desirability scale. It is proposed to use a verbal and numerical scale of bilateral restriction to interpret the results of assessing the restoration of destroyed and development of territories of Ukraine damaged due to the war, which has the following form: very high result or efficiency - 0.8 - 1.0; high - 0.63 - 0.8; satisfactory - 0.37 - 0.63; low - 0.2 - 0.37; very low - 0.0 - 0.2.
The author's proposals form the basis of the methodology for assessing the socio-economic results and effectiveness of restoring territories damaged due to the war.

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