Responsibility for Environmental Degradation – Analysis of Sectoral Perceptions

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Abstract: At the dawn of the 21st Century, the world entered an era of radical transformation, characterized by intertwined trends and crises. The extraordinary speed of technological development, changing demographic patterns, shifting value and norm systems, and emerging global challenges are fundamentally reshaping our everyday lives, our thinking and the logic of social organization. As a result of these processes, not only are the functioning of the economy and society changing, but crisis events are also having a much more direct impact on our living conditions. All these trends have irreversible consequences for the future of individuals, communities and societies, as well as for the ecological state of our planet [1]. Global trends have a wide-ranging impact on human life: from technological innovation to the transformation of social relations and environmental change. The issues of sustainability and environmental awareness have gained unprecedented momentum, encouraging individuals, businesses and governments to develop environmentally friendly operating practices and policy measures. It has become clear that we can only achieve lasting improvement in our living conditions if we address economic, social and environmental issues simultaneously, as they are closely intertwined. At the same time, the functioning of the economy places an increasing burden on natural resources, causing serious damage in the long term. It has become clear that endless economic growth is incompatible with the Earth's finite resources, which is why sustainability, conscious consumption and alternative theories of non-growth are playing an increasingly important role. Economic actors are increasingly expected to make their operations greener, while governments are using various policy instruments to promote an environmentally friendly future [2]. However, everyone must recognize that we are equally responsible for protecting environmental values. We cannot simply highlight the responsibility of a narrower circle, as we can all do something to protect the environment in the areas of production, consumption and legal regulation. In the 21st Century, in addition to the new and modern definition of sustainability, the concept of environmental responsibility must also be interpreted, and an attempt must be made to examine the extent to which individual economic actors are responsible for changes in the state of environmental values. This study explores the relationship between responsibility and the state of environmental values through a review of the literature and the presentation of primary research results.

Keywords: environmental awareness; ecology; sustainability; environmental damage; responsibility

1 Introduction

The timeliness of the topic is indisputable, as interest in environmental sustainability and green issues is growing at an unprecedented rate worldwide. This is clearly illustrated when we search for sustainability using the Google search engine. In just 0.35 seconds, it returns 650 million results, although this still lags behind the most searched terms, innovation and management, which return billions of results in just 0.2 seconds. However, it is a fact that every year there are more and more hits and more and more material dealing with sustainable and green issues. Climate change, the depletion of natural resources and mass environmental damage pose new challenges for the scientific community, economic decision-makers and society alike. In this context, research that seeks to explore issues of environmental protection and sustainable development from a new perspective and with an interdisciplinary approach is becoming increasingly important. It is not only a question of what sustainability means, but also of who can be held responsible for the deterioration or damage of environmental values. The importance of addressing this issue is not purely scientific, as it also carries real social, economic and moral responsibility. The rise of green issues is closely linked to changes in consumer habits, the emergence of new regulatory requirements, and the evolution of social expectations in the corporate and private spheres. The question of responsibility can be examined not only at the individual level, but also at the social or economic level. This raises the legitimate question: who is to blame for environmental damage and to what extent? The answer is nuanced, but we can basically say that responsibility is often systemic, yet every individual and community decision contributes to global processes. We cannot say that individuals or businesses alone are to blame for everything. At the same time, it is worth examining separately who can be linked to the preservation or destruction of a sustainable environment at what level. Technological solutions or regulations are not enough to bring about real change; a shift in mindset is also necessary at the individual, corporate and decision-making levels. The analysis can help us understand how sustainability can become part of everyday life, what obstacles we face during the transition, and who bears the greatest responsibility for environmental damage.

2 Literature Review

The issue of liability for environmental damage and environmental responsibility requires a multidisciplinary approach, as the problem encompasses legal, social, psychological and economic dimensions [3-5]. Epochal changes and global trends have made it necessary to rethink responsibility, as the scale of human activity is now greater than ever before, and therefore exploring the causes of environmental damage and the nature of responsibility is essential to achieving a more

sustainable future [4]. Human activities have a significant direct and indirect impact on natural systems, which is reflected in the decline of biodiversity, the deterioration of soil and water quality, and climate change [6]. The main causes of damage include the collective consumption habits and economic structures of human societies, as well as the decisions of large corporations and states [7] [8]. The causes are very complex, as the damage is caused not only by direct activities (such as pollution and deforestation) but also by indirect mechanisms, such as flawed legal regulations and economic incentives [9]. At the same time, it is naive to believe that we cannot do anything individually. It is difficult to determine individual and collective responsibility more strictly because individual decisions are influenced by a number of distortions and psychological factors [10]. There is a so-called compensatory environmental belief, according to which people tend to think that if we do something positive for the environment, it can offset the negative environmental impact of another behavior [5]. Environmental damage occurs because the sum of humanity's individual and collective behaviors directly or indirectly destabilizes the biosphere [11] [12]. The issue of responsibility is a prominent focus of sustainability research. Industrial production and corporate economic practices are largely to blame for environmental degradation, while other perspectives emphasize the responsibility of individuals' consumer choices [13-15]. The role of the state is also central, as it can significantly influence the behavior of both companies and consumers through regulatory and incentive systems [16]. Research in recent years has increasingly adopted an interdisciplinary approach, recognizing that environmental responsibility is a multidimensional issue that can be interpreted at both the systemic and individual levels. Social solidarity, ethical responsibility and consideration of the public interest have emerged as new elements of the sustainability discourse in recent years. Real change requires structural transformations in economic governance, social norms and values [17]. Increased environmental awareness at the individual level is not enough on its own if it is not accompanied by measures at the corporate and governmental levels, but community pressure and consumer preferences can be a significant motivating force [18] [19]. It is clear from the above that sustainability is a complex, multidimensional phenomenon that poses economic, social, environmental and moral challenges [20] [21]. A sustainable future can only be achieved through an integrated, systematic approach in which individuals, companies and the state share responsibility. None of these can be considered less responsible or exempt from protecting environmental values [22] [23]. What is more, in addition to corporate social responsibility (CSR), it may also be important to introduce environmental responsibility, treating it separately from CSR aspects and incorporating it into our daily routines [24] [25]. Environmental responsibility means that individuals, companies and organizations take conscious, proactive and active steps to protect the environment and operate sustainably, going beyond the minimum requirements set out in legislation [26-28]. This includes the rational use of natural resources, the prevention or reduction of environmental impact, the introduction of sustainable material and energy use,

and the application of environmentally friendly technologies [29]. It can also be interpreted as meaning that the actors in the economy and society are pulling in the same direction and essentially formulating a vision for the future that is clear and understandable to everyone and also promotes the preservation of our environmental values [30]. It is not just about avoiding direct pollution, but also about prevention, legal compliance and a system of long-term social responsibility [31]. According to the polluter pays principle, those who cause pollution or damage the environment are primarily responsible for and bear the costs of environmental damage, while environmental protection practices require responsible, environmentally friendly behavior on the part of individuals, communities, companies and states [32-34]. The attitudes of different generations towards environmental protection show significant differences based on the results of numerous studies [35-37]. Generation Z has a strong commitment to sustainability, and Generation Y is also open to sustainability, but in contrast, Generations X and BB are less willing to bear additional costs for the sake of environmental protection [38], although they are increasingly supportive of such efforts [39]. Some studies suggest that Generation Z has stronger sustainability attitudes [40], while others suggest that Generation Y or older generations are more committed to protecting the environment in certain cases [41].

3 Material and Methods

The primary research underlying this study was based on online data collection conducted in Hungary in 2025. The aim of the study was to explore how society perceives the environmental impact of different economic and social sectors. During the data collection, we processed the responses of a total of 6574 people, which provided a sufficient sample size for statistical analysis and generalisation of the results. Although the sample is not representative, it reflects the characteristics of the population and provides a starting point for further research. Sampling was done using the snowball method, which is an effective tool for measuring hard-to-reach or heterogeneous populations. The essence of the method is that the initial respondents recruit new participants into the research through their own networks, so the sample expands exponentially step by step. The questionnaire was completed on a voluntary and anonymous basis, and we fully complied with ethical standards and the relevant provisions of the GDPR during the research. Respondents were informed in advance about the purpose and method of data processing and the confidential treatment of data, thus ensuring the transparency and legality of the research. The items in the questionnaire were rated on a Likert scale from 1 to 4, with higher values indicating greater environmental responsibility. The data was processed using the SPSS 26.0 software package, and several statistical methods were used in the evaluation to assess the reliability and internal consistency of the responses and to identify

differences between groups. First, we calculated basic statistical indicators such as the mean and standard deviation**,** which gave us an idea of the extent to which respondents considered each sector and actor to be environmentally harmful, and how uniform or varied their assessments were. Analysis of variance (ANOVA) allowed us to examine whether there were significant differences between the assessments of different sectors or actors. We supplemented the ANOVA results with multiple comparison procedures, which helped us identify exactly which groups showed statistically significant differences. To examine the internal consistency of the questionnaire, we calculated inter-item correlations and Cronbach's alpha values. Inter-item correlations show the degree to which individual items are consistent with each other, while Cronbach's alpha measures the reliability of the scale. According to accepted professional practice, a Cronbach's alpha value above 0.7 indicates adequate internal consistency. The combined use of these methods made it possible for the research to be not only descriptive, but also to reveal deeper connections between social perceptions and the assessment of environmental responsibility. The composition of the sample is shown in Table 1.

Table 1
Composition of the sample

	Frequency	***Percent (%)***
Generation BB (1940 - 1964)	328	4.989
Generation X (1965–1979)	1408	21.418
Generation Y (1980-1994)	1281	19.486
Generation Z (1995-2007)	333	50.700
Generation Alpha (2008–)	224	3.407

Source: own research, 2025, N = 6574

4 Results and Discussion

Based on the data provided, respondents rated the environmental impact of various economic sectors on a four-point scale, with 4 representing the highest environmental impact for a given sector. During the analysis, we ranked the sectors based on their average values and determined which ones could be considered the most harmful and the least harmful. Industry clearly took first place with a value of 3.171. The energy sector received the second highest average value (2.993). The reasoning behind this opinion is that the energy industry, especially sectors based on fossil fuels, contributes significantly to air pollution, carbon dioxide emissions and climate change. Energy production and consumption directly affect the quality of air, water and soil, as well as the health of ecosystems. Further down the list are the transport and logistics sector (2.913) and mining (2.892). These also have a significant environmental impact: the

transport sector through transport emissions, and mining through the depletion of natural resources and landscape destruction. At the bottom of the ranking is education (2.203), which appears to be the least environmentally damaging sector. This is understandable, as the operation of educational institutions has relatively little direct environmental impact and often plays a key role in teaching sustainability. The health sector (2.368) and information technology and telecommunications (2.493) received similarly low scores. Although they can be energy-intensive, they do not cause direct environmental damage in the same way as industrial or agricultural activities (Table 2).

Table 2
Assessment of the environmental impact of the sectors examined

	Short designation	***Average***	***St.dev***
Industry	IND	3.171	1.115
Mining	MIN	2.892	1.088
Energy sector	EN	2.993	1.088
Agriculture	AG	2.561	1.069
Commercial sector	COM	2.737	1.093
Transport and logistics sector	TL	2.913	1.097
Service sector	SERV	2.525	1.076
Public administration	PUB	2.553	1.145
Health sector	HE	2.368	1.088
IT and telecommunications	IT	2.493	1.083
Education	EDU	2.203	1.125
Government and economic policy	GOV	2.728	1.181
Tourism and hospitality sector	TH	2.725	1.110

Source: own research, 2025, N = 6574

Cronbach's Alpha measures the internal reliability, i.e. how consistently a set of questions or a scale treats the same concept. The value can range from 0 to 1, with a higher value indicating greater reliability. A value of 0.901 indicates excellent reliability, showing that respondents consistently assessed the environmental impact of the sectors. This also means that the scale and questions used worked well and the results are statistically reliable.

We also examined the values of the inter-item correlation matrix based on the above value. The matrix shows the relationships between the individual sectors in terms of how similarly respondents assessed their environmental impact. The correlation values range from 0 to 1, with higher values indicating a stronger positive relationship, i.e. similar assessments of the two sectors. We found a strong relationship (above 0.6) in only one case. The correlation between the energy sector and industry is 0.603, which is a relatively strong relationship. This suggests that respondents rated the environmental impacts of the industrial and energy sectors similarly, probably because they are often intertwined, for example through the energy requirements of industrial production. A similarly strong

correlation can be observed between mining and industry (0.559) and between energy and mining (0.549). This is also logical, as mining forms the basis of industrial production and energy supply, so their environmental impacts may also be related. The strength of the relationship between mining and the energy sector (0.549) is also noteworthy, as it is the third highest value. The table shows that the assessment of the environmental impact of each sector is largely interrelated, but this relationship is considered moderate rather than strong (Table 3).

Table 3
Correlation between the assessment of the environmental impact of the sectors examined (inter-item correlations)

	IND	***MIN***	***EN***	***AG***	***COM***	***TL***	***SERV***	***PUB***	***HE***	***IT***	***EDU***	***GOV***	***TH***
IND	1.000												
MIN	0.559	1.000											
EN	0.603	0.549	1.000										
AG	0.359	0.465	0.429	1.000									
COM	0.449	0.451	0.463	0.455	1.000								
TL	0.530	0.488	0.520	0.421	0.531	1.000							
SERV	0.351	0.399	0.406	0.398	0.512	0.483	1.000						
PUB	0.310	0.356	0.366	0.369	0.443	0.395	0.497	1.000					
HE	0.263	0.324	0.308	0.397	0.443	0.353	0.474	0.473	1.000				
IT	0.294	0.349	0.371	0.358	0.432	0.393	0.483	0.429	0.531	1.000			
EDU	0.126	0.238	0.221	0.362	0.336	0.251	0.407	0.439	0.486	0.454	1.000		
GOV	0.390	0.404	0.421	0.372	0.428	0.414	0.422	0.528	0.395	0.402	0.411	1.000	
TH	0.435	0.421	0.404	0.373	0.475	0.443	0.439	0.402	0.400	0.409	0.360	0.455	1.000

Source: own research, 2025, N = 6574

Next, we used variance analysis to examine the effect of generational affiliation on the impact of individual actors. First, we analyze the average values measuring the impact of individual actors.

The Baby Boomer generation considers industry (2.954), the energy sector (2.857) and mining (2.841) to be the most environmentally damaging. These sectors traditionally have a high environmental impact: industry and mining can cause significant air, water and soil pollution, while the energy sector contributes to climate change through its carbon dioxide emissions. Members of Generation BB have been observing the effects of these sectors for a long time, so they are also aware of the harmful consequences based on their own experience. Education (2.171), IT and telecommunications (2.265) and healthcare (2.293) are considered to be the least harmful to the environment. These sectors have less direct environmental impact and tend to provide human services. Generation X gave the highest scores to industry (3.406), the energy sector (3.214) and the transport and logistics sector (3.110). This generation is already actively involved in economic life and is well aware of the environmental impact of industrial production and

logistics. The transport sector may have come to the fore particularly because of emissions from transport. Education (2.239), healthcare (2.456) and public administration (2.601) are considered the least environmentally damaging, as is the case with the previous generation. Generation Y also considers industry (3.176), the energy sector (3.039) and the transport sector (2.961) to be the most environmentally damaging. This generation is already highly environmentally conscious and sensitive to climate change issues. Industry and the energy sector continue to be viewed negatively, while transport has come into focus with the growth of global mobility and e-commerce. They agree with previous generations that these are the least environmentally damaging sectors. Generation Z considers industry (3.137), the energy sector (2.937) and the transport sector (2.860) to be the most environmentally damaging. This generation has grown up in a digital environment and is highly sensitive to sustainability. Industry and energy continue to be viewed negatively, while transport is becoming problematic due to global travel and consumption. They consider the same sectors to be the least environmentally damaging as their predecessors. According to the Alpha generation's assessment, industry (2.478), the energy sector (2.375) and the transport sector (2.313) are the most environmentally damaging, although the average values are well below the previous values. Although the values are lower than those of older generations, the order is similar. This suggests that environmental awareness develops at a young age but is not yet fully developed. Public administration (2.143), healthcare (2.174) and the service sector (2.214) are considered the least environmentally damaging. Education is not among the sectors considered least harmful, which may indicate that the Alpha generation does not yet perceive its long-term positive effects.

The significance values (Sig.) in the ANOVA table show whether the generational affiliation of the respondents has a statistically significant influence on the assessment of the environmental impact of each sector (Table 4). The threshold value used was 0.05 in this case as well. Based on the table, significant differences can be observed in several sectors, with one exception, namely education, i.e. with the exception of this sector, we can see an effect everywhere in relation to the assessment of the role. Based on all this, it can be stated that generational affiliation has a significant impact on the assessment of the role of the sectors.

Based on the multiple comparison table related to ANOVA, it can be analyzed by sector whether the opinions of different generations (BB, X, Y, Z, Alpha) differ significantly from each other or not. In the case of industry as an actor, we see that all generational comparisons (BB, X, Y, Z, Alpha) show a value of 0.05. This means that each generation assesses the environmental impact of industry significantly differently. It is likely that older generations are less sensitive to this, while the younger ones ( ) are more critical. In the case of mining, we do not see this picture, so it can be said that the assessment of mining is strongly generation-dependent, which can be explained by increasing environmental awareness.

Table 4
The effect of respondents' generational affiliation on their assessment of the environmental impact of the sectors examined (variance analysis, One-Way ANOVA)

		Mean	***Std.dev.***	***F***	***Sig***
Industry	BB gen.	2.954	1.330	42.253	0.000
	X gen.	3.406	0.990		
	Y gen.	3.176	1.107		
	Z gen.	3.137	1.101		
	Alpha gen.	2.478	1.336		
	Total	3.171	1.115		
Mining	BB gen.	2.841	1.275	38.071	0.000
	X gen.	3.094	1.058		
	Y gen.	2.952	1.058		
	Z gen.	2.833	1.052		
	Alpha gen.	2.219	1.289		
	Total	2.892	1.088		
Energy sector	BB gen.	2.857	1.227	37.580	0.000
	X gen.	3.214	1.011		
	Y gen.	3.039	1.068		
	Z gen.	2.937	1.068		
	Alpha gen.	2.375	1.357		
	Total	2.993	1.088		
Agriculture	BB gen.	2.591	1.188	11.623	0.000
	X gen.	2.693	1.043		
	Y gen.	2.556	1.058		
	Z gen.	2.525	1.049		
	Alpha gen.	2.237	1.268		
	Total	2.561	1.069		
Commercial sector	BB gen.	2.457	1.238	25.777	0.000
	X gen.	2.885	1.048		
	Y gen.	2.814	1.072		
	Z gen.	2.706	1.074		
	Alpha gen.	2.246	1.298		
	Total	2.737	1.093		
Transport and logistics sector	BB gen.	2.829	1.235	31.721	0.000
	X gen.	3.110	1.043		
	Y gen.	2.961	1.068		
	Z gen.	2.860	1.080		
	Alpha gen.	2.313	1.316		
	Total	2.913	1.097		
Service sector	BB gen.	2.390	1.171	8.309	0.000
	X gen.	2.602	1,004		

	Y gen.	2.564	1.071		
	Z gen.	2.512	1.078		
	Alpha gen.	2.214	1.277		
	Total	2.525	1.076		
State administration and public administration	BB gen.	2.338	1.289	11.337	0.000
	X gen.	2.601	1.124		
	Y gen.	2.547	1.132		
	Z gen.	2.583	1.127		
	Alpha gen.	2.143	1.270		
	Total	2.553	1.145		
Healthcare sector	BB gen.	2.293	1.157	5.798	0.000
	X gen.	2.456	1.040		
	Y gen.	2.411	1.081		
	Z gen.	2.334	1.088		
	Alpha gen.	2.174	1.257		
	Total	2.368	1.088		
IT and telecommunications	BB gen.	2.265	1.186	7.599	0.000
	X gen.	2.577	1.032		
	Y gen.	2.503	1.068		
	Z gen.	2.488	1.086		
	Alpha gen.	2.299	1.200		
	Total	2.493	1.083		
Education	BB gen.	2.171	1.235	0.592	0.669
	X gen.	2.239	1.129		
	Y gen.	2.208	1.114		
	Z gen.	2.188	1.104		
	Alpha gen.	2.214	1.301		
	Total	2.203	1.125		
Government and economic policy	BB gen.	2.643	1.294	19.588	0.000
	X gen.	2.908	1.175		
	Y gen.	2.793	1.149		
	Z gen.	2.664	1.162		
	Alpha gen.	2.299	1.314		
	Total	2.728	1.181		
Tourism and hospitality sector	BB gen.	2.494	1.219	16.023	0.000
	X gen.	2.823	1.055		
	Y gen.	2.740	1.103		
	Z gen.	2.731	1.099		
	Alpha gen.	2.268	1.329		
	Total	2.725	1.110		

Source: own research, 2025, N = 6574

Different age groups have very different views on the environmental impact of the energy industry, especially with regard to fossil fuels, and this marked difference in opinion is most noticeable among the Alpha generation, as is the case with agriculture. The environmental impact of the trade and service sectors is also viewed differently by the Alpha generation, perhaps due to their criticism of consumer habits. The difference in opinion among Alphas is also noteworthy in other sectors, which is not as evident among other generations (Table 5).

Table 5
Correlation between the opinions of each generation on the environmental impact of the sectors examined (multiple comparison)

		Gen BB	***Gen X***	***Gen Y***	***Gen Z***
Industry	X gen.	0.000			
	Y gen.	0.010	0.000		
	Z gen.	0.034	0.000		
	Alpha gen.	0.000	0.000	0.000	0.000
Mining	X gen.	0.001			
	Y gen.		0.006		
	Z gen.		0.000	0.007	
	Alpha gen.	0.000	0.000	0.000	0.000
Energy sector	X gen.	0.000			
	Y gen.	0.049	0.000		
	Z gen.		0.000	0.031	
	Alpha gen.	0.000	0.000	0.000	0.000
Agriculture	X gen.				
	Y gen.		0.008		
	Z gen.		0.000		
	Alpha gen.	0.001	0.000	0.000	0.001
Commercial sector	X gen.	0.000			
	Y gen.	0.000			
	Z gen.	0.001	0.000	0.020	
	Alpha gen.		0.000	0.000	0.000
Transport and logistics sector	X gen.	0.000			
	Y gen.		0.004		
	Z gen.		0.000	0.040	
	Alpha gen.	0.000	0.000	0.000	0.000
Service sector	X gen.	0.012			
	Y gen.				
	Z gen.				
	Alpha gen.		0.000	0.000	0.001
State administration and public administration	X gen.	0.002			
	Y gen.	0.026			
	Z gen.	0.002			
	Alpha gen.		0.000	0.000	0.000
Healthcare sector	X gen.				
	Y gen.				

	Z gen.		0.004		
	Alpha gen.		0.003	0.022	
IT and telecommunications	X gen.	0.000			
	Y gen.	0.004			
	Z gen.	0.003			
	Alpha gen.		0.003		
Education	X gen.				
	Y gen.				
	Z gen.				
	Alpha gen.				
Government and economic policy	X gen.	0.002			
	Y gen.				
	Z gen.		0.000	0.007	
	Alpha gen.	0.007	0.000	0.000	0.000
Tourism and hospitality sector	X gen.	0.000			
	Y gen.	0.003			
	Z gen.	0.002			
	Alpha gen.		0.000	0.000	0.000

Source: own research, 2025, N = 6574

Conclusions

Our rapidly changing world and economic growth have had many positive effects on human life. The improvement in quality of life and well-being, the modernization of certain sectors, and the positive effects of digitalization can be felt in all sectors of the economy. However, alongside these positive effects, there is also a visible negative side: we have destroyed our environment to an unprecedented extent and exploited the Earth's energy resources and treasures, and the natural consequences of this can no longer be denied. The destruction and erosion of the environment is happening before our very eyes, with some industries contributing more than others. The data obtained from this research clearly reflect society's perception of the environmental impact of different sectors. As part of our research expansion, we also intend to examine the household sector. This sector was deliberately omitted from the present study, as we wanted to focus on productive industries. Our findings are consistent with those reported in the literature review regarding the environmental awareness of different generations. Respondents clearly consider industrial and energy-intensive sectors to be the most harmful, while education and service sectors are less burdensome on the environment in their opinion. It is also clear that generational affiliation plays a significant role in how people assess the environmental impact of different economic sectors. This information may be important for targeted environmental communication and education, as different messages may be effective for different age groups. The perceptions of each generation regarding environmental damage clearly reflect the impact of social, economic and technological changes on their values. The table shows that all generations consider industry to be the most environmentally damaging, which is

not surprising, as this sector is traditionally associated with high emissions, raw material consumption and pollution. In addition to industry, the energy and transport-logistics sectors also receive consistently high ratings, especially from Generations X, Y and Z, who are already actively experiencing the effects of climate change and are more sensitive to sustainability issues. In contrast, the education, healthcare, IT and telecommunications, and public administration sectors are consistently ranked among the least environmentally damaging areas. Education stands out in particular, as it does not involve significant physical production and contributes to raising environmental awareness. IT also received a low rating, especially from younger generations, who see digital technologies as a solution rather than a problem. The generations' views on environmental damage accurately reflect the experiences, information background and values of each age group. This research and its findings help us understand which age groups need more intensive environmental education and where we can build on existing knowledge. Based on the assessment of the sectors, it is possible to identify areas where social pressure is greater, so that companies and decision-makers can prioritize the green transition. The research helps us to formulate generation-specific messages. For younger generations, information transfer via digital channels may be useful for shaping attitudes, while for older generations, more traditional forms of may be more effective. The positive assessment of the education sector provides an opportunity to strengthen environmental awareness, especially among younger generations.

References

[1] Mohajan, H. K. (2020) Circular Economy can Provide a Sustainable Global Society. Journal of Economic Development, Environment, and People, 9(3) pp. 38-62, https://doi.org/10.26458/jedep.v9i3.670

[2] Wamsler, C. (2020) Education for sustainability: Fostering a more conscious society and transformation towards sustainability. International Journal of Sustainability in Higher Education, 21(1) pp. 112-130, https://doi.org/10.1108/IJSHE-04-2019-0152

[3] Mazar, N., & Zhong, C. B. (2010) Do green products make us better people? Psychological Science, 21, pp. 494-498, https://doi.org/10.1177/0956797610363538

[4] Chu, E. W., & Karr, J. R. (2017) Environmental Impact: Concept, Consequences, Measurement. Reference Module in Life Sciences, https://doi.org/10.1016/B978-0-12-809633-8.02380-3

[5] Sörqvist, P., & Langeborg, L. (2019) Why People Harm the Environment Although They Try to Treat It Well: An Evolutionary-Cognitive Perspective on Climate Compensation. Frontiers in Psychology, 10:348, https://doi.org/10.3389/fpsyg.2019.00348

[6] Montgomery, D. R., Biklé, A., & Norton, W. W. (2016) The Hidden Half of Nature: The Microbial Roots of Life and Health. New York

[7] Griskevicius, V., Cantu, S. M., & van Vugt, M. (2012) The evolutionary bases for sustainable behavior: implications for marketing, policy and social entrepreneurship. Journal of Public Policy and Marketing, 31, pp. 115-128, https://doi.org/10.1509/jppm.11.040

[8] Kaklamanou, D., Jones, C. R., Webb, T. L., & Walker, S. R. (2015) Using public transport can make up for flying abroad on holiday: compensatory green beliefs and environmentally significant behavior. Environment and Behavior, 47, pp. 184-204, https://doi.org/10.1177/0013916513488784

[9] Varga, J., & Csiszárik-Kocsir, Á. (2024) The Impact of Human Activity on Environmental Elements Based On The Results of a Primary Research. Acta Polytechnica Hungarica 21(12) pp. 147-168, https://doi.org/10.12700/APH.21.12.2024.12.9

[10] Sahari, E., Salo, M., & Sandman, N. (2024) The role of socio-demographic and psychological factors in shaping individual carbon footprints in Finland. Scintific Report, 14(1):27984, https://doi.org/10.1038/s41598-024-75302-7

[11] Cianconi, P., Hanife, B., Grillo, F., Zhang, K., & Janiri, L. (2021) Human Responses and Adaptation in a Changing Climate: A Framework Integrating Biological, Psychological, and Behavioural Aspects. Life, 11(9):895, https://doi.org/10.3390/life11090895

[12] Anderies, J. M., & Folke, C. (2024) Connecting human behavior, meaning and nature. Philosophical Transactionse of Royal Society. 379(1903):20220314, https://doi.org/10.1098/rstb.2022.0314

[13] Brundage, M. P, Bernstein, W. Z, Hoffenson, S., Chang, Q., Nishi, H., Kliks, T., & Morris, K. C. (2018) Analyzing environmental sustainability methods for use earlier in the product lifecycle. Journal of Cleaner Production. 187, pp. 877-892, https://doi.org/10.1016/j.jclepro.2018.03.187

[14] Wang, Q., & Li, G. (2024) Research on the Effect of Corporate Environmental Responsibility on Corporate Sustainability and the Mediator Effect of Corporate Environmental Strategy. SAGE Open, 14(3) https://doi.org/10.1177/21582440241266115

[15] Popovics, A. (2024) Characteristics of consumer segments based on consumer habits and preferences from an environmental and social responsibility perspective. Acta Polytechnica Hungarica, 21(12) pp. 133-146, https://doi.org/10.12700/APH.21.12.2024.12.8

[16] Meadowcroft, J. (2009) What about the politics? Sustainable development, transition management, and long term energy transitions. Policy Sciences, 42, pp. 323-340, https://doi.org/10.1007/s11077-009-9097-z

[17] Blythe, J. Silver, J., Evans, L., Armitage, D., Bennett, N. J., Moore, M. L., Morrison, T. H., & Brown, K. (2018) The Dark Side of Transformation: Latent Risks in Contemporary Sustainability Discourse. Antipode, 50(5) pp. 1206-1223, https://doi.org/10.1111/anti.12405

[18] Kennedy, E. H., Beckley, T. M., McFarlane, B. L., & Nadeau, S. (2009) Why We Don't "Walk the Talk": Understanding the Environmental Values/Behaviour Gap in Canada. Human Ecology Review, 16(2) pp. 151-160, http://www.jstor.org/stable/24707539 (downloaded: 06.06.2025)

[19] Garai-Fodor, M., & Huszák, N. (2024) Consumer Awareness: Environmental Consciousness, Conscious Lifestyle among Generation Z based on Primary Data. Acta Polytechnica Hungarica, 21(12) pp. 73-87, https://doi.org/10.12700/APH.21.12.2024.12.5

[20] Mensah, J. (2019) Sustainable development: Meaning, history, principles, pillars, and implications for human action: Literature review. Cogent Social Sciences 5(1) https://doi.org/10.1080/23311886.2019.1653531

[21] Bernhard, O., Brandstetter, J., & Zaeh, M. F. (2024) A multidimensional holistic sustainability model for production systems. Production & Manufacturing Research, 12(1) https://doi.org/10.1080/21693277.2024.2423064

[22] Falkner, R. (2020) Global Environmental Responsibility in International Society. International Affairs, 96(3) pp. 727-745

[23] Weaver, M., Fonseca, A. P., Tan, H., & Pokorna, K. (2025) Systems thinking for sustainability: shifting to a higher level of systems consciousness. Journal of the Operational Research Society, pp. 1-14, https://doi.org/10.1080/01605682.2025.2486698

[24] Holtbrügge, D., & Dögl, C. (2012) How international is corporate environmental responsibility? A literature review. Journal of International Business Studies, 18(2), pp. 180-195, https://doi.org/10.1016/j.intman.2012.02.001

[25] Frezza, M. (2024) Spillover of sustainable routines from work to private life: application of the Identity and Practice Interdependence Framework. Frontiers in Psychology, 15, https://doi.org/10.3389/fpsyg.2024.1420701

[26] Ahmed, R. R., Streimikiene, D., & Zheng, X. (2021) The Impact of Proactive Environmental Strategy on Competitive and Sustainable Development of Organizations. Journal of Competitiveness. 13(4) pp. 5-24, https://doi.org/10.7441/joc.2021.04.01

[27] Tran, T. T., van Leeuwen, J., Tran, D. T. M., & Bush, S. R. (2023) Beyond compliance: public voluntary standards and their effect on state institutional capacity in Vietnam. Journal of Environmental Policy & Planning. 25(5) pp. 511-523, https://doi.org/10.1080/1523908X.2023.2175350

[28] McLeod, L. J., Kitson, J. C., Dorner, Z., Tassell-Matamua, N. A., Stahlmann-Brown, P., Milfont, T. L., & Hine, D. W. (2024) Environmental stewardship: A systematic scoping review. PLoS One, 19(5) https://doi.org/10.1371/journal.pone.0284255

[29] Alraja, M. N., Imran, R., Khashab, B. M., & Shah, M. (2022) Technological Innovation, Sustainable Green Practices and SMEs Sustainable Performance in Times of Crisis (COVID-19 pandemic) Information Systems Frontiers, 24(4) pp. 1081-1105, https://doi.org/10.1007/s10796-022-10250-z

[30] Aabid, A., & Baig, M. (2023) Sustainable Materials for Engineering Applications. Materials, 16(18) https://doi.org/10.3390/ma16186085

[31] Li, H., Kuo, Y. K., Mir, M. M., & Omar, M. (2022) Corporate social responsibility and environmental sustainability: achieving firms sustainable performance supported by plant capability. Economic Research. 35(1) pp. 4580-4602, https://doi.org/10.1080/1331677X.2021.2015612

[32] Adshead, J. (2018) The Application and Development of the Polluter-Pays Principle across Jurisdictions in Liability for Marine Oil Pollution. Journal of Environmental Law, 30(3), pp. 425-451, https://doi.org/10.1093/jel/eqy020

[33] Corvino, F. (2023) The forward-looking polluter pays principle for a just climate transition. Critical Review of International Social and Political Philosophy, pp. 1-28, https://doi.org/10.1080/13698230.2023.2243729

[34] Placani, A. (2024) Individual Responsibility for Collective Climate Change Harms. Ethics, Policy & Environment. 28(1) pp. 79-94, https://doi.org/10.1080/21550085.2024.2347812

[35] Satinover, B. N., & Holt, J. W. (2023) A comparison of sustainability attitudes and intentions across generations and gender: A perspective from U.S. consumers. Cuadernos de Gestión, 23(1), pp. 51-62, https://doi.org/10.5295/cdg.211647bs

[36] Lin, M. T., Zhu, D., Liu, C., & Kim, P. B. (2022) A systematic review of empirical studies of pro-environmental behavior in hospitality and tourism contexts. International Journal of Contemporary Hospitality Management, 34(11), pp. 3982-4006, https://doi.org/10.1108/IJCHM-12-2021-1478

[37] Szeberényi, A. (2025) A klímaszorongás tüneteinek vizsgálata budapesti tinédzserek és fiatal felnőttek körében. Statisztikai Szemle, 103(8), pp. 787-804, https://doi.org/10.20311/stat2025.08.hu0787

[38] Jäckel, K., & Garai-Fodor, M. (2025) A fenntarthatóság és környezetvédelem kérdései és kihívásai a Z generáció véleménye alapján. Controller Info, 13(1) 14-18, https://doi.org/10.24387/CI.2025.1.3

[39] Poortinga, W., Demski, C., & Steentjes, K. (2023) Generational differences in climate-related beliefs, risk perceptions and emotions in the UK. Communications Earth and Environment, 4(1), 1, https://doi.org/10.1038/s43247-023-00870-v

[40] Yamane, T., & Kaneko, S. (2021) Is the younger generation a driving force toward achieving the sustainable development goals? Survey experiments. Journal of Cleaner Production, 292, 125932, https://doi.org/10.1016/j.jclepro.2021.125932

[41] Casalegno, C., Candelo, E., & Santoro, G. (2022) Exploring the antecedents of green and sustainable purchase behavior: A comparison among different generations. Psychology and Marketing, 39(5) pp. 1007-1021, https://doi.org/10.1002/mar.21637