

# PROBLEMS OF APPROACH TO TRANSPORT INFRASTRUCTURE PROJECTS

## ПРОБЛЕМЫ ПОДХОДА К ПРОЕКТАМ ТРАНСПОРТНОЙ ИНФРАСТРУКТУРЫ

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**Abstract:** *The paper deals with the problems of transport infrastructure projects. First it characterizes transport infrastructure constructions and their specialities. Afterwards it is focused on investment projects, their life cycle and the process of projection. Finally it concentrates on decision-making concerning the investment project's realization, mainly on documents important for decision-making and on its process itself.*

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**KEYWORDS:** TRANSPORT INFRASTRUCTURE, INVESTMENT PROJECT, PROJECTING

### 1 Introduction

Transport supply is influenced by a whole range of factors. One of them is naturally the level of transport infrastructure, which is the essential prerequisite for transport system functioning. Problems of approach to transport infrastructure projects are connected with it and this paper is focused on them.

At first it is necessary to define the term “project”. It generally means a complex of mutually connected actions, measures and expenses that are orientated to the achievement of specific targets in a given field and time period in the extent of available resources.

The main problem from the economic point of view is the appraisal of money invested in particular projects, in this case the projects of transport infrastructure development, which must be in compliance not only with effectiveness criteria but also with transport policy targets and social benefit.

### 2 Specialities of transport infrastructure constructions

Transport constructions are an independent category of constructions; they serve land, water and air transport, both stationary and moving.

Transport constructions are often connected with some engineering constructions like bridges, tunnels, building constructions generally, retaining walls, embankments and cuts or some water constructions like dams, weirs, reservoirs and watercourse adjustments.

Tasks connected with proposal, realization and operation of transport projects are influenced by certain specialities of transport infrastructure constructions, which can be characterised in the following way [1, 2]:

- the appraisal of transport routes and their reproduction was carried out mainly through technical and transport engineering aspects for a long time. Money invested in networks of communication were judged by methods and techniques used in productive sphere. This situation doesn't correspond to present requirements any more,
- transport sector development and its wider social and economic context require a corresponding approach to the appraisal of transport routes reproduction, not only from the point of view of budget expenditure but also from the standpoint of financial effectiveness and social benefit,
- it is necessary to take into account changes in so-called affected part of networks of communication (among networks and also within them),
- long-term serviceability of particular infrastructure constructions (long time period of serviceability with necessary capacity reserve for long-term operation

maintaining without significant additional modifications, emphasis on long-term targets)

- multilateral effects complicate the appraisal because of their different types, difficult comparability and unequal impacts in the course of the time,
- non-uniformity of utilization in the course of the time (days, weeks, years) has a great impact not only on operational conditions but also on awakened costs. It requires the use of new appraising methods for the evaluation of positive and negative impacts in the course of the time,
- networks of communication utilization is not monitored sufficiently (especially in road system) and so it doesn't enable direct calculations of costs and savings. It requires to improve statistical methods, operational investigations and estimates,
- relatively high demands on investment means and their long-term accumulation.

### 3 Investment projects

The term “project” can be generally explained as an intention of making an important change, which can be characterised by further conditions [3, 4]:

- it determines targets in advance, which are set in interdependence, namely materially, economically and in the course of the time; it also determines funds for the targets achievement and resources from that these funds will be acquired,
- participation of more subjects (natural persons or corporate bodies) with various proficiency and various roles in preparation and realization of the project,
- complex, system approach (process is acyclic, unrepeatable),
- understandable structure and determination of environment.

#### 3.1 Life cycle of the project

We can differentiate several stages in preparation and realization of the project [5, 6]:

- preparatory stage (A),
- complex solving of the project (B),
- elaboration of the realization documentation of the project (realization preparation stage) (C),
- realization of the project (D),
- verification and proving (E),
- usage (operational stage) (F).

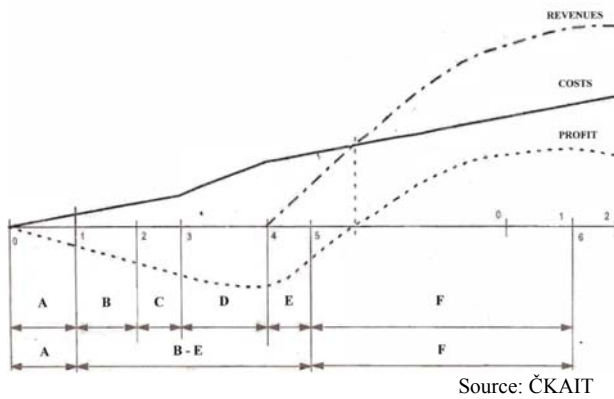


Fig. 1 Stages of preparation and realization of the project (costs, revenues, profit)

From the standpoint of long-term investment and strategic development at the level of higher innovations it is possible to unit the above mentioned stages into only three ones [7]:

- pre-investment stage (A),
- investment stage (B - E),
- usage stage (operational stage) (F).

The above mentioned stages of the project represent so called life cycle of investment projects, which is depicted in the figure 1 and in the table 1.

Table 1: Life cycle of the project

PRE-INVESTMENT STAGE	Identification of possible projects (alternatives)
	Preliminary selection of a project or an alternative
	Preparation of the project
INVESTMENT STAGE	Complex solving of the project
	Elaboration of the realization documentation
	Realization
	Verification and proving
OPERATIONAL STAGE	Operation
	Operation maintenance
	Expansion and utilization changes, possibly liquidation

Source: ČKAIT

The financial analysis of the project requires the analysis from this complex standpoint that means including all stages of its life cycle. It is necessary for decision-making concerning future realization of the project in its pre-investment (preparatory) stage.

### 3.2 Projection

Projection means a process (complex of activities) in that documentation of the project originates with the use of specific methods and means (e.g. computer graphics) [4].

Main functions of projection are following [8]:

- to define targets of the project and develop them to a needful extent,
- to analyze possible solutions of the project and recommend the optimal variant, both from the standpoint of the projected object and the method of realization of the project,

- to complete solving in particular stages to that extent to be possible to fulfil the role of each stage with the use of the relevant documentation.

According to special demands it is useful to differentiate following types of projection:

- conceptual (proceSSIONAL or technological), which solves internal relations of the project,
- situating, which solves external relations of the project (e.g. architectonic, technical, ecological),
- detailed (professional),
- economic, namely financial analyses and calculation of acquisition and operational costs,
- projection of a procedure and preconditions concerning realization of the project.

Preparation and realization of the project are typical by the fact that private and public interests meet here in a significant way [9, 10, 11]:

- in the Czech Republic private interests are regulated mainly by civil code and commercial code, they are aimed at project's targets achievement and its effective and quality preparation and realization (activity authorisation and contracts),
- public interests are regulated by building law and related legal regulations, which are aimed at:
  - adequate area utilization,
  - safe construction performance,
  - adequate and safe construction usage.

Public interests are pursued by way of [9]:

- administrative procedure (when the construction and its usage are authorized),
- construction supervision in the course of the construction.

Important administrative procedure is [9]:

- area proceedings, the aim of which is a zoning and planning decision concerning construction location in a given area,
- building proceedings, the aim of which is a building permission for construction realization in a given area,
- approval process for reaching a certificate of practical completion, only which enables to use the completed construction.

Building office is an administrative authority in the sense of administrative code with competence in these problems. The building office's competence in the case of railway, road and air constructions belongs to public service authorities according to special legal regulations (so called special building offices, e.g. the Ministry of Transport of the Czech Republic) except for problems of zoning and planning decision-making or expropriation [9].

In the administrative procedure concerning transport infrastructure projects is also very important to judge the impact on environment if law lays it down [9].

Participants of processes in preparation and realization of transport infrastructure projects are corporate bodies or natural persons, mainly in the following functions:

- investor – he puts financial means into the project for the purpose of profit or other benefit (e.g. public good),
- owner – the construction is realized for the benefit of him (publicly responsible person),
- user – the construction as the result of the project will be used by him,
- designer – person with authorisation who masters processes necessary for preparation and realization of the project, elaborates the documentation of the project in required extent and supplies the investor of the project with it,
- contractor – generally person who puts some fulfilment for the benefit of preparation and realization of the project under a contract,
- superior contractor – he ensures contractor's engineering of the construction.

If it is not necessary to differentiate the functions of the investor, the owner and the user, the term investor stands for all of them [4].

If the project is financed from public funds (state budget or public ones), contractors selection is regulated by the law concerning placing of public contracts [9]. It refers to most transport infrastructure projects.

#### **4 Decision-making concerning the investment project's realization**

##### *4.1 Documents for decision-making concerning the investment project*

Documents that are supposed to provide an optimal amount of quality information for the major decision concerning the realization of the transport infrastructure project and its conceptual variant can be called "documentation of the project's preparatory stage". Its extent, content as well as processing procedure can be very different according to:

- type and characteristic of the construction,
- determined procedure of the decision-making process concerning the investment project and its conceptual variant, that means according to distribution and progress of work in the project's preparatory stage.

The documentation of the project's preparatory stage has usually the form of a technical economic study, which is supported by required documents (e.g. by the text of the contract about land purchase, the zoning and planning decision etc.).

As a suitable form of the technical economic study is usually regarded the Feasibility Study [12]. Outline studies are called variously (e.g. Preliminary Study or Prefeasibility Study) [12], in the Czech Republic sometimes also "business plan" or "investment design" etc. It is useful to elaborate the Preliminary Study in the same structure as the final Feasibility Study. Differences will be especially:

- in the rate of elaboration and hereby in the rate of data reliability,
- in documentation, which is dependent on decisions of state administration authorities or acceptance of commitments by contractual partners,
- in elaboration costs.

While the Feasibility Study may usually work with the tolerance of maximal 10 %, which is covered by budget reserves, usual inaccuracy in the case of the Preliminary Study can be up to 20 or 25 % [13].

A special type of the technical economic study is so-called Opportunity Study [12], which is supposed to compare profitability of investment in various spheres of business, like to find an optimal allocation of disposable investment means. In all opportunities it is useful to compare the spheres that correspond to the chapters of the Feasibility Study. This comparison is often based on usually available documents and estimates and so final recommendations can be documented with possible tolerance of 25 % and sometimes up to 30 % [13].

##### *4.2 Decision-making process concerning the investment project's realization*

The most important decision, by which the investment project's preparatory stage is closing, is the investor's decision as to whether the project will be realized or not.

The decision-making process in a given case is based on the Feasibility Study and the decision of a competent person or authority must provide the optimal amount of information:

- about the project's targets and possibilities of their achievement in the recommended place of the construction,
- about the conceptual variant, which ensures the project's targets achievement in the optimal way, that means

mainly information about the optimal variant of the construction, its usage (operation) and the optimal process of the construction.

If it is decided in favour of further preparation and realization of the investment project, it is possible to regard all further decisions in the course of it as secondary because they mustn't change the conditions on them the decision was made. In the contrary case new decision-making at this level must be realized. Some procedures of the decision-making process concerning the investment project are usual (standard) [5, 14]:

- the investor decides the project and its conceptual variant in one step on the basis of the properly documented technical economical study. Such procedure is usual in the case of uncomplicated and lesser projects or when the investment is intended for superior targets achievement, possibly if it is necessary to enlarge assets quickly (e.g. in business). Disapproval is connected with the requirement to prepare other variant promptly in such case.
- the investor decides on the basis of the Preliminary Study if preparation of the project will continue. If he decides positively, consequently the Feasibility Study will be elaborated and documented. Such procedure is usual in the cases when the investor considers if the project should be ever realized. In the case of larger and especially more complicated projects the decision-making process can be cyclical, e.g. for the purpose of conceptual variants gradual elimination,
- the investor has own or available financial means and looks for their optimal placing (at a given risk degree) e.g. by means of an investment project. In such case the Opportunity Study is elaborated at first and on the basis of it then the investor proceeds in the case of investment in the particular project. This procedure needn't relate to business only. It can be chosen also in the case of decision-making how to invest money in public interest as effectively as possible.

We shouldn't ignore the procedure when the investor decides only on the basis of a construction plan, possibly documented by the zoning and planning decision and further documents according to regulations in force, without complex elaboration of the project's targets and variants of procedures for their achievement. Such procedure can be accepted as a standard one only for investment projects with simple or small constructions.

## **5 Results and discussion**

The ground of conceptual decision-making concerning the optimal variant of the investment project is decision-making about:

- conceptual solving of the construction from the standpoint of its usage (operation), which would ensure the project's targets achievement,
- optimal process of the construction, which would minimize risks connected with the project at the same time.

An approved conceptual variant of the construction, its usage and process of the construction will be decisive for subsequent elaboration of the documentation concerning complex solving of the project and at the same time for the way of placing of this documentation elaboration. In this stage will be elaborated a final variant of the approved conceptual variant, which will be realized afterwards. This stage will be finished by making contracts with those who will realize the project.

Any variant mustn't threaten the fulfilment of the project's targets and exceed an adequate risk degree.

Subsequently the optimal variant how to solve external context of the construction (especially construction funding) will be decided. Decision-making concerning the construction procedure will be focused mainly on the choice of the optimal way of the construction with the orientation on risks minimization. Looking for

the optimal variant in external context as well as in the way of the construction can cause reappraisal of the optimal variant.

## 6 Conclusion

Great opportunities in decision-making concerning realization of transport infrastructure projects are offered by present technology of projecting including adequate software products. For some types of constructions are available really advanced technologies. Their importance lies not only in process acceleration but especially in the possibility of better decision-making concerning the project's variants with regard to economical as well as environmental aspects.

As for the philosophy of approach to transport infrastructure projects, in this paper there are used concepts, terminology and principles from the methodology of the United Nations Industrial Development Organization. This methodology is used and accepted internationally and is implemented also in the Czech Republic in the sphere of construction projects. The methodology and its software serve for internationally comparable financial and economic analysis of construction projects.

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