## ENVIRONMENTAL PROJECTS MANAGEMENT IN ROMANIA AND ICELAND - A COMPARATIVE ANALYSIS BASED ON CASE STUDIES AND GOOD PRACTICE ELEMENTS

## Cezar-Petre SIMION<sup>a\*</sup>, Florin ANGHEL<sup>b</sup>, Mihai VRÎNCUŢ<sup>c</sup>, Daniel-Constantin JIROVEANU<sup>d</sup>, Camelia DRAGHICI<sup>e</sup>, David Christian FINGER<sup>f</sup>

<sup>a, b, c, d</sup> Bucharest University of Economic Studies, Romania <sup>e</sup> Transilvania University of Braşov, Romania <sup>f</sup> Reykjavik University, Iceland

#### ABSTRACT

The presented research aims to study how environmental projects are implemented in a comparative approach based on case studies from very different national contexts (Romania and Iceland) so as to reveal the elements of good practices that constitute a common heritage for organizations involved in carrying out such projects in the future. From a methodological point of view, to carry out the research, case studies were used for two projects from Iceland and Romania, which provided the necessary inputs for the comparative analysis between two projects from two countries. The case studies and the comparative analysis showed that the gaps between the project in Romania and the one in Iceland appear in terms of the relationship between policies – strategies – programs and projects, the relationship with stakeholders, the reporting of progressThere are a number of project management components where, even if there are no gaps, the two projects have scores indicating a lower level of use of specific methods/techniques and practices. That is why the article presents the need and paths to transfer good practices in the implementation of environmental projects in Romania and Iceland.

**KEYWORDS:** *environment, Iceland, management, project, Romania.* 

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## **1. INTRODUCTION**

The level and complexity of economic and social development have imposed increasingly varied and complex relationships between man and the natural environment. Paradoxically, technicalscientific progress has not led to a disappearance of man's dependence on natural resources but to an increase, based on knowledge, made concrete by the accentuated tendency to dominate and transform the natural environment. From an epistemological point of view, if at the beginning scientific thinking was oriented towards the knowledge of nature, in the contemporary era it subsumes the effort to limit the effects of human action on the natural environment. This trend of evolution also marked economic thinking and approach.

Environment problems gradually came to the attention of society, especially through the amplification of concerns regarding global warming (Luque et al, 2013), loss of diversity, pollution, waste (and especially toxic waste) and events of the nature of ecological accidents (Sholarin and Awange , 2015; Simion et. al, 2021). These affect the environment in all its essential components: air, water, soil,

<sup>\*</sup> Corresponding author. E-mail address: *cezar.simion@man.ase.ro*.

biota (Simion et. al, 2021). Romania is, from this point of view, among the countries in the European Union that are still far from the European average in terms of addressing environmental issues, especially regarding: waste management, air and water quality ((European Commission, 2019). Iceland is experiencing difficulties due to global warming or exploitation extensive use of natural resources in the field of fisheries (Simion et al., 2021).

That is why, in the current period, the 2030 Agenda of the United Nations Organization and the Green Pact of the European Union have appeared as programmatic documents to reflect the concerns of society at a global level for reducing the negative impact of human activities on the environment and sustainable development. The implementation of the provisions of the 2030 Agenda of the United Nations increases the need to carry out environmental projects, both in Romania and in Iceland, through:

- ensuring everyone's access to water distribution, sanitation and sustainable management services;
- the development of inclusive, safe, resilient and sustainable human settlements;
- ensuring sustainable consumption and production models;
- adopting urgent measures to combat climate change and its impact;
- protecting, restoring and promoting the sustainable use of terrestrial ecosystems, sustainable forest management, halting soil degradation and biodiversity decline;
- revitalizing the global partnership for sustainable development.

The European Green Deal (European Commission, 2019) represents one of the essential elements through which the European Union wants to put into practice the provisions of the 2030 Agenda of the United Nations. The application of the European Green Deal implies the transformation of the European Union, by 2050, into a space without greenhouse gas emissions and in which economic growth is decoupled from the use of natural resources to a proportionate degree (European Commission, 2019). For these reasons, the adoption of European Green creates at the national level, including in Romania, opportunities in the development of environmental projects, especially in rural communities, regarding: (i) the supply of clean and safe energy; (ii)energy efficiency of new and rehabilitated buildings; (iii) creating a healthy and sustainable food system ("from farm to consumer"); (iv)preservation of ecosystems; (v) biodiversity (European Commission, 2019).

The existing situation in both Romania and Iceland requires the realization of environmental projects so that both countries contribute to the fulfillment of the global objectives of reducing the impact of socio-economic activities on the environment and ensuring the premises of sustainable development. For the design, implementation and operation of environmental projects, it is necessary to have a relevant base of good practices so that future projects have maximum effectiveness. That is why there must be a retention of good practices not only at the national level, but also at international one, including between countries such as Romania and Iceland, which implement and exploit environmental projects in very different natural but also socio-economic national contexts.

The purpose of this research is the study how environmental projects are implemented in a comparative approach based on case studies from very different national contexts (tradition, culture, economic situation, perception of environmental problems) so as to reveal the elements of good practices that constitute a common heritage for organizations involved in the realization of such projects in the future. In order to achieve the proposed goal, the research presented in this article proposed the following objectives:

- identification of some environmental projects from Romania and Iceland to be the subject of case studies;
- carrying out case studies based on relevant environmental projects from Romania and Iceland;
- identifying, based on case studies, elements of good practice in the management, conception, implementation and realization of environmental projects;
- establishing the possibilities of knowledge transfer/good practice elements between the two countries.

Considering the context of the research, the proposed purpose and the previously formulated objectives, the research presented in this article should provide answers to the following research questions:

- What are the environmental projects in Romania and Iceland that can be the subject of case studies?
- What essential elements regarding the management of environmental projects are revealed by the case studies?
- What are the elements of good practices/examples of good practices that can constitute the object of knowledge transfer regarding the realization of environmental projects in the two countries?

This research is part of a wider approach leading to the transfer of good practices between Romania and Iceland and the creation of common learning/training resources, in the context of cooperation project initiated by the universities of the two countries.

# 2. LITERATURE REVIEW

Environmental projects and environmental project management have different approaches in the specialized literature. There are, from a theoretical-methodological point of view, several approaches to the management of environmental projects and environmental projects, starting from attempts to define the two concepts and ending with studies focused on different components of the management of environmental projects.

Scholarin and Avange (2015) tried to define environmental projects as a special type of projects that have environmental activities and outcome elements in the sphere of sustainability. From the perspective of these authors, the management of this type of projects involves a meeting of three elements: projects, management and the environment. Scholarin and Avange (2015) also consider that there are differences between environmental projects management and green project management. The concept of green project management refers only to the practical assimilation of green policies at the level of the organization (Mochal and Krasnoff, 2010; Maltzman and Shirley, 2012).

On the other hand, Tong, Linderman and Zhu (2022) assimilate green projects with the concept of environmental improvement projects and define them, like other specialists (Swink, 2003; Criscuolo et al., 2017; Jonas, 2010; Dhanorkar, Siemsen and Linderman, 2017) as those projects involving changes in the organization's technologies, policies and procedures intended to improve its environmental performance. That is why we consider these concepts of environmental project and environmental projects management to have a much wider scope and refer to projects related to the environment and their management.

Adamisin et al. (2018) conducted an empirical study on managerial approaches to environmental projects. Research realised by Adamisin et al. (2018) was focused on the spatial distribution of environmental projects at the regional level in Slovakia and the authors concluded that there is no link between the economic development of regions and the support of European funds through environmental projects. However, we appreciate that the previously mentioned study was less focused on project management itself, but more on the relationship between the impact of financing environmental projects and the degree of economic development of the regions in Slovakia. Also in Slovakia, Pavolova, Csikosova and Bakalar (2014) conducted an analysis of the benefits and risks involved in the implementation of regional environmental projects in the field of water management. The research conducted was based on a case study in the Kosice region.

Luyet et al. (2012) proposed a framework for stakeholder participation in environmental projects that includes all the necessary stages/methods/techniques from stakeholder identification to their evaluation. The mentioned research was based on a case study (concerning a development project in Switzerland) and aimed to determine, from a methodological point of view:

- Who must participate in the implementation of environmental projects?
- How should they participate?
- When should different categories of stakeholders be involved?

Tong, Linderman and Ju (2022) analyzed, using DEA, the influence of the portfolio of environmental projects at the firm level on the ability of firms to improve their results in terms of addressing environmental issues. The results in this research showed that firms that have a portfolio more focused on certain types of environmental projects are the ones that achieve better results in terms of addressing environmental issues.

Not many research results are published in the specialized literature regarding environmental project management or project management in Iceland. Representative of project management is the comparative approach of the research carried out by Schoper et al. (2018) on the situation in this field in Iceland, Norway and Germany. From this point of view, Iceland has a large part of its economy and society (27.7%) designed, but it ranks behind Germany or Norway. Although the design level of the economy and society is relatively high, there are also areas where this level is much lower than Iceland's national average.

Other studies and research on environmental projects carried out in Iceland are dedicated to environmental impact analysis and life cycle analysis (Shortall, Davidsdottir and Axelsson, 2015; Cook, Davíðsdóttir and Kristófersson, 2016; Sigurjonsson et al., 2021) but also the effects negative effects on the environment that even some environmental projects can have. Significant from this point of view is the study by Ingolfsdottir and Gunnarsdottir (2020) on the effects of renewable energy projects on the implementation and exploitation of flora and fauna conservation projects in Iceland.

Studies regarding the management of environmental projects in Romania are, as in the case of Iceland, very few. Most of the researches published regarding environmental projects consider aspects such as the financing of environmental projects in Romania, the definition of environmental projects, the particularities of the foundation of this type of projects, the impact of certain types of projects on the environment. Regarding the financing of environmental projects in Romania, the research carried out by Melnic (2008) according to which the use of a mix of financing sources amplifies the impact and benefits of this type of projects. Other significant studies regarding the environmental projects (Cormos, 2014) or those regarding the impact of projects in the energy field on the aquatic environment (Costea et al., 2021). Management studies in general have their own dynamics (Nicolescu O. and Nicolescu C., 2014).

The comparative approach of environmental projects in Romania and Iceland and certain aspects regarding their management is represented in the specialized literature by a single study (Simion et. al, 2021) which was focused on aspects regarding the management of time, cost and risk in the realization projects. The study by Simion et al. (2021) revealed that in the environmental projects carried out in both countries, time, cost and risk management are present in the implementation of the projects, but without the modern methods and techniques being present in all the documentation of the selected projects. Therefore, one of the conclusions of the study carried out by Simion et al. (2021) refer to the need to intensify training in the field in both countries and to the transfer of knowledge through joint projects.

# **3. RESEARCH METHODOLOGY**

The research carried out was focused on the identification of some projects from both countries (Romania and Iceland) to be the subject of case studies regarding the management of environmental projects and the revealing, through these case studies, of the elements of good practices to be transferred to the projects from both countries.

Two environmental projects were selected, one from Iceland and one from Romania, for which the project documentation related to the implementation and exploitation periods were used (opportunity, pre-feasibility and feasibility studies, technical reports, funding requests, progress reports, internal audit reports).

These were supplemented with discussions during the workshop in Iceland which involved visits and discussions on environmental issues and project management specific elements. The criteria used for the selection of environmental projects included the availability of information on at least two stages of the life cycle of environmental projects, their representativeness for the situation of environmental projects in both countries, the suitability of the information for the transfer of good practices, the maturity of the projects and the management of project.

For all environmental projects, the following elements specific to project management were considered for analysis: the formulation of the purpose and objectives, the strategy-programme-project relationship, the project environment and the relationship with the stakeholders, the integration of the project in the organization, time management, cost management, management risk and resource management. In order to be able to determine the gaps between the two projects regarding the elements, a scoring system was established 0 - the non-existence of the element and ending with 3 - the intensive use of the methods/techniques/practices that define the respective element. The case studies revealed the existence of some good elements practices that can constitute the subject of knowledge transfer between the two countries.plementation and exploitation of environmental projects.

## 4. CASE STUDIES. RESEARCH RESULTS

The case studies were carried out taking into account specific elements of project management for two relevant environmental projects: one from Romania (in the construction of a photovoltaic park with an installed power of 3 MW in Avram Iancu commune in Bihor county) and one from Iceland (the project Gaja made by SORPA for the Reykjavik capital area).

## 4.1 Case study 1 – GAJA Project (Iceland)

The project chosen in Iceland was the one related to the construction of a new biogas and compost plant in Álfsnes, which started operating from the second half of 2020, serving the area of Iceland's capital Reykjavík, where the majority of the country's population is concentrated. The project to build this biogas and compost station is part of a common waste management policy of all municipalities in the Reykjavík capital area adopted for the period 2009-2020.

The project aimed at the best possible management of the household waste collected in the Reykjavik Capital Area, using both the nutrients from the household waste and the energy released from the waste decomposition process. The biogas and compost facility will ensure the processing of all household waste collected from the serviced area. Thus, the organic matter will be used for the production of biogas and composting, and the inorganic matter (including metals) will be introduced into the recycling process.

Batteríið Architects was involved in the design phase of the station, the technical consultant involved in the project was Mannvit Engineering and the processing technology is the result of an invention patent of the Danish company Aikan Solum. The building in which the station operates was designed and built with an area of 12,800 square meters. The station will be able to process 35,000 tons of household waste. During the operation period of the GAJA project, the biogas and compost station will ensure:

- 3 million Nm<sup>3</sup> of methane gas;
- over 10,000 tons of soil improvers, usable in soil conservation (an important environmental problem in Iceland);
- reusing 95% of household waste produced by households in the Reykjavík capital area.

The methane produced annually by the biogas plant is enough to provide fuel for 4000 cars and 60 buses. This amount of methane produced annually during the operation period of the GAJA project could support the production of electricity for 2000 households.

From the perspective of the environment, the GAJA project regarding the construction and operation of the biogas and compost station has the following significant benefits:

- the interruption of the storage of organic household waste in the Reykjavík capital area;
- elimination of emissions equivalent to 90,000 tons of CO<sup>2</sup> annually.

The amount of emissions eliminated as a result of the operation of the GAJA project is the equivalent of removing 40,000 passengers from traffic each year, which is an additional argument for the benefits of this project.



**Figure 1. GAJA biogas and composting station** *Source:* https://sorpa.is; audit reports for Gaja Project

From the perspective of project management, the realization of the GAJA biogas and composting station presents the following distinctive elements:

- the project has a purpose and objectives but the objectives are not formulated as SMART objectives. However, there are a number of achievement and outcome indicators detailing the objectives;
- the project is integrated into a common policy of the municipalities in the Reykjavík capital area, being the expression and result of this policy;
- the life cycle approach is present and taken into account in the design phase of the project;
- the realization of the project is the result of the strong involvement of the stakeholders (municipalities, design firm, consultant, executor, the generator of the invention patent that is the basis of the biogas production processes);
- in the project, certain methods of programming the execution of the project in time, but also of budgeting in terms of cost management, were definitely used;
- risk management assumed the consideration of some operational risks but without a detailed assessment of the risks of delay and cost overruns;
- there is a good management of resources during the exploitation period of the project.

However, the documentation and audit reports of SORPA (the organization that ensures the operation of the Gaja project) confirm the materialization of certain problems, especially during the project implementation period:

- unrealistic estimates of the cost of the project (underestimation of the cost) which led to the need for additional allocations of financial resources through successive additional acts which affected the local budgets of the municipalities involved (638 million ISK). The cost deviation from the initial estimate is greater;
- the inconsistency of some elements in the WBS, which led to the lack of financial resources for the equipment of the Gufunesi reception center (over 700 million ISK);

- deficiencies in the project reporting and monitoring processes in the project-organization relationship, with direct effects on decision-making processes;
- inconsistencies in the management of the project team during implementation.

The GAJA project presents a series of good practice elements that could be taken over in other environmental projects carried out in Romania or Iceland. First of all, the strong involvement, contractually formalized, of some stakeholders (municipalities in the Reykjavik capital area) whose association generated the need for the project. Another element of good practice is the integration of the project into a wider approach represented by local policies.

# **4.2** Case study 2 –Project of a solar photovoltaic park development, Avram Iancu commune (Romania)

The project that constitutes the object of the second case study consisted in the realization of a photovoltaic park with an installed power of 3 MW in Avram Iancu commune in Bihor county. The project was located on a land area of 60000 square meters.

The objective of the project was to capitalize on the solar energy potential for the production of green energy, by implementing an electricity production capacity of 3 MW, on photovoltaic panels. The initiator of the project is the Bihor County Council.

The photovoltaic system with connection to an electricity network is characterized by the production of electricity and subsequently by its 3 main elements: photovoltaic panels, inverter, power line of the network These elements, in turn, are completed with a series of equipment auxiliary such as the various protections against overvoltages, or energy meters. The photovoltaic panel for this installation is a panel with thin film technology (on silicon as cadmium-tellurium) with a nominal power of 75 W. Because they contain laminated and robust lower frames at very good costs, thin film photovoltaic panels can be easily recycled at the end of their useful life without damaging the panel structure.

The actual construction was based on a series of activities that included landscaping of the used surface (cleaning, purification, leveling and movement of the land for the location of the installation), excavation of trenches and channels (for the location of the supporting structure of the modules, for inverters, meters and transformers), cementing the ditches and channels resulting from the excavations (for the structure of the modules, inverters, meters and transformers), mounting and fixing the installation elements as well as making the necessary electrical installations and wiring.

From an economic-organizational point of view, everything related to the construction of the solar installation amounts to 57,544,840 lei without VAT (11,700,00 euro). The construction period is 11 months. The construction of this installation implements in Romania a new technology for using renewable energy, the sun. This technology is thin film technology, which converts the direct current resulting from the capture of solar radiation, into alternating current, which can then be used as electric current. The peculiarity of this technology is that it works in good conditions even in cloudy weather.

The construction for the solar installation in the town of Avram Iancu, Bihor county presents as constructive options the arrangement of the structures directly on the ground by drilling and on support elements of the spredel type or the arrangement of the structures by casting the reinforced concrete elements on which the metal structure rests.

The first construction variant of the solar installation involves placing the structure directly on the ground without cementing, the structure being effectively supported by the spredel-type elements that are inserted into the ground following the drilling. Aluminum profiles are then positioned over these elements, over which the solar panels are placed. The second construction option involves the excavation of ditches and channels, their cementing, the introduction of galvanized steel columns in the cement to support the structure, the positioning of transverse cement beams over these columns, after which the aluminum profiles will be positioned, over which they come solar panels.

Due to the composition of the land, more clayey, resulting from the geotechnical study, it appears that the second constructive option is much more suitable for the solar installation in question. The operation mode of the photovoltaic system is shown in figure 2.

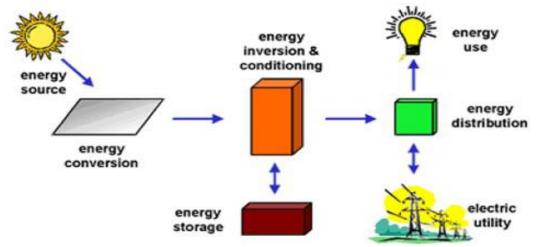


Figure 2. The operation mode of the photovoltaic system in Avram Iancu commune *Source:* Solar photovoltaic park feasibility study, Avram Iancu commune, Bihor country

From the perspective of project management, the realization of the solar photovoltaic park in Avram Iancu commune in Bihor county involved the following distinctive elements:

- in the project definition phase, the life cycle approach is used, representing the stages of feasibility, design, implementation and exploitation;
- project objectives are formulated, but they only partially correspond to the characteristics of some SMART objectives.
- two stakeholders of the project are highlighted (Bihor County Council and local public authorities from the Avram Iancu commune), but it is not clear how the Town Hall of the commune is involved in this project;
- there is a detailed list of project activities but the project WBS has not been identified;
- the project is not part of a strategy local or national policies;
- there are cost estimates (general investment estimate and project budget) but no cost control system is presented.

Although this environmental project carried out in Avram Iancu commune is an innovative one, it presents a series of missing elements:

- focusing reports exclusively on the implementation period;
- the lack of links with strategies and policies at the local or national level, the concrete expression of which should become the project;
- the lack of concrete forms of association between stakeholders in order to exploit the project;
- project risks are not identified and response actions are not provided.

The realization of the photovoltaic solar park project in Avram Iancu commune, Bihor county involved a series of elements of good practices that could constitute the object of knowledge transfer: the detailed identification of the project activities and the initial cost estimates (realized in the form of the general estimate of the investment In addition, for certain elements in the project (photovoltaic panels) there is the prospect of recycling.

#### 4.3 Comparative analysis of project management

Taking into account the elements described in the two case studies regarding environmental projects carried out in Romania and Iceland, the following table presents a comparative analysis of project management in the two projects. In order to be able to determine the amplitude of the gap, a scoring system was used in which the scores given have the following meaning: scoring 0 – the non-existence of the methods/techniques/practices that define the element/component of project management; 1- the use to a reduced extent of the methods/techniques/practices that define the element/component of the methods/techniques/practices that define the element; 3 – the intensive and widespread use of the methods/techniques/practices that define that element.

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		estimation issues				
7.	Communication management. Progress reporting	Extensive reporting system. Difficulties in the relationship between stakeholders.	3	No reporting system is identified	1	2
8.	Risk management	Risk identification shall be carried out. There are no records of risk analysis and response.	1	Risks are identified. No records of risk analysis and response appear.	1	0
9.	Resource management	Resources are allocated. No techniques for allocating and leveling resources are used.	1	Resources are allocated. No techniques for allocating and leveling resources are used.	1	0

Source: own processing based on the documentation of the Gaja (Iceland) and Solar Photovoltaic Park Avram Iancu (Romania) projects

The comparative analysis of the project management in Romania and Iceland revealed a series of gaps in the realization of the projects in the two countries. The gaps between the project in Romania and the one in Iceland appear in terms of the political relationship – strategies – programs-projects, the relationship with the stakeholders, the reporting of progress. There are a number of components of project management where even if no gaps occur, the two projects score scores that mark a lower level of use of specific methods/techniques and practices (time, cost and risk management).

# 5. DISCUSSIONS. FUTURE PERSPECTIVES

The results of the comparative analysis of the case studies show that there is a low degree of use of methods and techniques specific to the management of time, cost and risk, thus confirming some results recorded in previous research also of a comparative nature regarding the management of environmental projects in Romania and Iceland (Simion et al., 2021). Also, the results of the comparative analysis are correlated with those obtained in previous research of a comparative nature regarding the design of the company and maturity in project management, obtained by Schoper et al. (2018) regarding Iceland and by Gareis and Huemann (2019) regarding Romania.

The existence of the gaps revealed by the comparative analysis between the two projects creates the prerequisites for the transfer of good practices in the environmental projects carried out in the two countries. Thus, a series of good practices can be transferred from the Gaia project regarding: the relationship with stakeholders, the relationship between policies-strategies-programmes-projects. The project carried out in Avram Iancu commune also reveals a series of good practices that can be the object of a transfer of good practices.

The logic of the transfer of good practices is presented in the following scheme (figure 3).

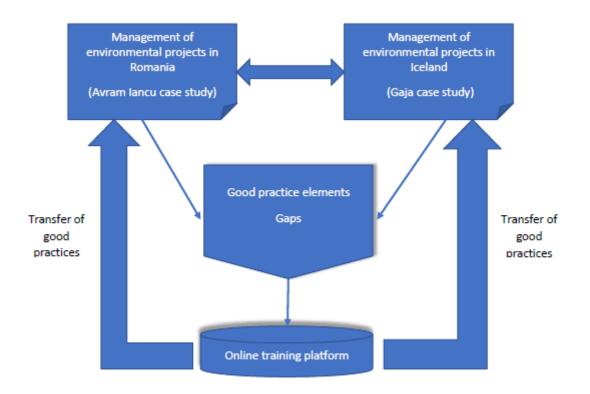


Figure 3. Approach to the transfer of good practices in the project " Environmental Education – OERs for rural citizens (EnvEdu-OERs)"

The transfer of good practices achieved through the platform created through the "Environmental Education - OERs for rural citizens (EnvEdu-OERs)" project, in which three Romanian universities are involved (Transilvania University of Brasov, Bucharest University for Economic Studies, Gheorghe Asachi Technical University from Iasi) and one from Iceland (Reykjavik University) will be realized not only through the course modules but also through the policy recommendations that will be published on this platform. The existence of such international cooperation projects favors the transfer of knowledge and good practices.

The "Environmental Education - OERs for rural citizens (EnvEdu-OERs)" project constitutes a framework for the transfer of good practices through training modules developed for environmental education (one of which is dedicated to environmental project management), designed for dissemination through a dedicated platform intended for users in both countries. The training modules are designed from the perspective of ensuring continuous training, especially for citizens from rural areas (Finger et al., 2021).

## 6. CONCLUSIONS

In this study, the characteristic elements of environmental projects and the management of environmental projects in Romania and Iceland were analyzed in a comparative approach, based on case studies and elements of good practices. Based on the developed research methodology, two case studies were selected, one in Iceland (the Gaja project) and one in Romania (the project to build a solar photovoltaic park in Avram Iancu commune) for which the main specific elements of project management were analyzed. The case studies highlighted a series of elements synthesized in the comparative analysis and allowed the highlighting of existing gaps in the management of projects in Romania and Iceland as well as elements of good practices transferable between the two countries.

The comparative approach revealed the existence of some gaps between the project to build a solar photovoltaic park in Avram Iancu commune and the Gaja project in Iceland (involving the biogas and composting station), especially in terms of the relationship between policies - strategies - programs and projects, the relationship with stakeholders, progress reporting. There are also a number of project management elements (time, cost and risk management) where projects in both countries appear to have a lower level of use of specific methods/techniques and practices. The research carried out thus confirms some results from previous studies carried out by Simion et. al. (2021), Schoper et al. (2018) and by Gareis and Huemann (2019).

The gaps regarding the two environmental projects but also the highlighted good practices create the prerequisites for a transfer of knowledge through platforms such as the one used in the "Environmental Education - OERs for rural citizens (EnvEdu-OERs)" project. They favor the transfer of good practices which, together with other theoretical-methodological elements included in modules intended for continuous training, will contribute in each of the two countries to the amplification of inter-project and intra-project synergies.

The research that has been the subject of this article is of course limited to the two environmental projects considered for the case studies. Therefore, in the research that will be carried out in the future, we will expand the number of case studies and the scope of the research on other types of environmental projects so that other elements of good practices transferable between the two countries are obtained.

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