Technological and Economical - Ecological Concept in the Construction of Line Structures

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Abstract. The proposed concept presented is a significant contribution (with economic impact) in the supporting segments of the strategic long-term solution of the development of the motorway and railway network in the Czech Republic. The content of this study and, above all, the clear recommendations in its conclusion on how to proceed in the field of compensatory measures for the design and construction of line structures clearly describe the methodology and procedures for achieving significant savings in the scope of planned construction in future projects compared to current approaches. The key parameters for success in achieving the presented objectives are the introduction of an environmental audit in the preparation phase and sustainable ecological functionality in the implementation and operation phases. The system correlates with the priority axes of economy and innovation, landscape, ecosystems and biodiversity and land development. The strategic framework defines the vision of sustainable development in the Czech Republic, defines the basic principles of sustainable development, measuring indicators and defines key priorities and objectives of sustainable development, divided into five interrelated priority axes. The implementation of the priorities and objectives proposed in the strategic framework is intended to ensure that the prosperity of the Czech society stands on the mutual balance of the three pillars of sustainable development - economic, social and environmental.

1. Introduction

Territory development is based on the fact that all development is realized in a certain territory, see [1], [2], [3], [4] and [5]. A key element for sustainable development in the area is the responsible approach to spatial planning and its consistent implementation. This will meet the requirements for territorial cohesion and quality of life. Landscape, Ecosystems and Biodiversity: Focuses on landscape care as a basic prerequisite for biodiversity conservation. It deals not only with responsible farming in agriculture and forestry, but also with the issues of adaptation to climate change.

Three main objectives of this study are defined: economics, processes and communication. In economics of environmental measures, savings are achieved over a time horizon, with highly effective approaches and process changes. Introduction of a new procedural and content approach to solving the issue of large compensation measures in the construction of highway development plans. Have a strong and proven PR tool in the system for communicating with stakeholders in the form of proactive and positive solutions to environmental issues with a strong argumentation level based on a professional background. Introduce a cross-sectoral and more critical solution that is comprehensive and pursues the principles of sustainable construction (3 pillars of sustainable development) as one of the EU’s priorities,
thereby achieving valid availability of subsidies on the issue at specific points of the EU development strategy. This will ensure the full funding of the projects monitored from EU subsidies.

2. Designing a new concept
As can be seen from the background, the solution currently used is a viable, realistic solution and also suitable for assessment. A number of implemented objects were thus evaluated economically as well as on the added value of functionalities. However, the assessment of the current situation does not confirm the achievement of original expectations. In addition to the compensations thus carried out - simply referred to as the "ecoduct solution" - a new solution is available, which is referred to as the "Corridor Solution". These designations symbolize the predominantly form and content of the solution, there is no single solution preferred to 100 percent or another rejected as non-functional.

The concept presupposes such application of compensatory measures that are innovative, proactive in processes, behaves highly proactively and finds a more critical solution on the principles of sustainable development in ecological and economic coherence, perceives the high importance of uniform ecological audits of all projects and prefers the solution of the corridor based on research, analysis and multi-disciplinary analyzes) more than the ecoduct solution. more than the ecoduct solution.

3. Migration objects
When using the word “ecoduct”, we should explain in more details the real meaning of this. First, constructively. The term ecoduct is related to a multi-purpose construction, a bridge, a green bridge, a special bridge, an object, an eco-object, a building, etc. The word bridge (green, special) should not be used as one of the (good) way if a tunnel. A more general term "building object" is recommended. Among the materials, reinforced concrete (not obvious advantages, especially economic, with pre-stressed upper belts), new wooden vaults are tested, the question remains unverified life. Statically the most widespread vaults are monolithic and prefabricated of various shapes, either one over the entire motorway or one arc for each direction. In justified cases, there can be no objections to frame constructions or other static solutions.

For what purpose are ecoducts built? There is already a mixed mix of opinions, all very different. At www.ceskedalnice.cz [6], it can be found that the aim is to "maintain the link between the environment and the migratory routes of the animals". Here, it can be argued that the continuity of the environment can be interrupted, but it does not have to trigger the need to address migration at all. If we already encounter a conflict with the migration route, the solution may not be just the ecoduct. The migratory route can be converted in appropriate measures or possibly designed a modified bridge object, which must be in a given location for another reason. It does not specify what animal we are dealing with. It could be mentioned whether it is an existing migration route or a future one. We can move the current migration route to some other advantageous location (for example, under an estacade) under certain circumstances and the need for the ecoduct will be dropped. However, as a brief layman's definition, it is not bad.

It can be heard that "the ecoduct is an object that allows animals to migrate through the highway". At first glance, we can see the weakness of this definition, if we really mean all the animals, we should probably have just ecoducts (and no "normal" bridge). Here it is clear that the animals should be specified.

The author of the text is close to the view that the purpose of the construction of the ecoduct is to "enable the migration of wild protected larger mammals in order to prevent fragmentation of populations." Objections to this claim are obvious. Why protect only the larger mammals, what else do they protect and protect animals? Is not there enough ground fragmentation? Why demand fragmentation of populations? How to find and prove it? Answers are mostly economic. Can today explain to taxpayers the need for billions of investments to enable the migrating of donuts, which many regard as breeding animals? By adopting this definition, none of the already built ecoducts in the Czech Republic could be considered an ecoduct, which would also bring problems.
Another question is whether the declared purpose is to be the only, predominant, major or at least minority. Here the author clones to the prevailing opinion, if we insist on one, the ecoducts would be very few. More important is at least partial functionality. The proposed categories of ecoducts could contribute to better decision-making, whether planning, building or improving functionality. All should apply only to category A, with Category B reservations.

3.1. Category A
The ecoduct, in which the predominant reason for its implementation was to allow wildlife migrations to prevent fragmentation of populations. Functional for the migration of protected larger mammals. Its failure would most likely mean fragmentation of populations. Economically and ecologically justifiable and defensible investment.

3.2. Category B
The ecoduct, where the predominant reason for its realization was to allow the migration of wild animals. Functional for the migration of protected larger mammals. Its failure would not cause fragmentation of populations. Economically and ecologically justified investments.

3.3. Category C
The ecoduct only works for migrating other animals. Its failure would not cause fragmentation of populations. From the ecological point of view, it is difficult to justify, economically wasting public funds.

3.4. Category D
The ecoduct does not work for middle and larger mammals. From the ecological and economic point of view, the wasteful use of public funds. Virtually not an ecoduct.

3.5. Definition
The final draft definition could read as follows: The ecoduct (green bridge, wildlife crossing) is a building over a line structure (most often a highway, a highway) where the predominant (ideally the only) reason for its implementation is to enable migrations (and migration actually occur) of wildlife, especially protected larger mammals where the situation cannot be solved more effectively.

4. Structure of the new solution
It is a system that has two strategic phases. Project preparation and all processes related to the right design with long-term functionality and full functionality (labelled as environmental audit) prior to implementation. Environmental auditing is a very concrete procedure, as at the various stages of project planning and preparation of buildings there must be complex views on the projects of compensatory measures. Each measure must have a variant solution, it must be assessed and evaluated in accordance with the new methodology of migration potential. The proposed measures are in line with the principles of conception and the principles of EU grant funding on the priority axes. Each project must go through and have an environmental audit certificate in accordance with the methodology.

Implementation and operational phase which, both in process and in the legislative (ownership), will ensure the long-term and stability of the proposed solutions (identified as sustainable ecological functionalities - environmental measures integrated into the framework of sustainable development). Long-term monitoring of the solution is necessary. The solution must meet the requirements of all the authorities concerned (e.g. state-owned migration corridors). Ensuring long-term maintenance by a specialized entity is a critical success factor - here defined as sustainable ecological functionality - to ensure that the investments invested bring the expected added value to our case, it is apparent that an underpass’s technical and ecological migration potentials need to be used as inputs for the analysis. Another important input is total costs, which means costs for preparations vehicles.
When endeavouring to increase a bridge’s technical migration potential, the first options offered are to increase its span (widening the overpass) and suitably to modify the surface under the bridge.

5. Conclusions
The presented study assessed and analyzed the current and the status and then suggests in line with the reachability of the goals. To achieve the goals, the action plan, measurement parameters and realistic implementation dates are set. Goal completions are indicated as follows:

5.1. Main objectives: Economy
The presented solution ensures in the form of stabilization of processes and feedback the real economic viability of economical savings and thus will very strongly support a new approach to the economic construction of the infrastructure fixed in the proposed conception.

5.2. Main objectives: Processes
The proposed system provides stability and functionality in the two crucial stages of implementing compensatory measures. Designing - here in the form of Ecological audit of project approaches. Implementation, long-term operation - here through the observation and monitoring of ecologically sustainable functionality. Processes such as feedback, long-term monitoring, multidisciplinary interlinking, etc. are standards that are not available in today's implementations, and proposed system introduces them.

5.3. Main objectives: Communication
If a clear system is available to address sustainable development issues (economics / ecology / social relations) - then there is a tool for strong proactive communication and a positive presentation - communicated problems, including those often leaning on a media wave unrealistically unjustified) requirements.

5.4. Secondary objectives: Economy
The entire system is designed in accordance with the priority axes, so that the use of subsidies is possible, respectively. is one of the basic axioms in ensuring the implementation of compensatory measures. All necessary measures, requirements, etc. are embedded in the proposed system.

5.5. Secondary Objectives: Ecology
The system makes it possible for the state authorities to exert pressure on the cooperating organization and puts the organization in the hands of a tool for the realization of developmental ecological activities - especially in relation to the sectoral activities and obtaining extensive support for investments from EU subsidies or other sectoral resources.

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