Public good of ecology: results of international survey

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Abstract. Based on an author’s survey of citizens living in different countries, the hypothesis of low demand for the public good «clean environment» for developing countries and for high demand – for developed countries was tested. The attitude of representatives of different nations to the environment as a public good was studied based on the results of a survey of 564 respondents from different countries (228 from Ukraine and 336 from abroad). k-means method was used for clustering, which allows the creation k-groups from a set of data. It was determined that the respondents of the 1st cluster are more satisfied than others with the level of personal awareness of the state of the environment in their countries than the respondents of the 2nd cluster. Most of the population in all surveyed groups receives information about the environmental situation from the Internet. Representatives of both clusters are aware of environmental human rights at the average level (65-75%). Representatives of both clusters are ready to take an active part in solving environmental problems, but among the representatives of the 1st cluster there are much more people who know about the existence of international environmental organizations. Only about half of the respondents from both clusters believe in the threat of a global environmental crisis. Representatives of the 2nd cluster and Ukrainians see the greatest threat to the environment in the transport and manufacturing spheres, while representatives of the 1st cluster pay considerable attention to other factors. Approximately the same number of respondents in both clusters acknowledge that corruption affects the environment. The situation in the survey on the destructive impact of financial-industrial groups on the environment is similar. About 90% of respondents in the 1st cluster and over 95% of Ukrainians consider environmental protection a public good, while in the 2nd cluster only 75% hold a similar opinion. The analysis of the survey results confirms the hypothesis about the sociality of the choice of the public good «clean environment», important for the design of environmental policy tools in the long run. Underestimation of the public good «clean environment» indicates a potentially weak public pressure to form a model of economic policy that corresponds to the modern understanding of sustainable development.

Keywords: Ecology; Public Good; Governance; Cluster; Ecological Crisis; Evaluation.
Introduction.

The role of ecology in rating the social well-being and the separate individual has radically changed under the influence of increasing requests for qualitative life and the awareness of the destructive impact of increasing technological pressure on the environment. Environmental quality has been becoming an increasingly important characteristic of state welfare. The environmental factor is especially important in the context of achieving the long-term goals of sustainable development (17 Goals to Transform Our World, 2022; Sustainable local development, 2013). Environmental initiatives have long been on the agenda of many first-world countries but have also intensified in recent decades in second- and third-world countries with varying degrees of success. Russia’s full-scale war against Ukraine, launched by the aggressor country on February 24, 2022, also exacerbated the problem of nuclear security and nuclear terrorism in the 21st century, as well as the numerous migration problems associated with it (Vergano, 2022; Koshulko and Dluhopolskyi, 2022; Dluhopolskyi, Zatonatska et al., 2019). The dependence of European countries on energy carriers from the Russia of the 21st century has led to the inability of many of them to form their own environmental policy in the international arena (Dyke et al., 2021). The unique state policy on the economy’s ecologization (greening), which provides introduction and implementation of the principles of rational environmental management and minimization of the negative impact on environmental objects during anthropogenic activities, was also not systematically conducted in Ukraine, in contrast to the EU countries (Martyniuk, 2017). Only, the Concept of Implementation of the State Policy in the sphere of climate change for the period up to 2030 was approved on 7 December 2016 (Ukraine 2030, 2017; Concept, 2016; On the Main Principles), which became a key document for inherence in the public plane of environmental security problem.

Literature review.

Environmental issues are objects of numerous works conducted by different researchers from different countries of the world (Brown et al., 2007; Brych et al., 2021; Callan et al., 2000; Galeotti et al., 2006; Haase et al., 2017; He et al., 2007; Pauli, 2010;UITto, 2014). A group of authors from Ukraine (Koziuk et al., 2018; Koziuk et al., 2019; Koziuk et al., 2020; Dluhopolskyi, Koziuk et al., 2019a; Dluhopolskyi, Koziuk et al., 2019b) systematically researches the level of well-being and greening of economic development.

The article (Söderholm, 2020) focuses on overcoming global environmental risks, achieving radical sustainable technological change, and addressing problems of distribution and impact. The author argues that sustainable and long-term technological change requires a reassessment of the role of large industrial businesses and the government, and future research will develop the idea of introducing a new design of policy instruments in different institutional contexts.

The studies (Prsyazhnyuk and Mikhail, 2019; Hongjun et al., 2017) focus on the key principles of coexistence of the ecological and economic systems, suggests areas of ecological modernization of the national economy, and analyzes «green growth» in the context of the development of public policy tools. The paper (Panova, 2018) summarizes the key aspects of the process of greening economic development as a major factor in optimizing relations in the system «human – nature» in the environmental crisis condition. In the paper (Abanina et al., 2021) authors consider the category of «greening» as a new way to ensure environmental safety in the transition to sustainable development.

Despite numerous works on the ecological development of the economy (Ecological Portrait of the Ukrainian Citizen, 2018a; Ecological Portrait of the Ukrainian Citizen, 2018b), research on the attitude of the international community to ecology as a pub-
lic good at the national and local levels in individual countries remains relevant. Such problems have not found proper analysis in the works of modern ecologists and economists, and therefore in this article, we put forward the hypothesis that the demand of citizens for a clean environment in developing economies is rather low, while the public good «clean environment» may become more demanded only with the growth of GDP and real citizens’ incomes (the logic of the Kuznets curve). The purpose of the research is the detection of environmental factors perception of individual well-being of the population in several regions of the world (compared with Ukraine), and to demonstrate of difference in demand for the qualitative environment among citizens of different countries of the world that were grouped into two clusters, and highlighted Ukraine separately.

**Materials and methods.**

This article continues and deepens our previous studies (Dluhopolskyi et al., 2019a; Dluhopolskyi et al., 2019b; Dluhopolskyi and Ivashuk, 2018; Dluhopolskyi et al., 2021). We have expanded the focus group of the previous survey by surveying an additional 130 respondents in 2020-2021, some of whom represented 36 countries (Dluhopolskyi and Ivashuk, 2018), and some from an additional 6 countries (questionnaires from Russia and Belarus were excluded). Thus, the new number of respondents is 336 people from 40 countries and 228 people – from Ukraine, like in the study (Dluhopolskyi et al., 2019). The average error for groups of respondents is 3%. The countries and corresponding clusters are shown in the Figure 1.

**Results and analysis.**

The growing the so-called «green mood» in developed countries demonstrates the bias toward a new interpretation of welfare and its components. Increasing environmental standards and the growing burden of environmental regulation are considered the elements of a new model of an inclusive economy. Inclusiveness in such an environment is understood as the availability of «clean ecology» to all, as it is not only conferred with the power to generate positive externalities, but also allows for a natural increase in individual wellbeing through a concomitant reduction in health care costs, increasing of life expectancy, reduction in the burden of occupational diseases, etc.
Fig. 2. Results of answering the question «Are you satisfied with the level of personal awareness about the environmental situation in your country?», %

The Figure 2 shows that respondents in the 1st cluster were mainly satisfied with the level of awareness about the environmental situation in the country (the responses «yes» and «mostly yes» were given by 75.5% of respondents), whereas only 24.2% of respondents said «no». In the 2nd cluster, 6.9% of respondents gave the answer «I do not know», but there are considerably fewer «yes» and «mostly yes» answers – 64.7% and the majority of them are «no» (28.4%). For Ukraine, only 25% of respondents were satisfied with the level of personal awareness of the environmental situation, 60.1% were not satisfied, and 14.9% could not say.

Fig. 3. Results of answering question «What is the main source of information about the environmental situation in your country?», %

The Figure 3 demonstrates that in the 1st cluster 90% of respondents receive information from the Internet, only 5% by means of their own observations, and 4% – from television. In the 2nd cluster, approximately 67% of respondents trust the Internet, while television and personal observations are trusted by nearly 13-14%. Respondents in this cluster also receive information about the condition of the environment from newspapers – (2%) and radio (4%). Just over 2% of surveyed Ukrainians receive information about the environmental situation in the country from newspapers, less than 2% – from radio, nearly 18% – from TV, 19.3% – their own observations, and over 59% – from the Internet.
In the 1st cluster there are 75% of respondents are well known about environmental rights and 17.2% know nothing about it. In the 2nd cluster, a lower share of both those who are aware (65.3%) and those who are not aware (15.6%) regarding their environmental rights, while the share of those who find it difficult to answer is 19.1%. However, only 41% of Ukrainians know about environmental rights, 32% do not know, and slightly more than 27% find it difficult to answer the question (Figure 4).

The Figure 5 shows that in the 1st cluster, nearly 34% of respondents successfully defended their environmental rights, less than 3% failed, while 46.5% of the respondents had no such experience. In the 2nd cluster, only 23.5% of respondents had successfully defended their environmental rights, 21.2% had unsuccessful attempts, and 45.5% had no such experience. Most Ukrainian respondents had no prosecution experience of their environmental rights (84.2% of the Ukrainians surveyed indicated this), 4.4% had such attempts but failed and only 3.5% were able to defend their environmental rights.

* Build by the authors based on the questionnaires analysis

**Fig. 4.** Results of answering the question «Do you know about people’s environmental rights?», %

* Build by the authors based on the questionnaires analysis

**Fig. 5.** Results of answering the question «Have you had experience in protecting your environmental rights?», %
The Figure 6 shows that about 70% of the respondents in both clusters are ready to join to solving environmental problems (in the 1<sup>st</sup> cluster 78.4%, while in the 2<sup>nd</sup> cluster – 72.8%). However, in the 2<sup>nd</sup> cluster 12% of respondents do not want to take part in environmental initiatives, while in the 1<sup>st</sup> cluster – just 7.2% declare their unwillingness to environmental initiatives. In Ukraine, only 59.2% of Ukrainians interviewed were ready to work towards solving environmental problems, while around 8% were not, and 32.9% of respondents felt difficulty to answer the question.

![Figure 6](image1.png)

* Build by the authors based on the questionnaires analysis

**Fig. 6.** Results of answering the question «Are you ready to work on solving environmental problems?», %

The Figure 7 shows that 57.5% of the respondents in the 1<sup>st</sup> cluster and 60.4% of Ukrainians have something heard about the existence of international environmental organizations, also 35.3% of above-mentioned 1<sup>st</sup> cluster and 33.6% of Ukrainian respondents can say something about environmental organizations, 4.1% of respondents in the 1<sup>st</sup> cluster were never aware of their existence. In the 2<sup>nd</sup> cluster, significantly fewer respondents are informed about the existence of international environmental activities, and organizations (45.3%), only one-fourth of them can talk about it and 23% of them have never been informed.

![Figure 7](image2.png)

* Build by the authors based on the questionnaires analysis

**Fig. 7.** Results of answering the question «Are you informed about the existence of international environmental organizations?», %
The Table 1 shows that respondents in the 1st cluster only in 19% of cases, respondents in the 2nd cluster – in 32% of cases, and respondents from Ukraine – in 41% of cases consider transport as a factor in the global environmental crisis. About 42% of respondents in the 1st cluster, 25% in the 2nd cluster, and only about 4% of Ukrainian respondents have a skeptical attitude towards the existence of an environmental crisis. Approximately 8.4% of respondents in the 1st cluster, around 23% of respondents in the 2nd cluster and around 8% of Ukrainians hesitate to answer.

The Figure 8 shows that the respondents of both clusters only in 42-50% believe in the threat of a global environmental crisis, while there are over 88% of Ukrainians share this statement. About 42% of respondents in the 1st cluster, 21% in the 2nd cluster, and 32% of Ukrainians consider industry as a threat to the environment. Population growth is considered the threat to the environmental development of the countries by about 11% of the respondents in the 1st cluster, over 17% – in the 2nd cluster, and only about 5% of Ukrainians. Respondents in the 1st cluster pointed to the growth of natural anomalies and other factors affecting the population in 12 and 21% of cases, while for the respondents in the 2nd cluster and Ukraine these factors are negligible.

Table 1. Results of answering the question «Name the most important factors of the global environmental crisis», %

<table>
<thead>
<tr>
<th>Factor</th>
<th>Cluster 1</th>
<th>Cluster 2</th>
<th>Ukraine</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transport</td>
<td>19</td>
<td>32</td>
<td>41</td>
</tr>
<tr>
<td>Population growth</td>
<td>11</td>
<td>17</td>
<td>5</td>
</tr>
<tr>
<td>Increasing number of natural anomalies</td>
<td>12</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Agriculture</td>
<td>8</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>Impact of financial and production groups</td>
<td>7</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>Production sector</td>
<td>18</td>
<td>21</td>
<td>32</td>
</tr>
<tr>
<td>Other</td>
<td>21</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>I don’t know</td>
<td>4</td>
<td>2</td>
<td>0</td>
</tr>
</tbody>
</table>

* Build by the authors based on the questionnaires analysis

The influence of financial and industrial groups on environmental policy is considered a threatening factor only by more than 7% of respondents in the 1st cluster, and only by 15% in the 2nd cluster and Ukraine. 8% of respondents in the 1st cluster and 5% in the 2nd cluster consider agriculture as a threat to environmental development. Ukrainians do not point to agricultural production as a factor threat the global environmental crisis, while respondents in the 2nd cluster point to other factors.
The Table 2 shows the attitudes of respondents from both clusters to how effectively public authorities respond to environmental issues. Apparently, 54% of respondents in the 1st cluster and 42% in the 2nd cluster consider the activity of institutions to be effective, while in Ukraine only 2.2%.

Table 2. Results of answering the question «Are the measures taken by the authorities today enough to improve the environmental situation in the country?», %

<table>
<thead>
<tr>
<th></th>
<th>Cluster 1</th>
<th>Cluster 2</th>
<th>Ukraine</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>13</td>
<td>12</td>
<td>1.3</td>
</tr>
<tr>
<td>On major issues</td>
<td>41</td>
<td>30</td>
<td>0.9</td>
</tr>
<tr>
<td>No</td>
<td>43</td>
<td>48</td>
<td>92.5</td>
</tr>
<tr>
<td>I don’t know</td>
<td>3</td>
<td>10</td>
<td>5.3</td>
</tr>
</tbody>
</table>

* Build by the authors based on the questionnaires analysis

The Figure 9 shows that 85% of respondents in the 1st cluster link the environmental situation with the efficiency of governing in the country, in the 2nd cluster this opinion is shared by 78% of respondents and in Ukraine – 74%. Answer «no» to this question is given by 3% of the respondents in the 1st cluster, 12.3% of the respondents in the 2nd cluster, and 7% of Ukrainians. The largest share of those who are not convinced is among Ukrainians (18.9%).

The Figure 10 shows that respondents of all clusters and Ukraine give almost identical answers to the question about the link between the environmental situation and the level of corruption: more than 65% are sure about this, about 20% consider it is not true, and from 10 to 15% do not agree with the answer.

Fig. 9. Results of answering the question «Do you think the environmental situation is related to the efficiency of the management?», %

Fig. 10. Results of answering the question «Do you think the environmental situation is related to the level of corruption?», %

* Build by the authors based on the questionnaires analysis
The Figure 11 shows that most respondents, who are convinced that financial and industrial groups are the main factor in the deterioration of the environmental situation are in the 1st cluster (82.2%), among Ukrainians these are 76.4%, and a little less in the 2nd cluster (73.2%). 12.1% of respondents in the 2nd cluster and 11% in the 1st cluster oppose the decisive influence of financial and industrial groups while Ukrainians constitute only 6.1%. The largest number of those who hesitate with the right answer is among the Ukrainians (17.5%). The results of this question correlate with the answers to the question about the global environmental crisis among the groups of respondents.

![Figure 11](image1.png)

*Build by the authors based on the questionnaires analysis

**Fig. 11.** Results of answering the question «Do you think that financial and industrial groups are the main reason for the deterioration of the environmental situation?», %

The Figure 12 shows that 41.2% of respondents in the 1st cluster, 55% of respondents in the 2nd cluster, and almost 32% of Ukrainian respondents believe that corporations engaged in plant growth and animal husbandry can offer non-organic production in conditions of low quality of institutions. Approximately 40% of respondents in cluster 1 and 24.2% of respondents in cluster 2, and almost 51% of Ukrainians agree with this opinion. Only 7% of respondents in cluster 1, 18% of respondents in cluster 2, and almost 9% of the Ukrainians who were interviewed did not think so.

![Figure 12](image2.png)

*Build by the authors based on the questionnaires analysis

**Fig. 12.** Results of answering the question «Do you think that corporations engaged in animal husbandry and plant growing are able to offer non-organic production due to the low quality of institutions?», %
The Figure 13 shows that approximately 34% of respondents in the 1st cluster notice the changes in the environmental situation of their place of residence for the better, 31.3% do not see any changes and about 28.5% notice changes for the worse. In the 2nd cluster 29% of respondents mentioned positive changes, 31% did not see any changes, and about 27.3% noted deterioration of the ecological situation. The situation in Ukraine is as follows: 14.5% of the respondents note improvement in the environmental situation in the places where they live, almost 40% do not see any changes and about 41% think the situation will deteriorate.

* Build by the authors based on the questionnaires analysis

**Fig. 13.** Results of answering the question «How has the environmental situation in your place of residence changed in the last 5 years?», %

The Figure 14 shows that approximately 87% of the respondents in the 1st cluster consider environmental protection as a public good, 75% of the respondents in the 2nd cluster and over 96% of Ukrainians share a similar opinion. Respondents in the 2nd cluster (21.3%) and the 1st cluster (13.2%) are most not sure about it.

* Build by the authors based on the questionnaires analysis

**Fig. 14.** Results of answering the question «Do you think that good ecology is a public good?», %
Therefore, the conducted survey confirms our hypothesis that the demand of citizens for a clean environment in developed economies is significantly higher than in developing economies, and the public good «clean environment» becomes in demand only with the growth of GDP per person and real incomes of citizens.

Discussion.

Presented data analysis allows us to see the confirmation of a certain set of hypotheses regarding the social choice of the good «clean environment», which is important for understanding the design of environmental policy tools. In particular, the results of the conditionality of income level preferences for a good «clean environment» are unambiguous. In the case of Ukraine, this pattern creates a certain problem, considering the level of economic development and the nature of income distribution. Underestimating a good «clean environment» due to «chronic poverty» indicates a potential weak public pressure on the formation of the model of economic policy, consistent with modern understanding of sustainable development. In light of European integration processes, this raises the problem of functional asymmetry with the structure of preferences in the EU. However, the war of 2022, in our opinion, will significantly smooth out these differences very soon. Another observation demonstrates a significant gap between the representatives from different countries in relation to the environment, sources of environmental pollution, and readiness to pay for environmental goods. The nature of access to information is also important.

Conclusion.

The developed author’s questionnaire allows to determine the similarity in the individual perception of environmental factors of the well-being of respondents from around the world, grouped into two clusters. Respondents of the 1st cluster are more satisfied with the level of personal awareness of the environmental conditions in their countries than respondents of the 2nd cluster and Ukrainians. Most of the population in all surveyed groups receives information about the environmental situation from the Internet (especially the high share of such population is in the 1st cluster).

Representatives of both clusters are aware of environmental human rights at the middle level (65-75%), but Ukrainians know much less about this issue (about 41%). That is why the representatives of the 1st and the 2nd clusters had a positive experience of protecting their environmental rights (32 and 22% of expenditures, respectively).

Representatives of both clusters are ready to take an active part in solving environmental problems, but among the representatives of Ukraine and the 1st cluster, there are much more persons who are aware of the existence of international environmental organizations.

Only about half of the respondents from both clusters believe in the threat of a global environmental crisis, while almost 90% of Ukrainians believe in it. Representatives of the 2nd cluster and Ukrainians see the greatest threat to the environment in the transport and manufacturing sectors, while representatives of the 1st cluster pay considerable attention to other factors. Representatives of both groups are mostly dissatisfied with the level of environmental management by the official authorities, but all agree that the quality of public management in this area will attract the quality of the environment.

Approximately the same number of respondents admit that corruption affects the environment in all surveyed groups. The situation is similar in the survey on the destructive impact of financial and industrial groups on the environment. A much smaller number of respondents from the 2nd cluster treat the environment as a public good than from the 1st cluster and Ukrainians.

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