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User Evaluation of Innovative Megaprojects Induced by Environmental Change Using Primary Data

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Abstract: The modern age and the associated rise in living standards have been achieved at the cost of enormous environmental damage. The environmental degradation of today, the environmental devastation of previous years, and global warming have presented the world with new and novel challenges that were not experienced in previous decades. Rising sea levels, increasing energy demand and the explosion in energy prices have created new focal points in the thinking of all spheres of economic life. All these environmental factors require a new and fresh approach to future sustainability. New solutions to energy supply are needed and solutions to sea-level rise must be sought. In this article, we undertake to examine in detail the Maldives floating city and the European energy island project from a user's perspective, specifically in terms of its progress and exemplary value. In this paper, we will examine the two flagship projects through the results of a primary research conducted in 2022 and 2023, formulating the main messages for the design of future projects.

Keywords: Change, Environment, Project, Energy, Sea level rise

Introduction

We experience significant changes every day. It is a well-known fact that the impacts of environmental and climate change are extremely wide-ranging. Not only our quality of life, but also our health and our future are determined by global processes that can be linked to changes in the natural environment (WHO, 2015; Costello et al., 2009). We can hardly be independent of environmental change. There are very few economic actors that are not directly or indirectly affected by some external environmental change. The environment in which economic actors operate has undergone significant changes in recent decades. Whereas in the past the pace of change was slower and the economic systems were not so extensive, these actors could operate in a much simpler, so-called static environment. In such an environment, the pace and speed of change was not so rapid that it would have placed a significant strain on the day-to-day functioning of economic agents. However, recent decades have changed this situation. After the Second World War, the world economy started to grow intensively, if we only look at GDP or world trade. Population growth has also been unprecedented in our history. It is practically impossible to list all the factors that have made the economic system of our time so complex and changeable. Yet the effects of globalisation, the development of telecommunications and the spread of the internet (digitalisation), the emergence of new consumer awareness, the easier availability of resources, the proximity of distant markets, etc., are very often highlighted, as are new trends such as sustainability (Garai-Fodor, et al., 2023; Garai-Fodor 2022; 2023). The reasons for the slow shift from a static environment to a turbulent global environment are almost endless. Of course, this does not mean that all areas of life have the same environmental conditions. But we can say that most economic actors are experiencing an acceleration of events and that these changes require us to respond in some way. We can relate climate variability in the natural environment to sudden and irreversible changes in ecosystems (Malhi et al., 2019).

This study tries to direct attention to what significant influences we are exposed to today and what response the economic actors can make to the current challenges.

Literature Review

It was mentioned in the introduction that for most economic actors the world has accelerated and events are becoming more intense and varied, impacting on our daily lives (Russell-Jones, 2005). The complexity of economic globalisation and the increased dynamism of business have also led to a surge in unexpected events and changes. These come from our immediate environment and have an impact on our daily lives. Among the most significant environmental changes of our time are digitalisation, sustainability and the green transition, technological advances, the COVID-19 crisis, the Russian-Ukrainian conflict, the energy crisis and, last but not least, the environmental degradation that has been observed for decades, or the impact of global warming. There are common points and differences. The common point is that they all affect a large number of economic actors, while there is also a fundamental difference. Part of the environmental change is taking place in the natural environment, which we can only influence indirectly, while the other part is taking place in the social environment. Global environmental change is a topic that is increasingly discussed in the literature (Pyhälä et al., 2016). Changes in the natural environment include global warming, the green transition or resource scarcity. Changes in these areas could be caused or triggered by human activity, but it is essentially the natural environment itself that is driving the change process. In the social environment, on the other hand, it is humanity, the economic actors, who cause the change and who carry out the change. Digitalisation or the conflict between Russia and Ukraine are clearly changes caused by humanity and are also being carried out by people themselves. Human activity, which is mostly a feature of the social environment, is changing many of the world's natural systems, including the climate system (McMichael et al., 2008).

Global environmental change is challenging both natural and social scientists to better understand. Global climate change refers to the long-term alteration of Earth's climate patterns on a global scale. It encompasses shifts in temperature, precipitation, wind patterns, and other atmospheric conditions over extended periods, typically decades to centuries. The primary driver of contemporary global climate change is the increase in greenhouse gas concentrations in the atmosphere, primarily resulting from human activities such as the burning of fossil fuels, deforestation, and industrial processes. The consequences of global climate change are far-reaching, including rising global temperatures, melting polar ice caps and glaciers, sea-level rise, changes in weather patterns, and more frequent and severe extreme weather events. Global environmental change offers a strategy for combining the efforts of natural and social scientists to better understand how our actions affect global changes and how these changes affect us (NRC, 1992). Whatever the environment in which the change takes place, it will affect a narrow or broad range of actors. Each of the processes identified above has affected economic actors and people more broadly, so that none of the events has not been an epoch-shaping factor in recent years (Shi, 2018). Of the environmental changes, changes in the natural environment are the main focus. Among the changes in the natural environment, climate change is one of the most significant challenges (Lenton et al, 2019). It is a proven fact that climate change has negative impacts on people's lives (Stern, 2006) and is mostly the consequence of human related carbon emissions (Csutora & Harangozo, 2017; Csutora & Harangozo, 2019). In terms of concrete economic impacts, this is reflected in the deterioration of access to adequate drinking water, the negative impact on food production, and the deterioration of people's health and the quality and condition of the environment. Environmental change can only be considered in a complex, even global, way (Norgaard-Bode, 1998). This is because ecological change cannot be limited to a narrow geographical context. Global warming or resource scarcity does not stop at national borders and does not discriminate between people and people. What is more, the effects of changes in the natural environment spill over into the social environment, where they have their real impact. Changes in the natural environment can all affect the lives of societies more widely, but this is not always the case in the social environment, where, for example, the closure of an economic organisation that did not have a large market share anyway may not affect the lives of many people. In the natural environment, there are fewer changes that are concentrated in a narrow segment of society, if only because, for example, natural disasters do not happen every day, but in the economy, new products may be released on a daily basis, causing changes in some consumers. The social environment is more likely to generate a number of changes, but not all of them are comprehensive. In the natural environment, we see fewer changes, but most of them have a knock-on effect on several people or economic actors.

The drive for sustainability, which has also become a dominant trend today in many areas (Blaskovics, 2016; 2018; Blaskovics et al., 2023; Borzán & Szekeres, 2019; Borzán & Szekeres, 2021; Borzán et al., 2022; Győri et al., 2021) and is linked to the natural environment, can also be seen as a response to changes in the natural environment. The concept of sustainability dates back to the 1960s, although its roots go back even further

(McKenzie, 2004; Győri, 2012; Engelman, 2013, Győri & Csillag, 2019). The underlying causes of sustainability can be highlighted as societal environmental changes, such as globalisation, market liberalisation, international factor mobility or the emergence of economic integration. These have been created by the social environment and have had an impact on the natural environment. This has led to adverse processes in the natural environment, and nature has reacted in its own way. Climate change is now an alteration of the natural environment, the effects of which feed back into the environment that actually caused it, which was none other than our social environment. The consequences can be unforeseeable. Rising sea levels, rising average annual temperatures, water scarcity, drought, energy shortages, while our continuing population growth will only place greater demands on the planet's resources, which are in turn becoming increasingly scarce and scarce. Fossil fuels are extremely polluting, and we must take significant steps to keep our air and water clean. Climate change is a threat to vulnerable societies.

It can cause heat waves, floods, tornadoes, hurricanes, droughts, fires and the disappearance of glaciers (Cianconi et al., 2020; Church et al., 2013). We need new thinking and new awareness to protect the values of the natural environment. We need to implement projects and investments that are sufficiently innovative and green to mitigate or possibly prevent negative impacts on the natural environment and adverse changes in the natural environment. Understand the ecological dynamics of climate impacts, identify vulnerabilities and points of resilience. Identify intervention steps that can help build resilience of the biosphere to climate change. At the same time, ecosystems can also help mitigate and adapt to climate change. The mechanisms, opportunities and constraints of climate change solutions need to be explored and quantified as clearly as possible. Environmental problems are more common in developing countries and less developed countries need more money and investment to become more sustainable. Developing countries need to invest more in promoting environmentally friendly activities and responding to the risks of climate change (Ahmed et al., 2018). The compatibility of environmental and socio-economic development is a key area of sustainability research (Szigeti et al., 2017). However, there is no question that responding to environmental challenges requires funding and targeted investments, projects and development (Varga - Csiszárik-Kocsir, 2019; Dobos et al., 2022). Some people need to spend more and others less, but we are talking about something that is a common concern for all. We have talked about global environmental change, which includes the word global.

Material and Methods

The megaprojects presented in this study are included in the list of the top 50 projects published by the Project Management Institute (PMI, 2021). The study presents two projects that address contemporary environmental problems, meet the requirements of environmental protection and conservation, and are considered to be important and interesting from a user perspective. The two selected projects (Energy Island, Maldives Floating City) were evaluated from the perspective of ordinary people as users, i.e. there was no educational background or previous project management experience as a prerequisite for inclusion in the sample, so the questionnaire on which the evaluation was based could be completed by anyone. Respondents were asked to rate the selected projects according to some factors of project scope. Respondents rated the factors on a scale of 1 to 4, with a value of 1 indicating a very weak factor and a value of 4 indicating a very strong factor. We then examined how respondents rated the project overall on a scale of 1 to 5, where 1 was the weakest and 5 the best, and then used significance analysis to see if there was a correlation between the specific scope characteristic and the overall rating of the project. There were 172 evaluable responses to the questions. Of the sample respondents, 39.5% had a tertiary education and 60.5% had a secondary education. 12.2% of the respondents are Generation Y, 23.3% are Generation X and 64.5% are Generation Z. The survey was conducted in April and May 2022.

Results and Discussion

Opinions on the Energy Island Project

The project ranked 9th in the PMI Top 50. Thirty years after Denmark built its first offshore wind farm, it is now embarking on another gigantic project to secure the country's entire energy supply from renewable sources. To do this, they want to create an artificial offshore island capable of collecting, storing and delivering the energy generated by the surrounding wind farms to where it is needed. The surplus energy that they plan to produce will be sold to other parts of Europe, providing part of their electricity supply from renewable energy sources. The project is scheduled to come on stream in 2023, and will be defined as one of the largest construction projects in the country's history in terms of budget. The gigantic scale of the project could once

again serve as a model for other coastal countries, offering an alternative to renewable energy projects that take up land (PMI, 2021).

For some characteristics of the project coverage, it can be seen that, in contrast to the Maldives Floating City, there was a much higher proportion of characteristics above 3.5. The future focus of the project was ranked first, practically the highest on the scale, but utility, environmental awareness, public interest, sustainability and usability of the project were also highly rated (in descending order). The lowest score for each of the scope characteristics was for the profit orientation of the project, which was the only characteristic below 3 for the factors studied. At the very end of the list, in addition to profitability, were feasibility and cost-effectiveness. Overall, it can be said that the purpose of the project was clearly appreciated by the respondents.

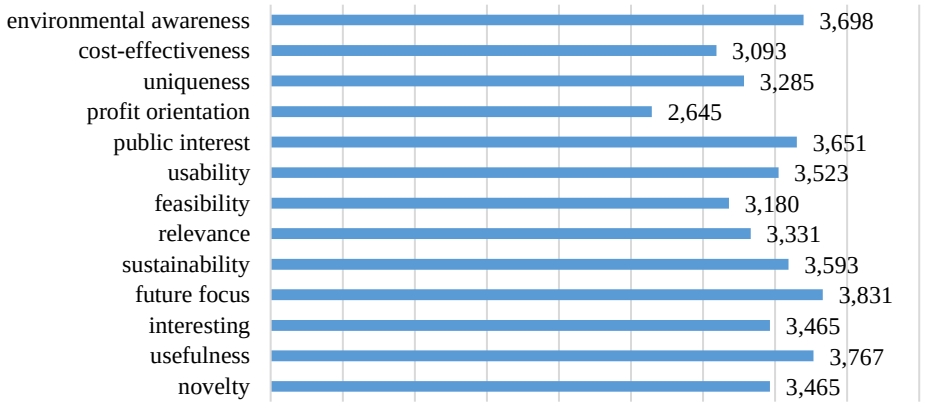


Figure 1. Assessment of the scope of the Energy Island project

Source: own research, 2022, N = 172

On the project management side, we wanted to examine which stage of the project lifecycle was considered the most important by respondents. In order for project sponsors to come up with a breakthrough, innovative project, the idea is crucial and must be sufficiently innovative. We also know that a good project needs a good plan to prepare for unexpected events and challenges. Without a good plan, a project cannot be managed effectively, which also affects its implementation. With all these principles in mind, we asked users to rate each stage of the project, as shown in the figure below. Notwithstanding the above, users did not rate the initial phase of the project highly, preferring to give the highest score to the execution, and putting the idea itself almost at the bottom of the list. This shows that a preventive awareness campaign is very important from the users' point of view for similar projects, because of the recognition of the role of the project phases.

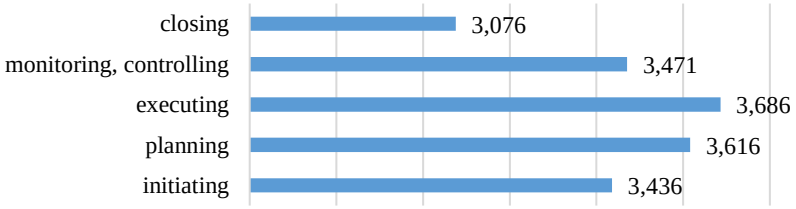


Figure 2. Assessment of the project phases of the Energy Island project

Source: own research, 2022, N = 172

Opinions on the Maldives Floating City project

The 24th ranked Maldivian floating city project looks like a utopia at first glance. But the problem it seeks to solve is very real. The island nation will be one of the biggest victims of global warming in the near future. It is estimated that sea levels could rise by as much as half a metre by 2100, which means that 77% of the island group will be covered by water. That is why decision-makers have tried to run ahead and find a solution to the looming problem. The project itself would be built in a warm-water lagoon not far from the Maldivian capital.

The project would provide homes for thousands of families, in addition to hospital and school facilities and commercial property. The floating city would rely entirely on renewable energy to protect the environment. The floating city would be both flexible and stable, following the geometric pattern of the local coral. If successful, the project could be a model for all countries involved, as it would be the world's first and largest floating structure, with 5,000 floating houses. Construction was scheduled to start in 2022, which is estimated to take 5 years (PMI, 2021).

Respondents gave the project the highest average rating of interest and a very high rating of novelty, above 3.5. The uniqueness of the project and its future focus also received a high rating, with an average of over 3.4. In addition, the project design presented was considered by many to be useful, usable, of public interest and feasible. However, the respondents felt that the environmental, profit orientation, and cost saving aspects of the project were less dominant. Thus, many fear that the project will be implemented with a very high budget, which will be a problem in terms of usability and utilisation, i.e. poorer people, who are more in need, will not be able to benefit from this solution.

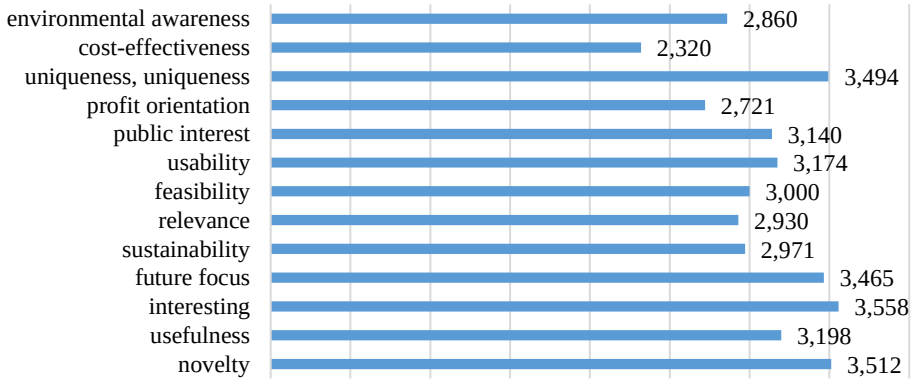
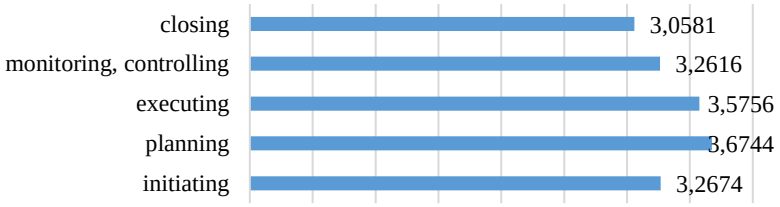


Figure 3. Assessment of the scope of the Maldive Floating City project

Source: own research, 2022, N = 172

In the case of this project, the most important aspect for the evaluation of the project phases is the design. The idea itself was also ranked better, coming in third place. In the case of the present project, users also gave a higher rating to the innovation itself, which the project itself conveys. Implementation was again rated as important by users, as it came second in the evaluation.



Source: own research, 2022, N = 172 Figure 4. Assessment of the project phases of the Maldive Floating City project

Conclusion

Today's increasingly serious environmental problems call for new and innovative solutions. The challenges that have arisen from the environmental degradation of previous years cannot be tackled by traditional means because our existing knowledge is finite. That is why only innovation can provide solutions. The two projects presented in this study are highly regarded for their innovation. Both projects aim to address acute problems that could become serious in the decades ahead. Rising sea levels, the increasing depletion of conventional energy sources and the environmental damage they are causing are problems that must be addressed. The project plans presented in this study can only be described as pilot programmes for the time being, but their success will

provide solutions to the problems described above. The positive nature of the projects has been demonstrated by the present non-representative research and can be used as a model for future similar projects in order to provide more workable solutions to the challenges of environmental degradation. We intend to continue this research in the future, especially during the implementation phase of the projects, in order to provide a starting point for future projects with similar objectives.

Scientific Ethics Declaration

The authors declare that the scientific ethical and legal responsibility of this article published in EPSTEM journal belongs to the authors.

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