ECOLOGICAL INNOVATIONS IN SHAPING SUSTAINABLE GOVERNANCE POLICIES

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ABSTRACT
Environmental innovations, proposing resource-efficient technological solutions, are gaining increasing significance as factors in the transition to sustainable development based on efficient governance models. The study explores the concept of environmental innovations and sustainable governance, setting important sustainable development goals and stricter environmental standards. The correlation between environmental indicators of European countries and the quality of governance is examined through comprehensive indices and sociological surveys. The results confirm a moderate positive correlation, indicating the capabilities of capable state institutions to achieve further progress in ensuring sustainable development indicators, albeit with certain regional variations. To overcome existing challenges, there is a need to shape a comprehensive state policy that encompasses regulatory incentives and market mechanisms throughout the innovation cycle. The proposed measures aim to stimulate demand for 'green' technologies, reduce risks for private investment, and create favourable innovative systems. Therefore, the strategic integration of innovations can guide governance reforms towards ensuring sustainable, inclusive and environmentally friendly development.
KEY WORDS: *ecological approach, public administration, state policy, sustainable development.*

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Introduction

In the contemporary scientific discourse, given the increasing challenges associated with climate change, resource depletion and environmental degradation, ecological sustainability has become a paramount issue. Most countries have identified transitioning to sustainable development models as a priority, aiming to create a balance between social welfare, economic growth and environmental protection (United Nations, 2015), through significant changes in production systems, infrastructure provision, public administration and lifestyles.

Key factors in transitioning to sustainable development increasingly include ecological innovations, which employ less harmful and resource-efficient technological solutions. Ecological innovations encompass newly created or modified processes, business models, services, and products, that prevent or minimise the negative impact of anthropogenic activities on the natural environment (Bierwisch et al., 2021; Pichlak, Szromek, 2021), involving the significant utilisation of green technologies across various economic sectors.

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Based on environmental issues, state policy ensures the implementation of innovative directions through regulatory acts, the creation of institutional opportunities, economic incentives, and priorities for government procurement. Simultaneously, the implementation of environmental innovations contributes significantly to shaping scientifically justified state policies for sustainable development, demonstrating economically and technically necessary solutions for environmental protection (Ferraz et al., 2023; Grillitsch et al., 2019).

Thus, the development of effective public administration policies is one of the key ways to reduce environmental risks and promote a sustainable future. The global community must make decisions that will significantly impact the well-being of future generations. Therefore, the shared responsibility of countries for adopting environmentally conscious policies is emphasised by the Paris Agreement, the Sustainable Development Goals (SDGs), and other international agreements. Research on the role of environmental innovations in this policy becomes a necessary element for understanding the possibilities for countries jointly addressing environmental challenges.

The aim of this research is to analyse the impact of environmental innovations on the formation of sustainable management policies.

The primary objectives of the study are as follows:

- to examine contemporary innovative approaches aimed at improving the state of the environment;
- to evaluate the influence of environmental innovations on the development and implementation of management policies;
- to identify obstacles and opportunities arising in the adoption of environmental innovations in management policies;
- to formulate recommendations for government authorities on the optimal utilisation of environmental innovations in sustainable management policies.

1. Literature review

The intersection of ecological innovations and sustainable public administration is the subject of numerous scientific studies. The urgent need to address global environmental problems activates the search for approaches to form effective strategies for integrating innovations into state policy.

Ecological innovations in scientific literature are defined as new or modified systems, methods, tools, processes and products that contribute to preventing or reducing negative environmental impacts (Skordoulis et al., 2020; Aldieri, Vinci, 2021). According to Schiederig et al. (2012), ecological innovations aim at preserving the environment and sustainable resource use. Sustainable governance is considered as the institutional capacity to develop comprehensive social, ecological and economic policies (Hickmann et al., 2024). The theoretical definitions provided lay the foundations for a deep connection between state policy, technological progress, ecological aspects and business processes.

Ecological innovations help shape the key goals of sustainable development in the system of state governance, by increasing policy coherence through the establishment of stricter environmental standards and norms. The advantages of ecological innovations for sustainable development include opportunities to reduce resource dependence, create jobs and promote clean production in green sectors, mitigate the negative consequences of climate change, and enhance competitiveness (Schiederig et al., 2012). Ecological innovations, which have become the basis for implementing sustainable governance, have subsequently yielded correspondingly positive results. A favourable innovative ecosystem should focus on stimulating and implementing green technologies alongside the processes of forming comprehensive state environmental policies.

Understanding environmental policy as the mutually beneficial regulation of relations between the natural environment and humans necessitates a qualitative and relevant definition of environmental efficiency. This may depend on available data from the implementation of state policy and relevant government programmes, methodologies for assessing progress made towards significant improvement in environmental conditions, and ensuring decision-making processes and policy formation (Nguyen et al., 2023).

The resolution of the United Nations General Assembly adopted in July 2022 identified climate change and environmental degradation as among the most pressing threats to the world's future. The issues published anticipate that intensifying efforts to ensure access to clean and sustainable environments becomes a key direction for all nations (UN, 2022). Consequently, the task for states is to invest in energy-efficient, environmentally friendly projects, to achieve sustainable development linked to environmental quality. Additionally, a crucial factor remains the formulation of state policies aimed at creating incentives for sustainable economic growth, contributing to overall environmental efficiency (Adeel-Farooq et al., 2018).

Therefore, contemporary research and global strategies emphasise the importance of environmental innovations for achieving sustainable development.

2. Methodology

To obtain the research results, general scientific and specific research methods were utilised, including a systemic approach, methods of analysis and synthesis, descriptive statistical methods, methods of multifactor statistical analysis, and graphic methods. These methods allowed for the testing of formulated hypotheses and drawing generalised conclusions, providing a deeper understanding of the relationship between environmental innovations and sustainable governance policy.

The research procedure involves several stages: (1) the use of two models depicting the dependency of environmental indicators on the level of government management in a country and the sustainable development goals (Wolf et al., 2022; Sachs et al., 2023; Legatum Institute, 2023); (2) the analysis of indicators of the Green Budget Index of individual European member states (OECD, 2023a); (3) the analysis of respondents' support for directions in solving environmental problems (OECD, 2023b).

To investigate the dependence of environmental indicators on the level of implementing the concept of sustainable development and the level of government management, open available data for individual European countries and Ukraine were used. The methodology involves using the Environmental Performance Index (EPI), which takes into account the state of the environment and the viability of the ecosystem (Adeel-Farooq et al., 2023). The predictor used is the 'Governance' component of the Legatum Prosperity Index, measuring the degree of control and restriction of power, as well as the level of state efficiency (Khan, Ahmad, 2019; Günay, Sülün, 2021). Another model uses the results of the Sustainable Development Index, demonstrating the annual progress of all UN member states in achieving SDGs, including environmental conservation and biodiversity (Sachs et al., 2023).

The next stage involved analysing the indicators of the Green Budget Index of individual European OECD member countries (OECD, 2023a). The final stage of the methodological approach was the analysis of respondents' support for directions in solving environmental problems (OECD, 2023b).

The methodology used allowed for determining the level of influence of environmental innovations on the formation of sustainable governance policies.

3. Results and discussion

In the current era of escalating environmental challenges, the integration of innovative approaches in both ecology and public administration has become imperative. In the field of ecology, a paradigm shift has occurred, accompanied by the use of innovative approaches to address pressing environmental issues based on technological, social and political initiatives. The adoption of the Sustainable Development Goals has accelerated the implementation of various management systems and policy programmes aimed at harmonising social-economic, and environmental objectives to ensure long-term prosperity.

Understanding the impact of government policy on the ecological state of a country has demonstrated the existence of a correlation between the Environmental Performance Index (EPI), which indicates how close countries are to established environmental policy goals (Wolf et al., 2022), and the Governance sub-index of the Prosperity Index (Legatum Institute, 2023), measuring the effectiveness of government bodies. The

identified dependencies between the Environmental Performance Index (EPI) and the indicator of government governance are illustrated in Fig. 1.

Let us define the indicators of the specified OLS model (Table 1), which will allow us to conduct testing in the Gretl program and check the model's quality in the software environment (Table 2).

Table 1. The OLS model in a Gretl environment (dependent variable: EPI)

	Coefficient	Std. Error	t-ratio	p-value	
const	28,2541	5,14972	5,487	<0,0001	***
Governance	0,460375	0,0733962	6,272	<0,0001	***

Source: Compiled by the authors

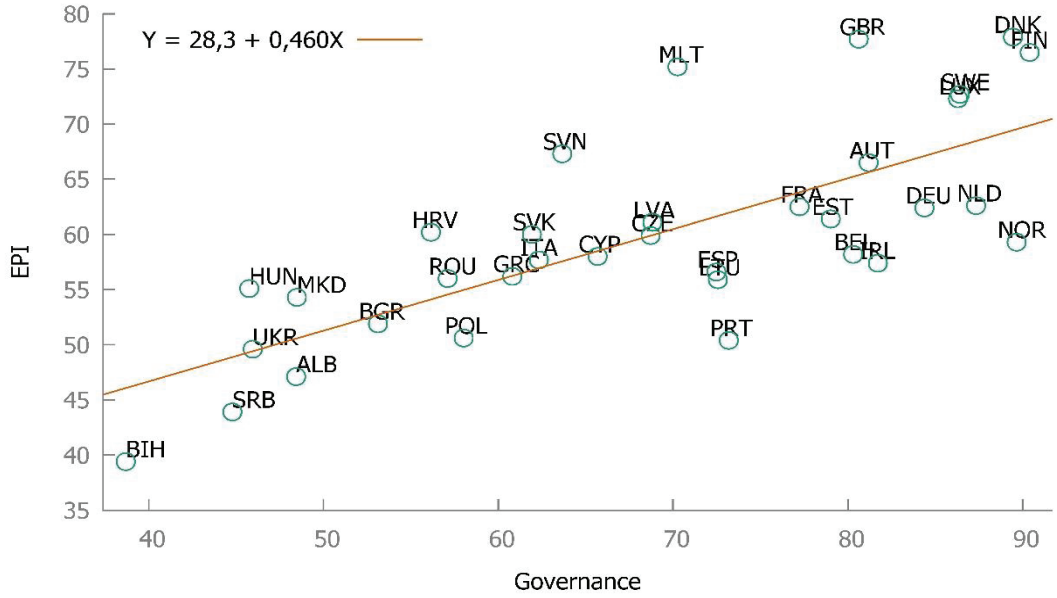

Fig. 1. The relationship between the Environmental Performance Index (EPI) and the indicator of state governance

Sources: Wolf et al. (2022); Legatum Institute (2023).

White's test for heteroskedasticity showed an absence of heteroskedasticity. The test statistic: LM = 2.45516 with a p-value = P (Chi-square (2) > 2.45516) = 0.293. The normality test of residuals proves a normal error distribution. The test statistic: Chi-square (2) = 0.867613 with a p-value = 0.648038. The Chow test indicates no structural breaks. The test statistic: F (2, 30) = 1.04163 with a p-value = P (F (2, 30) > 1.04163) = 0.365292.

Table 2. Model quality indicators

Mean dependent var	59,81765
Sum squared resid	1303,135
R-squared	0,551468
F (1, 32)	39,34378
Log-likelihood	−110,2288
Schwarz criterion	227,5102
S.D. dependent var	9,382978
S.E. of regression	6,381454
Adjusted R-squared	0,537451
P-value (F)	4,94e-07
Akaike criterion	224,4575
Hannan-Quinn	225,4986

Source: Compiled by the authors.

The results of the dependence between the Sustainable Development Index and the Environmental Efficiency Index are determined in another model (Fig. 2). Based on the obtained data (Tables 1–4), the first model more likely reflects the existing relationships.

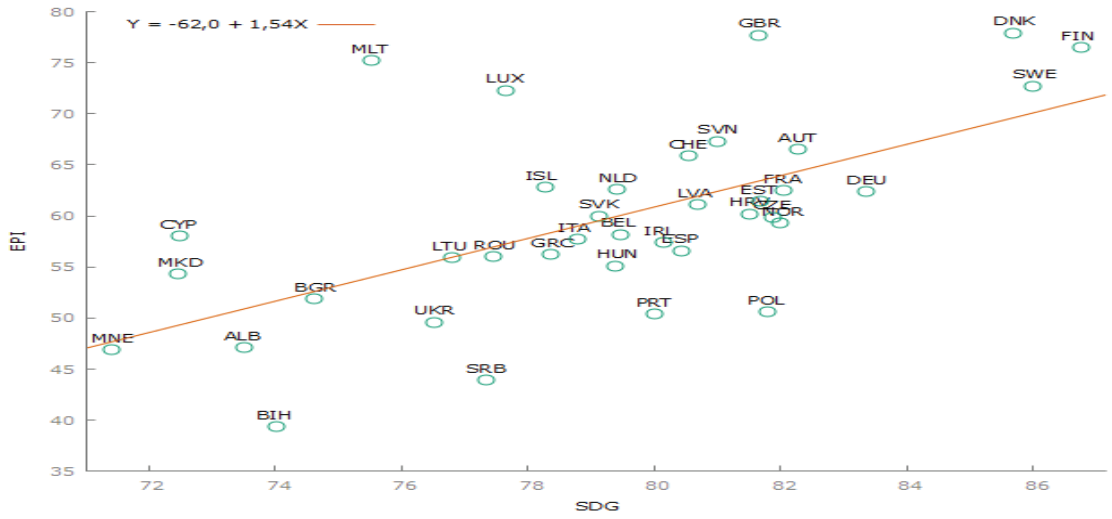

Fig. 2. The relationship between the Environmental Performance Index (EPI) and the Sustainable Development Index Indicator

Sources: Wolf et al. (2022); Sachs et al. (2023)

Let us define the indicators of the second OLS model (Table 3), which will allow us to conduct testing in the Gretl program and check the model's quality in the software environment (Table 4).

Table 3. The OLS model in a Gretl environment (Dependent Variable: EPI)

	Coefficient	**Std. Error**	**t-ratio**	**p-value**	
const	−62,0041	26,4820	−2,341	0,0250	**
SDG	1,53597	0,333822	4,601	<0,0001	***

Source: Compiled by the authors

White's heteroskedasticity test showed an absence of heteroskedasticity. The test statistic: LM = 1.09141 with a p-value = P (Chi-square (2) > 1.09141) = 0.579432. Checking the normality of residuals confirms a normal error distribution. The test statistic: Chi-square (2) = 4.18382 with a p-value = 0.123451. Chow's test indicates the absence of structural breaks. The test statistic: F(2, 30) = 1.23472 with a p-value = P (F(2, 30) > 1.23472) = 0.304007.

Table 4. Model quality indicators

Mean dependent var	59,71351
Sum squared resid	1942,629
R-squared	0,376900
F (1, 35)	21,17076
Log-likelihood	−125,7770
Schwarz criterion	258,7758
S.D. dependent var	9,306036
S.E. of regression	7,450079
Adjusted R-squared	0,359097
P-value (F)	0,000053
Akaike criterion	255,5540
Hannan-Quinn	256,6898

Source: Compiled by the authors

As we can see from the two models, there is a correlation between the implementation of state policy, the efficiency of the state governance system, and the outcomes of a country's environmental condition. State policy can incentivise innovation, while innovations may require further policy changes in response. Many decision-making processes employed by governments can help in addressing the climate crisis. An example is ecological budgeting, which involves considering climate and environmental considerations in decisions regarding taxes and government expenditure. The Green Budget Index of individual European OECD member countries illustrates a significant difference in the results of the countries under investigation (Fig. 3) (OECD, 2023a).

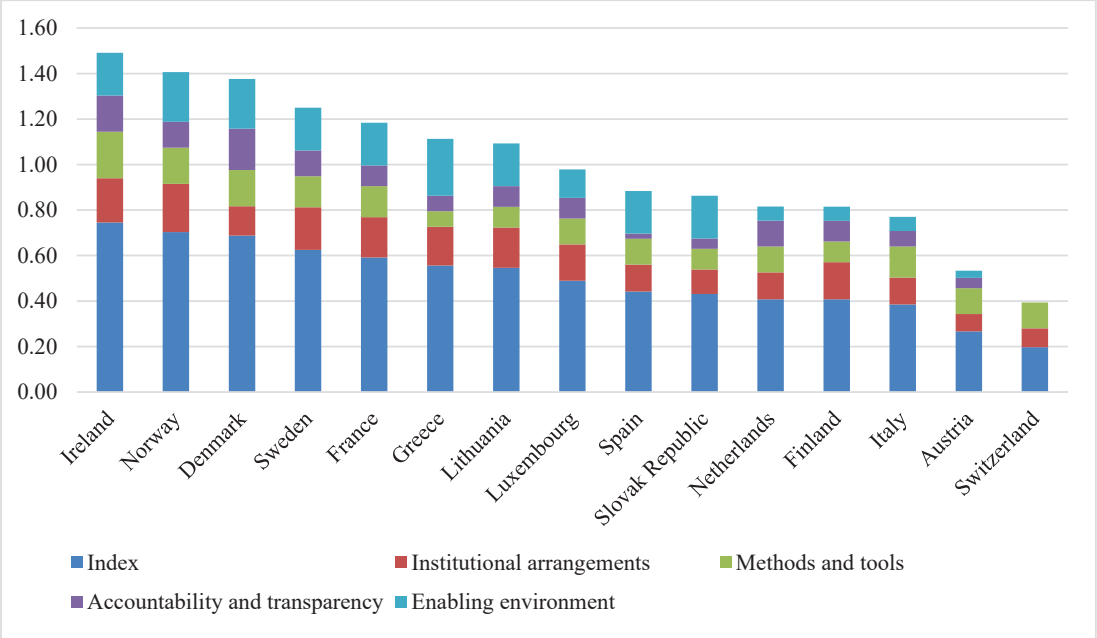

Fig. 3. Green Budget Index of individual European OECD member states, 2022

Source: OECD (2023a)

The policy of environmental innovation is shaped based on the needs and demands of society. However, societal perspectives on responsibility for environmental outcomes have different vectors (Fig. 4), and the presence of higher education plays a role in the responsible attitude towards the environment. In most cases, respondents consider issues of environmental protection and its impact on economic development to be important.

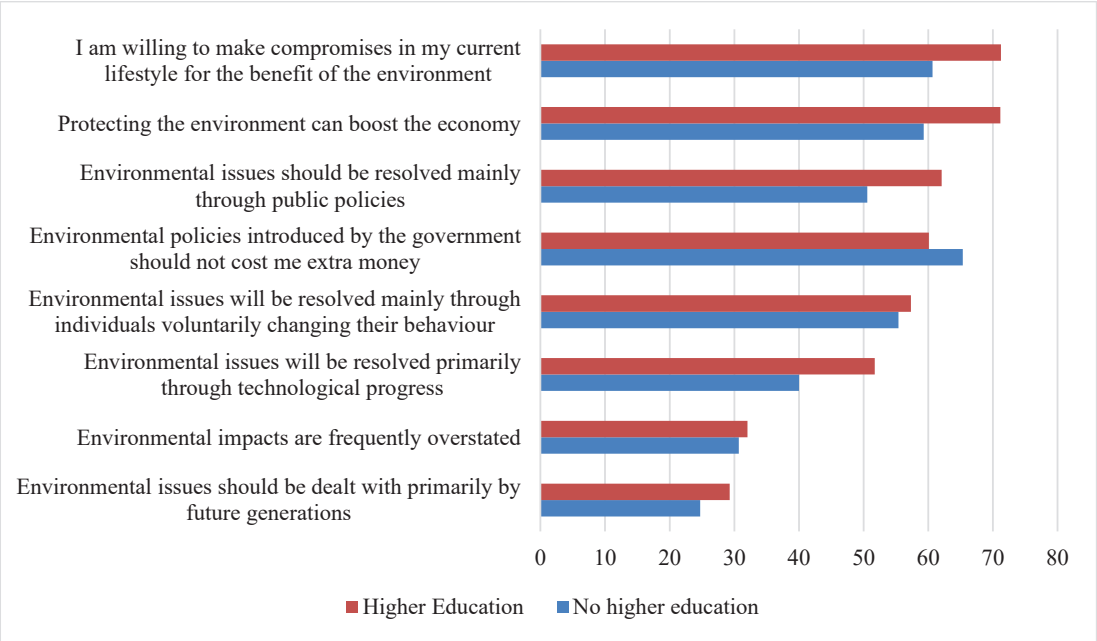

Fig 4. Respondents' views on possible solutions to environmental issues, 2022

Source: OECD (2023b)

In this way, it should be noted that environmental innovations accelerate profound transformations in the formation of policy and the public administration sphere. The dynamic interaction between technological progress and political approaches signifies a shift towards more adaptive, inclusive and sustainable models of government management. As governments grapple with complex environmental challenges, the implementation of innovations in decision-making processes is crucial for developing effective and resilient policies in the face of intricate environmental realities.

The analysis conducted provides grounds to assert that environmental innovations play a significant role in shaping and implementing sustainable governance policies. Primarily, environmental innovations contribute to the realisation of the concept of sustainable development in practice, demonstrating the economic, social and ecological efficiency of relevant technologies and models. This involves the adoption of more stringent environmental regulations, standards and goals in sustainable governance policies. The implementation of policies by individual countries underscores the importance of integrating environmental innovations into political decisions. Countries that strategically integrate necessary innovations into their state policies demonstrate a commitment to long-term sustainable development.

Successful implementation often requires a comprehensive approach that considers economic, social and environmental aspects. Initiatives such as circular economy practices, biodiversity conservation strategies, and other innovations, showcase the effectiveness of comprehensive, multidimensional approaches. Many innovations require significant financial and technological resources for implementation. Small developing countries may face challenges in implementing environmental innovations without external support (UNCTAD, 2023). In regions where such opportunities are absent or ineffective, the implementation of environmental innovations can be complicated.

Regarding the research's purpose, certain limitations in the methodology used should be acknowledged. Primarily, the study was based on data from European countries with a high level of implementation of state policies in the ecological sphere. Moreover, contemporary approaches in the public administration system, specifically the concept of sustainable development goals and the greening of management, have contributed to achieving a high level of ecological efficiency.

The results obtained confirm the notion that weak institutions are the main obstacle to formulating and regulating environmental policy, implementing green technologies, and alternative energy (Slesman et al., 2015). The successful implementation of environmental innovations depends on strong institutional capacity and effective governance. Weak state institutions, corruption and inadequate compliance with environmental legislation can hinder progress. Addressing these issues requires collective efforts from the state, civil society and international organisations.

Conclusion

The findings of the study lead to the conclusion that the integration of environmental innovations into state policies is a crucial factor in promoting sustainable governance. The pivotal role of technologies, which have expanded the capabilities of economic entities for the effective monitoring, management and optimisation of natural resource utilisation, cannot be overstated.

It was established that there is a moderate positive correlation between indicators of a country's environmental efficiency and the level of implementation of state policies. Countries with more developed institutions demonstrate better results in environmental protection, as regulatory instruments actively contribute to the implementation and dissemination of environmental innovations in the economy.

A holistic approach, considering economic, social and ecological aspects, is of paramount importance. Comprehensive approaches in state support (both regulatory and market instruments) at different stages of the innovation cycle enable the realisation of the transformative potential of environmental innovations toward a sustainable governance model. However, the implementation of many innovations requires significant financial and technological resources, and regions lacking such capabilities may face obstacles in adopting environmental innovations.

The research on effective environmental innovations in state policies demonstrates compelling progress and potential. On the path to developing sustainable solutions, prioritising the implementation of environmental innovations is necessary for preserving biodiversity, ecosystem health, and the well-being of current and future generations. By embracing this approach as a fundamental component of environmental protection, society can establish harmonious relationships with a safe environment, contributing to the creation of favourable and sustainable social development.

References

Adeel-Farooq, R. M., Abu Bakar, N., Raji, J. O. (2018). Green Field Investment and Environmental Performance: A Case of Selected Nine Developing Countries of Asia. *Environmental Progress & Sustainable Energy*, *37* (3), 1085–1092. DOI: https://doi.org/10.1002/ep.12740

Adeel-Farooq, R. M., Raji, J. O., Qamri, G. M. (2023). Does financial development influence the overall natural environment? An environmental performance index (EPI) based insight from the ASEAN countries. *Environment, Development and Sustainability*, *25* (6), 5123–5139. DOI: https://doi.org/10.1007/s10668-022-02258-x

Aldieri, L., Vinci, C. P. (2021). Eco-Innovation in Support of Sustainable Development Goals. In: W. Leal Filho, A. M. Azul, L. Brandli, A. Lange Salvia, T. Wall (eds.). *Industry, Innovation and Infrastructure. Encyclopedia of the UN Sustainable Development Goals.* Springer, Cham. DOI: https://doi.org/10.1007/978-3-319-71059-4_63-1

Bierwisch, A., Huter, L., Pattermann, J., Som, O. (2021). Taking Eco-Innovation to the Road A Design-Based Workshop Concept for the Development of Eco-Innovative Business Models. *Sustainability*, *13* (16), 8811. DOI: https://doi.org/10.3390/su13168811

Ferraz, J. C., Santiago, J., Ramos, L. (2023). Policy innovation for sustainable development: the case of the Amazon Fund. *Review of Evolutionary Political Economy*, *4*, 109–136. DOI: https://doi.org/10.1007/s43253-023-00092-z

Grillitsch, M., Hansen, T., Coenen, L., Miörner, J., Moodysson, J. (2019). Innovation policy for system-wide transformation. *The case of Strategic Innovation Programmes (SIPs) in Sweden Research Policy*, *48* (4): 1048–1061. DOI: https://doi.org/10.1016/j.respol.2018.10.004

Günay, E. K., Sülün, D. (2021). The evaluation of the impact of social capital on economic development within the framework of the Legatum prosperity Index: The case of OECD countries. *Elektronik Sosyal Bilimler Dergisi*, *20* (80), 1982–1996. DOI: https://doi.org/10.17755/esosder.864792

Hickmann, T. et all. (2024). Scoping article: research frontiers on the governance of the Sustainable Development Goals. *Global Sustainability*, *7*, e7, 1–12. DOI: https:// doi.org/10.1017/sus.2024.4

Khan, A. J., Ahmad, H. R. (2019). Prosperity and Instability: An Evaluation of Legatum Prosperity Index. Papers and Proceedings, 407–431. https://www.pide.org.pk/psde/pdf/AGM33/papers/Abdul%20Jalil%20Khan.pdf

Legatum Institute. (2023). *The Legatum Prosperity Index 2023.* https://www.prosperity.com/rankings?pinned=DNK&rankOrScore=1&filter=

Nguyen, T. T., Tran, C. T., Ly, T. B., Nguyen, T. T. (2023). Developing a provincial environmental performance index for the environmental health of Vietnam. *Environment, Development and Sustainability*, *25*, 622–647. DOI: https://doi.org/10.1007/s10668-021-02072-x.

Pichlak, M., Szromek, A. R. (2021). Eco-innovation, sustainability and business model innovation by open innovation dynamics. *Journal of Open Innovation: Technology, Market, and Complexity*, *7* (2), 149. DOI: https://doi.org/10.3390/joitmc7020149

OECD. (2023a). Government at a Glance 2023. OECD Publishing, Paris. DOI: https://doi.org/10.1787/3d5c5d31-en

OECD. (2023b). *How Green is Household Behavior?: Sustainable Choices in a Time of Interlocking Crises, OECD Studies on Environmental Policy and Household Behaviour.* OECD Publishing, Paris. DOI: https://doi.org/10.1787/2bbbb663-en

Sachs, J. D., Lafortune, G., Fuller, G., Drumm, E. (2023). Implementing the SDG Stimulus. *Sustainable Development Report 2023.* Paris: SDSN, Dublin: Dublin University Press, 2023. DOI: https://doi.org/10.25546/102924

Schiederig, T., Tietze, F., Herstatt, C. (2012). Green innovation in technology and innovation management – an exploratory literature review. *R&D Management*, *42* (2), 180–192. DOI: https://doi.org/10.1111/j.1467-9310.2011.00672.x

Skordoulis, M., Ntanos, S., Kyriakopoulos, G. L., Arabatzis, G., Galatsidas, S., Chalikias, M. (2020). Environmental innovation, open innovation dynamics and competitive advantage of medium and large-sized firms. *Journal of Open Innovation: Technology, Market, and Complexity*, *6* (4), 195. DOI: https://doi.org/10.3390/joitmc604019

Slesman, L., Baharumshah, A. Z., Ra'ees, W. (2015). Institutional infrastructure and economic growth in member countries of the Organization of Islamic Cooperation (OIC). *Economic Modelling*, *51*, 214–226. DOI: https://doi.org/10.1016/j.econmod.2015.08.008

UN. (2015). *Transforming our world: the 2030 Agenda for Sustainable Development*. https://documents.un.org/doc/undoc/gen/n15/291/89/pdf/n1529189.pdf?token=jLq9KFZoL0b20Vft1n&fe=true

UN. (2022). *The human right to a clean, healthy and sustainable environment*. Resolution A/76/L.75. https://digitallibrary.un.org/record/3982508?ln=en#record-files-collapse-header

UNCTAD. (2023). *Transitioning to a clean energy growth model: Challenges, opportunities and solutions*. https://unctad.org/system/files/official-document/cimem8d17_en.pdf

Wolf, M. J., Emerson, J. W., Esty, D. C., de Sherbinin, A., Wendling, Z. A., et al. (2022). *2022 Environmental Performance Index.* New Haven, CT: Yale Center for Environmental Law & Policy. https://epi.yale.edu/downloads/epi2022report06062022.pdf

EKOLOGINĖS INOVACIJOS FORMUOJANT TVARAUS VALDYMO POLITIKĄ

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Santrauka

Straipsnyje nagrinėjamas ekologinių naujovių vaidmuo formuojant tvarios valdysenos politiką. Tvarus vystymasis yra prioritetinis gausėjant aplinkos iššūkių, kurie susiję su klimato kaita, išteklių išsekimu ir aplinkos degradacija. Vyriausybės siekia pereiti prie darnių ekonominio augimo, socialinės gerovės ir aplinkos apsaugos modelių, skatinant gamybos, infrastruktūros, gyvenimo būdo ir valdysenos transformacijas. Ekologinės inovacijos, siūlančios švarias ir efektyvias išteklių technologijas, atlieka lemiamą vaidmenį pereinant prie tvaraus vystymosi. Jos apima naujus procesus, produktus, paslaugas ir verslo modelius, kurie turėtų šalinti aplinkai kenkiančias pasekmes. Vyriausybės politika formuoja inovacines trajektorijas per įstatymus, pirkimo prioritetus, ekonomines skatinimo priemones ir institucines galimybes. Kartu ekologinės inovacijos prisideda prie moksliniu pagrindu grindžiamos tvarios plėtros politikos formavimo, siūlant gyvybingus alternatyvius variantus. Taigi veiksminga inovacijų valdysenos politika yra būtina, siekiant šalinti aplinkos rizikas ir užtikrinti tvarią ateitį.

Tyrimo tikslas – atlikti ekologinių inovacijų poveikio analizę, formuojant tvarios valdysenos politiką. Pagrindiniai uždaviniai apima inovatyvius požiūrius į aplinkos gerinimą, įvertinant inovacijų poveikį valdysenos politikos plėtrai, nustatant jų įgyvendinimo kliūtis ir galimybes bei teikiant rekomendacijas. Atliekama mokslinių ekoinovacijų apibrėžčių ir klasifikacijų analizė, pabrėžiant jų indėlį į tvarų vystymą, ypač mažinant klimato kaitos pasekmes ir kuriant „žaliąsias“ darbo vietas. Aptariama *tvaraus valdymo* sąvoka, kaip integruota galimybė taikyti aplinkos, socialinę ir ekonomikos politikas. Ekoinovacijos leidžia apibrėžti esminius tikslus, laikytis griežtesnių nuostatų, keisti rizikos suvokimą, teikti duomenis, siekiant vykdyti aplinkos stebėseną.

Vykdant tyrimą taikyti bendrieji moksliniai ir specifiniai tyrimo metodai – sisteminio požiūrio, analizės ir sintezės, aprašomieji statistiniai, daugiafaktorės statistinės analizės ir grafiniai, leidę patikrinti suformuluotas hipotezes ir padaryti apibendrintas išvadas. Tai lėmė aplinkosaugos inovacijų ir tvaraus valdymo politikos tarpusavio ryšio suvokimo svarbą.

Tarp šalies aplinkosauginio efektyvumo rodiklių ir valstybės politikos įgyvendinimo lygio nustatyta vidutinė teigiama koreliacija. Išsivysčiusių šalių institucijos demonstruoja geresnius aplinkos apsaugos rezultatus, nes reguliavimo priemonės aktyviai prisideda prie aplinkosauginių inovacijų diegimo ir sklaidos eko-

nomikoje. Visuotinis požiūris ekonominiu, socialiniu ir ekologiniu aspektais ypač svarbus. Kompleksiniai požiūriai į valstybės paramą (tiek reguliavimo, tiek rinkos instrumentai) skirtinguose inovacijų ciklo etapuose leidžia realizuoti aplinkosaugos inovacijų transformacinį potencialą siekiant įgyvendinti tvarų valdymo modelį. Tačiau daugelio inovacijų diegimas susijęs su dideliais finansiniais ir technologiniais ištekliais, o tokių galimybių neturintiems regionams gali kilti kliūčių diegti aplinkosaugos inovacijas. Tolesni tyrimai būtini, atsižvelgiant į konkretų kontekstą, siekiant pagreitinti perėjimą prie tvaraus vystymosi pasauliniu mastu.

PAGRINDINIAI ŽODŽIAI: *ekologinis požiūris, viešasis administravimas, viešoji politika, tvarusis vystymasis*.

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