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MANAGEMENT OF THE SDGS ACHIEVEMENT PROCESS IN LNTU SCIENTIFIC ACTIVITIES

УПРАВЛІННЯ ПРОЦЕСОМ ДОСЯГНЕННЯ ЦСР У НАУКОВІЙ ДІЯЛЬНОСТІ ЛНТУ

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The article is devoted to considering green standards for scientific research activities, and a system of priority measures and the achievement of key performance indicators reasoning. A self-assessment of SDGs achievement according to Green standards at LNTU in 2023 has been conducted, which includes environmental, social, and economic responsibility, as well as components of education and research. The hypothesis of the consistency of experts' views during the self-assessment of compliance with green standards of scientific activities has been proven by the Kendall concordance coefficient.The results of the self-assessment of compliance with green standards of scientific activities at LNTU are the basis for forming strategic actions to achieve SDGs. A methodology for forming an archetypal scenario of interaction between LNTU and SDGs has been proposed for use: tolerant, uncommitted, paternalistic, or transformational. The implementation of the transformational archetypal scenario of interaction between LNTU contains priorities for improving policies and plans.

Keywords: sustainable development goals, green transformation, scientific research in HEIs, SDGs achievement management scenarios.

Наукові дослідження у закладах вищої освіти відіграють фундаментальну роль у стимулюванні цілей сталого розвитку. Організація наукових досліджень у ЗВО та просування їх результатів – нових знань, технологій – є ключовими факторами економічного зростання, створення робочих місць та соціальної інтеграції. Технологічні зміни можуть відкрити нові можливості для досягнення екологічної стійкості шляхом зміни виробничих процесів, моделей споживання та підвищення ефективності використання ресурсів. Розглянуто зелені стандарти науково-дослідної діяльності ЗВО та обґрунтовано систему першочергових заходів задля досягнення ключових показників ефективності. Проведено самооцінку досягнення ЦСР за Зеленими стандартами в ЛНТУ у 2023 році, яка включає екологічну, соціальну та економічну відповідальність, а також компоненти освіти та дослідження. Результати узгодженості поглядів експертів під час самооцінки відповідності зеленим стандартам наукової діяльності підтверджено коефіцієнтом конкордації Кендалла. Коефіцієнт конкордації Кендалла становить W=0,73, що свідчить про високий ступінь збігу думок експертів), оцінка значущості коефіцієнта конкордації відповідає критерію узгодженості Пірсона. Результати самооцінки дотримання зелених стандартів наукової діяльності в ЛНТУ є основою для формування стратегічних дій щодо досягнення ЦСР. Запропоновано до використання методологію формування архетипового сценарію взаємодії ЛНТУ та досягнення ЦСР: толерантного, незаангажованого, патерналістського чи трансформаційного. Реалізація трансформаційного архетипового сценарію взаємодії ЛНТУ містить пріоритети вдосконалення політики та планів. Розроблено дорожню карту досягнення ЦСР у ЛНТУ, яка включає екологічну, соціальну та економічну відповідальність.

Ключові слова: цілі сталого розвитку, зелена трансформація, наукові дослідження у ЗВО, сценарії управління досягненням ЦСР.

Formulation of the problem. The social, environmental, and economic situation caused by anthropogenic influence is leading to irreversible changes. Currently, economic sectors in Ukraine are facing the impact of destructive threats and risks – martial law, environmental pollution, limited access to resources, research, and innovation.

Considering the educational, research, and social mission of higher education institutions (HEIs), universities are important participants in the transition to carbon neutrality, sustainable economy, and achieving SDGs. Universities play a crucial role in achieving sustainable development goals by 2030. Higher education institutions can achieve SDGs through teaching and learning, research results, and initiatives in university campuses.

Analysis of recent research and publications. The increasing number of studies M. Alam, G. Brown, R. Holtzclaw, M. Gallagher-Cooke, M. Jackueux, M. Karvinen, S. Komisar, U. Lundgren, B. Mack, H. Malkki, V. McConnell, R. Lauren, F-R. Lin, M. Lytvyn, U. Mukhi, S. Perez, I. Sanchez, J. Sorvari, W. Steele, T. Strumolo, N. Stukalo, D. Zacks and others are aimed at assessing the scientific and technical potential of HEIs to assess impact and achieve sustainability. In accordance with the new goals of achieving SDGs, HEIs are revising their missions, educational and research objectives, and leadership.

Formulation of the goals of the article (statement of the task). The goal of research is to improve the management of SDGs achievements by 2030 in HEIs. The tasks of scientific research include: reviewing the experience of HEIs in research and management related to SDGs achievement; conducting self-assessment of SDGs achievement in scientific and technical activities; determining management scenarios for SDGs achievement in HEIs.

Presentation of the main research material. In 2015, the UN adopted the Agenda for Sustainable Development Goals until 2030. The Agenda for Sustainable Development until 2030 sets out 17 goals, including 169 targets. The adoption of the Paris Agreement on Climate Change (COP21) and the Agenda for Sustainable Development until 2030 has promoted the advancement of SDGS in HEIs and requires the improvement of the management process for their achievement. With this purpose in mind, HEIs are increasingly focusing on integrating SDGS into educational and scientific research activities, and scientists are exploring the issues of their implementation.

Research by M. Alam, F. Linia, V. McConnell, N. Stukalo, M. Lytvyn highlights the presence of strategic gaps in the organization of HEI activities, which hinder internationalization of sustainable development research, defining a lack of resources, changes, and the quality of education [2–4]. This indicates that while HEIs organize scientific research in line with SDGs, problems with ensuring sustainable development in educational institutions may hinder the achievement of such goals.

S. Neto emphasizes the lengthy process of integrating SDGs into HEIs, taking into account the influence of contextual factors [5]. This indicates that the sustainability of educational and scientific research activities is an evolving process, dependent on the internal potential of HEIs and external influencing factors.

D. Zaks investigated the approach to achieving SDGs both in research and educational activities, forming a model for implementing a holistic sustainable approach [6, pp. 64–93], with a focus on research as a strategic priority. W. Steel and L. Ricards noted that universities should become agents of change to achieve SDGS and define the goals of such changes [7, p. 292]. In agreement with researchers, we believe it is appropriate to assess the achievement of SDGS in HEIs, forming a strategy for their achievement, which will include environmental, social, and economic responsibility, as well as components of education and research.

Based on the report prepared by the Sustainable Development Solutions Network (SDSN), we will develop a roadmap for achieving SDGs in HEIs [8–9] (Figure 1).

HEIs develop green standards to determine the compliance of their activities with SDGs [10]. These standards do not have specific time frames; however, each Ukrainian HEI that implements them determines them independently.

The self-assessment of LNTU compliance with green standards in scientific activities in 2023 was carried out in accordance with the objectives of the "Green Transition in Ukrainian Universities" project supported by NAWA. Within the framework of the project, Green Standards were developed, and criteria and indicators for self-assessment were established [10]. The stages of LNTU self-assessment regarding the criteria of green standards in scientific activities are presented in Figure 2.

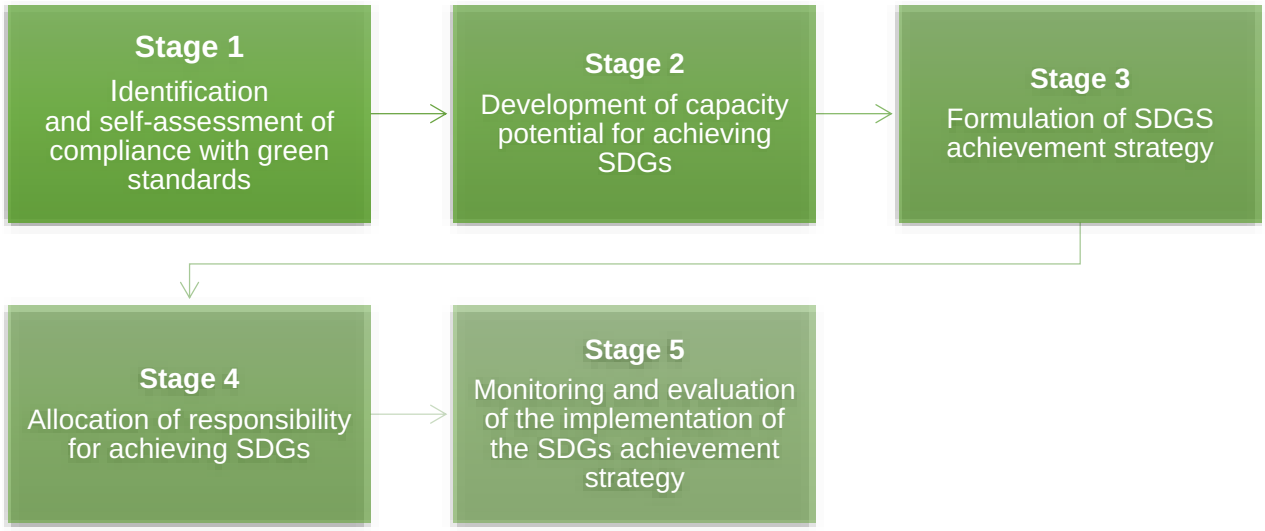

Figure 1. Stages of Achieving SDGs in HEIs [8; 9]

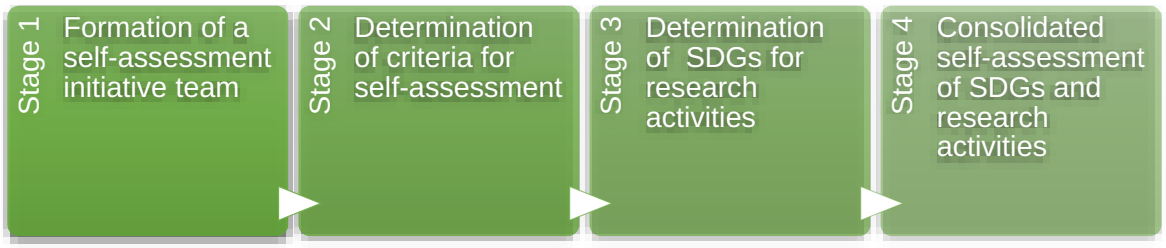

Figure 2. Stages of LNTU self-assessment for compliance with green standards of scientific activity

Note: compiled by the authors

Let's define the main stages of LNTU self-assessment for compliance with green standards of scientific activity.

Stage 1. Formation of the self-assessment initiative team. The 17 sustainable development goals cover a wide range of topics, so involving a team to conduct the self-assessment will ensure the representativeness of the results.

LNTU issued an order to form a self-assessment team and initiate the process of self-assessment of green standards in scientific activity [11].

During the self-assessment process of LNTU for compliance with green standards of scientific activity, the quantitative coverage of the target audience and the methods of selecting individuals for the survey were determined. Selective participation of the following members of the self-assessment team LNTU was carried out: Vice-Rector for Research Development and Research; deputy deans for scientific work; heads of departments; students.

Stage 2. Definition of criteria for self-assessment. Based on the results of the GTUA project work packages executed from April to September 2023, Green Standards were prepared for testing [10], and criteria and indicators for self-assessment were defined. It was determined that self-assessment can be facilitated by methods such as value chain creation, product lifecycle, causal relationship methods, and others.

Stage 3. Determination of SDGs in scientific research activity. During the self-assessment, SDGs was determined based on the results of scientific research activities at LNTU in 2023. It was established that LNTU scientific activities are aimed at conducting fundamental and applied research in priority areas of science and technology development, innovative development, and activities aimed at generating, supporting, developing, and effectively using the university's scientific and innovative potential to ensure economic growth in accordance with SDGs [12]. Other criteria for compliance with

green standards in scientific activity are provided in the Self-Assessment Report [13].

Next, participants applied an approach to assess real situations and specific actions in achieving SDGS, sorting them according to the criteria of "Compliance," "Non-Compliance," and "I don't have information". It was established that the main priority thematic areas of scientific research and development at LNTU in 2023 correspond to SDG7, SDG8, SDG9, SDG11, SDG12, SDG13, SDG15 [13].

Stage 4. Consolidated self-assessment of SDGs and scientific research activity. Assessment is carried out for each statement of green standards and SDGs [13]. Since SDGs is agreed at the global level, there may be a need to consider SDGs in a national or local context. The aim is to formulate one generalized impact for each SDGs. This constraint may create a dilemma when, hypothetically, a case may be assessed as having a positive impact on one goal and a negative impact on another. Sustainable development is usually associated with compromises, and determining priorities in such situations is part of the methodology. Each statement of the green standard and SDGs compliance was evaluated according to the categories listed in Table 1.

Table 1

Criteria for self-assessment of compliance with green standards for scientific activities at LNTU and their impact on SDGs

Criteria for compliance	
Green standard criterion	**Impact on SDGs**
0–2	Need more knowledge
	Direct negative
	Indirect negative
2,1-3	Indirect positive
3,1-4	Positive
4,1-5	Direct positive

Note: compiled by the authors

Let's formulate a hypothesis regarding the consensus of experts' viewpoints in conducting a self-assessment of compliance with green standards in the scientific activities of LNTU. We will substantiate the hypothesis by calculating Kendall's concordance coefficient, the results of which can be used to assess the agreement among assessors and, specifically, the reliability of the assessments. The value of Kendall's concordance coefficient varies from 0 (no agreement) to 1 (complete agreement). The number of factors is n=4 (taken from the Green Standards [12]), and the number of experts is m=6.

Experts' opinions were collected through a questionnaire for self-assessment of compliance with green standards in the scientific activities of LNTU. The experts assess the significance of compliance with green standards in the scientific activities of LNTU and sustainable development goals by assigning them a rank from 0 to 5. The factor to which the expert gives the highest rating is assigned the rank 1. If an expert considers several factors of compliance with green standards in the scientific activities of LNTU to be equivalent, they are assigned the same rank.

Based on the data from the questionnaire survey, we will calculate the combined assessment of the average degree of agreement among all experts regarding compliance with green standards in the scientific activities of LNTU. The concordance coefficient W=0.73 indicates a high degree of agreement among experts in conducting self-assessment of compliance with green standards for scientific activities at LNTU. The calculated value of χ^2 will be compared with the tabulated value for the degrees of freedom K=n-1=6-1=5 and at the given significance level α = 0,05. Since the calculated χ^2 14,66 is greater than the tabulated value (χ^2=11,07050), the value of W=0,73 is not a random variable, and the obtained results are significant. Therefore, they can be used in further research.

So, in the process of self-assessment by LNTU regarding compliance with green standards for scientific activities, a representative sample of representatives is involved, indicating the ability of the selected sample to reproduce the main characteristics of the population. This means that based on the obtained self-assessment data, conclusions can be drawn regarding the results of scientific and technical activities, SDGs achievements, and appropriate strategic actions can be formulated.

Ukrainian HEIs are governed within a coordinated sectoral structure of relevant and special legislation, statutory, collective, and voluntary documents. Ukrainian HEIs have greater autonomy and flexibility than most other organizations in the public sector. This contributes to the ability of HEIs as autonomous institutions to develop their own statutes, regulations, policies, and implementation procedures for strategies, missions, and goals.

LNTU attaches great importance to achieving Sustainable Development Goals and realizing its scientific and technical potential to ensure the well-being of future generations. The scientific and technical activities of LNTU and the achievement of SDGs are a two-way interdependent process of making management decisions to initiate transformative changes in policy, strategy, processes, and practices.

W. Steele, L. Rickards identified four archetypal scenarios of the university's interaction with SDGs: tolerant, uninvolved, paternalistic, or transformational.

We propose to use an adapted matrix of archetypal scenarios for SDGs management in LNTU. The matrix for forming archetypal scenarios for SDGs management in HEIs contains two dimensions – the dimension of self-assessment of compliance with green standards in scientific activities and the level of commitment to achieving SDGs. Each of the four quadrants has a number of options for formation and implementation to help assess potential directions for achieving SDGs in LNTU. Figure 3 presents archetypal scenarios for HEI management in achieving SDGs.

Disabled archetype scenario for SDGs management in HEIs – The self-assessment level of compliance with green standards of scientific activity ranges from 0 to 2 points, resulting in a negative impact on SDGs. This scenario is characterized by the absence of regulatory documents and insufficient institutional support. SDGs efforts are weak, sporadic, and primarily driven by external factors such as funding requirements or third-party ratings

Disabled archetype scenario for SDGs management in HEIs – The self-assessment level of compliance with green standards of scientific activity ranges from 0 to 2 points, resulting in a negative impact on SDGs. This scenario is characterized by the absence of regulatory documents and insufficient institutional support. SDGs efforts are weak, sporadic, and primarily driven by external factors such as funding requirements or third-party ratings.

Tolerant archetype scenario for SDGs management in HEIs – The self-assessment level of compliance with green standards of scientific activity ranges from 2.1 to 3 points, resulting in an indirectly positive impact on SDGs. The tolerant strategy lacks direct institutional commitments from HEIs to comply with green standards of scientific activity. While sustainable development goals are not prioritized for achievement, they may be considered as a niche or specialized

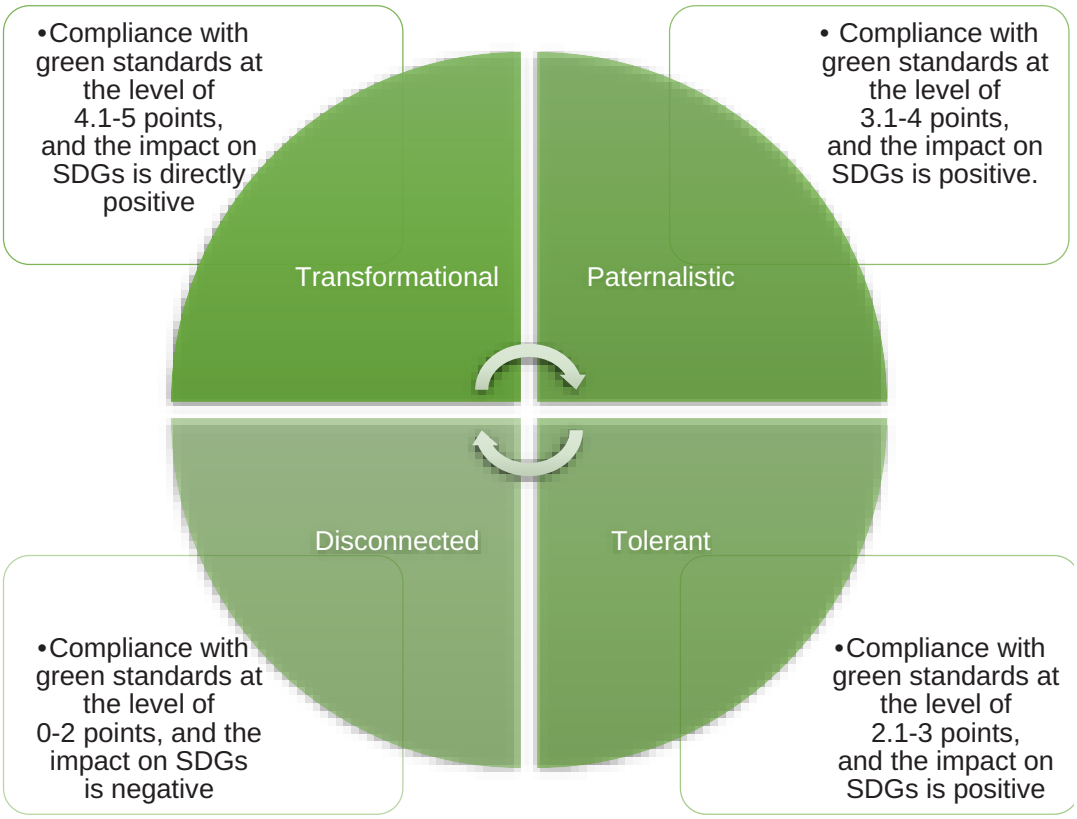

Figure 3. Archetypal scenarios for achieving SDGS management in HEIs

Note: adapted from [7]

topic rather than a strategic goal of HEIs. Radical innovations occur in specific areas and rely on change leaders in SDGs within HEIs.

Paternalistic archetype scenario for SDGs management in HEIs – The self-assessment level of compliance with green standards of scientific activity ranges from 3.1 to 4 points, resulting in a positive impact on SDGs. The paternalistic scenario involves institutional documents and mechanisms that recommend employees to participate in the SDGs achievement process. Efforts are focused on increasing general awareness of SDGs and obtaining innovative results. This approach can lead to effective acceptance and achievement of SDGs, especially when standardized top-down processes are implemented.

Transformational archetype scenario for SDGs management in HEIs – The self-assessment level of compliance with green standards of scientific activity is obtained at the level of 4.1-5 points, resulting in a direct positive impact on SDGs. The transformational scenario includes institutional documents and supports radical innovations. HEIs' interaction regarding SDGs achievements occurs at a collective level with a flexible approach to research directions and projects, while maintaining ethical commitment to its principles. The transformational archetype scenario of interaction according to the results of self-assessment is applicable to LNTU.

Considering the implementation of the transformational archetype scenario of interaction between LNTU and the improvement of SDGs achievement policies and plans, practical actions should be proposed at every management level.

LNTU focuses directly on its core activities, namely education and research. It is committed to supporting these transformations through management, funding, and visibility of research results.

The measures outlined will contribute to conducting scientific research to guide LNTU policy towards achieving SDGs. LNTU scientific and technical research plays a crucial role in the development of the national and global economy, with the goal of reaching leading continental, regional, and national achievements of the 17 Sustainable Development Goals (SDGs). Having evidence-based data to support research activities, improving educational and educational-scientific programs, as well as monitoring and evaluation, is crucial [13].

Self-analysis of LNTU's scientific research activities, the availability of reliable data collected during research, will help create practical innovative solutions and strategies necessary to achieve SDGs. The research has shown that LNTU has actively engaged in the change management process, contributing to the development of innovative solutions to achieve.

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