

Large City Circle Road Brno

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BRIEF INTRODUCTION TO THE PROBLEM: BRNO IS THE SECOND LARGEST CITY IN THE CZECH REPUBLIC. IT IS LOCATED IN THE CENTRAL PART OF EUROPE, AND WITHIN A DISTANCE OF TWO HUNDRED KILOMETERS THERE ARE OTHER IMPORTANT EUROPEAN CAPITALS: PRAGUE, VIENNA AND BRATISLAVA. Brno is situated at the crossroads of the D1 (Prague - Brno) and D2 (Brno - Bratislava) motorways. Both of these motorways form part of trans-European East-West (France - Ukraine: E50) and North-South (Scandinavia - Balkans: E55, E65) highways. This means that Brno needs very good road connections inside the city. The Large City Circle Road Brno will solve this problem. Its circular length of 20 km will be one of the most important elements of the Brno transport system. It will become the fastest connection between the external and internal parts of the city and divert much of the transit traffic. This paper deals with the introduction of this important megaproject.

Purpose: This paper focuses on the management process of this megaproject, the relationship among the individual parties and it aims at identifying critical risks in managing the project.

Design/methodology/approach: Searching for available resources and their analysis, interviews with project partners, the author's own calculations and conclusions according to the information obtained.

Findings: Analysis of main risk factors connected to the realization of megaprojects, drawing conclusions from this analysis and evaluation of difficulties in the context of their managing processes.

Keywords

Megaproject,
Risk management,
Project management

Description of the present state

The main objective of this paper is to define the issue of identification and management of risks in construction projects and to use the case study of the Large City Circle Road Brno to identify and partly evaluate the most common risk factors connected with the preparation, realization and operation of megaprojects.

Megaprojects are projects characterized mainly by their financial and organizational difficulty and long time horizon. Detailed information about approaches to megaprojects and their determination is described in (Priemus and Flyvbjerg, 2008). Approaches to risk evaluation of megaprojects have been discussed by many authors in a number of publications, and it is very important to choose the appropriate point of view to best be able to analyze risk factors. A basic approach to risk evaluation of investment projects is defined in (Fotr and Souček, 2005). According to this approach, it is necessary to place an emphasis on identification and determination of risk factors and evaluation of their significance. This is the only way to not overlook any important risk factor and to consider it in the evaluation. The application of mathematical and statistical methods for the real risk assessment may then follow. This idea is also the main subject of the present paper. The risks of megaprojects are also taken into account in (Locatelli and Mancini, 2010). Four basic areas are defined which must be taken into account in the economic and financial consideration of megaprojects. It is important to monitor a number of risks: the risk of costs for construction, maintenance or management; the risk of demand and estimated revenues from the project respecting its nature; the financial risk connected with availability of financial resources and development of interest rates; and finally the political risk influencing the legislative background of megaprojects. There also exist many other kinds of risks connected

Category of risks	Group of risks
Risks of construction, technology and project	Construction and project risks; Site risks; Failure of technology, utilities and related services.
Credit risks	Liquidity risks; Default risks/Availability risk.
Market risks	Demand risk; Favored competition; Inflation risk.
External risks	Political risks; Force majeure; Other external risks.
Operational risks	Equipment/facility risks; Labor risks; Security risks.
Strategic risks	Contractual risks; Violation of generally binding regulations (law); Strategic decision.

Table 1 General category of risks

with megaprojects. A possible means of determination and classification is set out in (Edwards, P., 1999). According to the nature of the megaproject, the environmental risk may be very important as well. The environmental risk connected with the realization of megaprojects in the area of airport infrastructure, which may in some cases be comparable with other megaprojects in the area of transport infrastructure, is discussed in (Chen and Li, et al. 2011).

The risk connected to megaprojects should be projected onto their economic evaluation. This projection is possible in cost-benefit analysis (Priemus and Flyvbjerg, 2008). CBA in the area of roads and highways is discussed by a team of Canadian experts (Litman, 2005). The economic evaluation of investment projects in transport infrastructure in British Columbia is the main topic of (Waters, 1992), while problems of efficiency of megaprojects in the context of a feasibility study are solved in (Mina-sovitz, 2009).

Respecting the risk and uncertainty in decision-making about project issues in governance of the project is discussed in detail in (Sanderson, 2012) and (Dunović, 2010).

Risk analysis of megaprojects

This chapter presents a brief summary of the possibilities for identifying and evaluating risk factors connected with the realization of projects. The first part of the chapter is focused on the general classification of risks (Smejkal and Rais, 2005), while the second part deals with the general problem of identification of risk factors and the assessment of their significance (Fotr and Souček, 2005).

Classification of risks

Risks that may affect the evaluated megaproject can be examined from many points of view.

Some authors look at this process according to social, technical, economic, environmental and political (STEEP) criteria related to the built, social and natural (BSN) trinity environment (Chen Zhen et al.). Other authors, however, manage risks according to the direct impact on the results of the project - risk of costs, risk of demands, financial risks and markets and political risks (Flyvbjerg et al., 2002, 2003). Considering that most of the megaprojects in the Czech Republic are realized with support from public resources, the risks of megaprojects may be solved in the context of groups

that are also used for the management of risks of PPP projects in the conditions of the Czech Republic. Monitored groups of risks are determined in table 1 (catalogue of risks of PPP projects available at <http://www.pppcentrum.cz/res/data/006/000777.pdf>)

Identification and significance of risk factors of the project

Defining risk factors and evaluating their importance are the basic steps for risk management of the project. The project risk factor can be characterized as a variable, whose possible future development could positively or negatively affect the success of the project. The success of the project can be viewed from many perspectives depending on the character of the evaluated project. Economic evaluation of commercial projects is based mainly on the analysis of cash flows; for non-commercial projects a criterion may be used which is based on the cost of the project and evaluation of benefits that are associated with the particular project. Identification of risk factors is not a fundamentally difficult issue, but it places heavy demands on the experience and expertise of the evaluator. In order to identify project risk factors, one can use e.g. the breakdown of the project. The project can be analyzed from the time aspect and material aspect. In terms of time the project can be divided into the following phases of the project life cycle: pre-investment, investment, operation and liquidation. The division into these phases of the project can greatly simplify the identification of risk factors, because each phase of the project life cycle is characterized by different risks, often the same across different projects. From the material aspect the project can be divided according to the number of aspects, such as the technological aspect, target groups, products or customers. Another way of facilitating the determination of risk factors is to determine areas where the project is vulnerable, potential problems and possible fail-

ures, not only from a technical perspective, but also in terms of organizational, personnel, administrative and business perspectives. To detect all risk factors of the project is appropriate to determine the also significant risk factors affecting the results of the project that were previously regarded as certain. There are only a very small number of project inputs, whose development can be considered certain, it is appropriate to argue with the values of the factors that were not due to their stability deemed to threaten the project. Important advice in identifying risk factors is to use the post audits of projects realized in the past, as some risks are associated with the majority of completed projects (Fotr and Sou ek, 2005).

Within a risk management system, various tools for identifying risk factors can be used. An especially useful tool are help-sheets containing lists of questions arising from the experiences associated with the realization of previous projects or checklists containing an overview of potential risk factors that might affect the project. It can also be very beneficial in this area to organize interviews with experts or group discussion. The result of identifying risk factors is an overview of all risk factors that may influence the project or investor. For individual risk factors, the level of importance of their negative impact on the project should then be determined. Determination of the importance of risk factors is another very important step in risk analysis. The significance of a particular risk factor provides us with information about the need for further detailed analysis to determine the total amount of risk, or whether it is only a residual risk, which the organization is willing to accept and which is therefore not further analyzed. To determine the importance of a risk factor, expert evaluation and sensitivity analysis are especially distinguished.

The essence of the expert evaluation lies in the determination of the probability of risk factors and the intensity

of negative influences. An aggregated or detailed approach to evaluation can be used to determine their importance by means of an expert evaluation of risk factors. Aggregate access to an expert assessment of the importance of risk factors collectively assesses the impact of risk factors on the results of the project and its success (investment performance of the subject, the indicators of efficiency, financial stability). The probability of the occurrence of risk factors and their intensity can be ranked on five levels: extra-small, small, medium, large and extra-large. Factors considered as the most important are those whose probability of occurrence and intensity of negative impact are at least medium-level, and those factors whose probability is small, but the intensity of their negative impact is particularly high or very high.

A detailed assessment of the importance of risk factors assesses the impact of risk factors on the project for each factor separately. In general it may be in the interest of the investor to examine the effects of partial risk factors such as quality of supply, realization time, difficulty of maintenance at the time of operation, etc. The risk factors are mainly project inputs; the threatened results are especially the project outputs (partial results to be achieved within the project). In the case of problems discussed within the framework of this chapter, mainly the impact of identified risk factors on project outcomes in terms of selected criteria indicators is studied. The sensitivity analysis consists of the determination of the sensitivity of certain economic criteria (NPV, profit, costs) on factors that affect this criterion (the demand for production and capacity utilization, selling prices, raw materials prices, capital costs, interest rates, tax rates, etc.). Factors that cause a small change can be regarded as of little importance, while the factors causing a large change are then regarded as significant (Fotr and Souček, 2005).

General characteristics and dimensions of the project

The Large City Circle Road in Brno after its completion will be one of the most important elements of the transport system of the city of Brno. The road circuit passing through the neighborhoods outside the center will be directionally split speed communications type. It will allow quick and smooth movement of cars from one side of the city to the other and lift an unacceptable traffic burden from many main streets. The circuit length of 22.7 km will become the fastest route between the external and internal parts of the city and will convert a large part of transit traffic. The circuit construction of interchanges with major cross streets will significantly reduce travel time across the city.

This project is technically, financially and organizationally extremely difficult and time-consuming. It includes a number of sections and sub-sections, often very difficult constructions. The project includes, among other things, 27 interchanges, 1 intersection, 8 tunnels and 4 flyovers. This extraordinary difficulty is mainly based on a complex situation arising from the location of the city of Brno. Tunnels are often required, maintained at a small depth below the densely populated territory. The situation is further complicated by often solved and complicated ownership issues, legislative changes, changes in technology and a lack of available funds. As the total costs for realization are expected to exceed EUR 1 billion, the Large City Circle Road in Brno can be considered a megaproject.

Lifecycle stages and costs estimated or real

The project is divided into four sectors, north – east, south – east, south – west and north – west. Each sector is divided into two sections and each section consists from several parts of the road, important intersections and tunnels. The list of sectors and sections including expected costs is following:

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Sector	Section	Costs	Term
N-W Sector	Žabovřesky	€ 138 mil.	2015
	Královo pole	€ 264 mil.	2012
N-E Sector	Brno–North	€ 120 mil.	2015
	Židenice	€ 347 mil.	2023
S-E Sector	Černovice	€ 248 mil.	2025
	Brno – South	€ 285 mil.	2026
S-W Sector	Bohunice	€ 288 mil.	2030
	Pisárky	€ 82 mil.	2029
Total		€ 1772 mil.	2030

The following parts of the Large City Circle Road Brno have already been finished:

1. Intersection Hlinky (N-W Sector, section Žabovřesky), finished in 6/2007
2. Bridges Lesnická (N-E Sector, section Brno- North), finished in 10/2003
3. Svitavská road (N-E Sector, section Brno- North), finished in 9/2003
4. Kohoutova road (N-E Sector, section Brno- North), finished in 12/1998
5. Intersection Pražská road (S-W Sector, section Pisárky), finished in 9/1998

Stakeholders

In the preparation, realization and operation of the Large City Road Circuit in Brno, the participation of a large number of stakeholders is planned. The key body as an investor is the Directorate of Roads and Highways, a state contributory organization established by the Ministry of Transport. Its main activity is the exercise of ownership rights for real property constituting the state highways and main roads, security administration, maintenance and repairs of highways and primary roads and construction and the modernization of motorways and primary roads. Another important body involved in the project is the municipality of Brno, in whose territory the project is implemented. Collaboration between the Directorate

of Roads and Highways and the city of Brno is supported by a cooperation contract and is very important for ensuring the preparation and implementation of the project, particularly in the areas of legislation, administration and land ownership.

The implementation and subsequent operation of the project is significantly secured by the company Brno Communications, Inc. This company is co-owned by the Statutory City of Brno, for which it provides the management and maintenance of roads under its ownership. It is also in a contractual relationship with the Directorate of Roads and Highways, for which it performs administration and maintenance of Brno city roads under state ownership. Within the Large City Road Circuit in Brno, it fulfills the role of construction supervision and carries out engineering activities. On the supply side, the project sees participation by contractors of the project documentation at the level of land proceedings, construction proceedings and actual implementation as well as construction and technology. The project also sees participation by state authorities, local residents and civic associations representing the interests affected by the implementation of this project. The structure of the parties and the basic links between them are apparent from the diagram in figure 1.

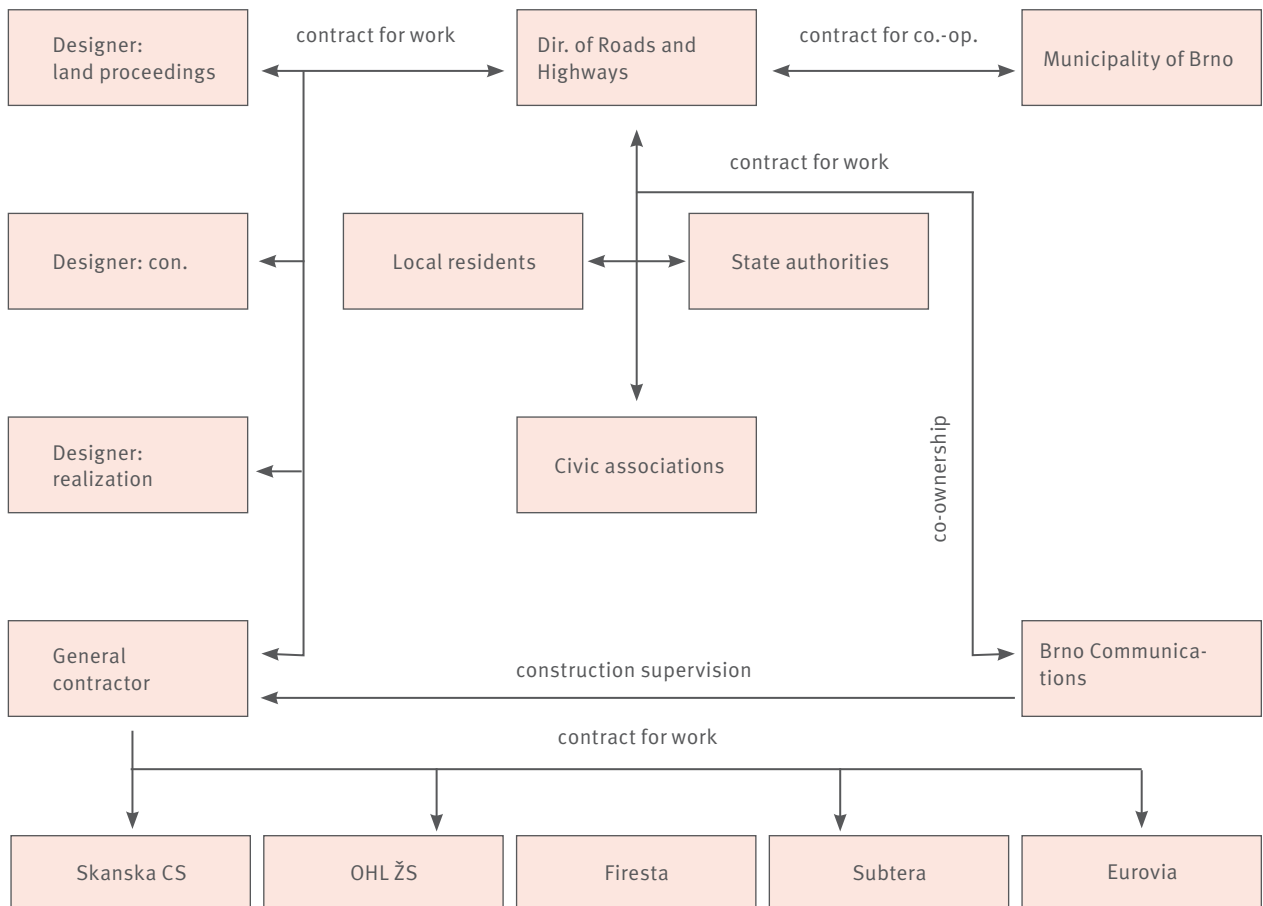


Figure 1 Structure of stakeholders

Investment intention and its efficiency

The Large City Road Circuit in Brno is a key project in the area of transport infrastructure in South Moravia. It is not only intended to divert traffic from the center of Brno and significantly relieve the burden on individual neighborhoods, but also ensure the transit of the traffic through the city without significant delays and complications. Its importance can be understood as supra-regional. At the beginning of each project stage it is necessary to elaborate several important documents, the most important of which are the EIA (Environmental Impact Assessment) and investment plan. In the Czech Republic, first tier project documentation is elaborated from these in order to obtain planning permission and subsequently building permission. For the economic evaluation of economic efficiency of investments within the investment plan,

outputs of the evaluation system HDM 4 are required, which is currently the international standard for evaluating the effectiveness of projects in transport infrastructure (Novický, 2007). However, it is designed more for constructions in the urban areas; for projects in the city it is a fundamentally wrong option with a tendency not to consider the positive impacts of the project in full. Despite the formal lack of effectiveness, the project got the exception and was approved. Problems with using the HDM 4 model for these types of projects have given an impulse to revising the procedures and principles of project evaluation review of transport infrastructure in the city.

Financing

One of key areas of project preparation and realization of the Large City Road Circuit in Brno is the project financing. It follows from the previous sections of the paper that the project

has significant financial difficulties and therefore the structure of funding sources is a very important issue. Key to this project are national resources: the provider of funds is the Ministry of Transport through the State Fund of Transport Infrastructure. A smaller part of the total project budget will be financed by the municipality of Brno. At present, however, availability of resources from the state budget is highly uncertain and the process of realization of particular stages of the project is uncertain for financial reasons. It is not currently possible for a project like the Large City Road Circuit in Brno to use resources from EU funds (Structural Funds and Cohesion Fund), which would be justifiable from the supra-regional importance of the project and vital for the stability of the cash flow for the project (Official website of the Road and Motorway Directorate of the Czech Republic, 2012).

Risks

During the preparation and implementation of the project it is necessary to consider a wide range of potential risks. A classical risk analysis was not carried out in preparation of the project. However, multiple risk factors were identified that can have a significant effect on the preparation, realization and operation of the project. Attention must be paid to the effects of risk factors on the following areas (Korytářová, 2011):

- ▶ investment costs of the project,
- ▶ timetable,
- ▶ fulfillment of defined objectives of the project,
- ▶ availability of financial resources.

The investment costs of the project may be affected by a number of risk factors, particularly price increases of materials and construction work, changes in the project design, changes in technology and building security systems, acquisition of land, etc. The deadline for completion of individual stages or the project as a whole is also key indicator of success. The deadline can be

influenced by similar risk factors such as investment costs, any changes in the project or problems with the purchase of land can significantly delay the construction. The term of the construction may be also affected by administrative processes and gaps in project financing in the absence of promised funds. Another indicator of a successful project, perhaps the most important one, is the fulfillment of its defined and expected objectives. The objectives are the essential impetus for the project itself and must therefore be formulated before beginning work. The actual implementation of these objectives during the project can then be influenced by incorrect forecasts, changes in the preferences of users or legislative changes. In addition to the above-mentioned risk factors, the entire project and its success depends on sufficient financial resources, including resources allocated to cover additional costs. Because of the character of the funding, where the crucial source of funds is the state budget, this is considered one of the most important risk factors.

Example of identification and evaluation of the significance of risks associated with the project under discussion

For the correct definition of risk factors it is necessary to first define the elements of success of the evaluated project. Depending on the character of the project, which was described in the previous part of the article, it is possible to define the success of the project with the following characteristics:

- ▶ compliance of planned investment costs of the project
- ▶ compliance of the timetable,
- ▶ achievement of defined project objectives.

The fulfillment of these characteristics may subsequently be threatened by the following risk factors:

- ▶ increase in prices of materials and construction work (F1),
- ▶ changes in the project documentation for construction (F2),
- ▶ changes in technology of construction or security systems (F3),
- ▶ complications in purchases of land (F4),

Category of risks	Group of risks	Risks monitored in case study
Risks of construction, technology and project documentation	Construction and project risks; Site risks; Failure of technology, utilities and related services.	Changes in the project documentation for construction (F2); Changes in technology of construction or security systems (F3).
Credit risks	Liquidity risks; Default risks/Availability risk.	Gaps in project financing in the absence of promised financial resources (F6).
Market risks	Demand risk; Favored competition; Inflation risk.	Increase in prices of materials and construction work (F1); Changes in user preferences (F8); Resentment of stakeholders (especially civic associations).
External risks	Political risks; Force majeure; Other external risks.	Lengthy administrative processes (F5); Legislative changes (F9).
Operational risks	Equipment/facility risks; Labor risks; Security risks.	
Strategic risks	Contractual risks; Violation of generally binding regulations (law); Strategic decision.	Complications in purchases of land (F4); Incorrect forecasts (F7); Resentment of stakeholders (especially civic associations) (F10).

Table 2 Identification of risks

- ▶ lengthy administrative processes (F5),
- ▶ gaps in project financing in the absence of promised financial resources (F6),
- ▶ incorrect forecasts (F7),
- ▶ changes in user preferences (F8),
- ▶ legislative changes (F9),
- ▶ resentment of stakeholders (especially civic associations) (F10).

Identified risk factories were assigned to the groups specified above general category of risks– see table 2.

It is certainly possible to identify a number of other risk factors associated with the project as a whole or with its individual stages (Edwards, M., 2000). However, for the project under discussion, these key risk factors are sufficient.

Assessment of the significance of individual risk factors is based on the assessment of the relationship between two variables:

- ▶ the probability of the risk factor,
- ▶ the intensity of the impact of the relevant risk factor on the project evaluated.

To determine the levels of both variables, the following scale can be defined (Smejkal and Rais, 2005):

Level	Description	Evaluation
1	Extra-small (XS)	1
2	Small (S)	2
3	Medium (M)	3
4	Large (L)	4
5	Extra-large (XL)	5

Table 3 presents a demonstration of expert evaluation of the significance of identified risk factors in relation to the success of the issue under discussion, the Large City Road Circuit in Brno. Expert evaluation of risk was based on interviews carried out by the authors of the paper with representatives of the investment organization and the organization responsible for the operation of partial segments of the city road circuit.

Intensity of	XL					
	L	F8		F4	F6	F10
	M		F7	F1	F3	
	S			F5, F9	F2	
	XS					
	XS	S	M	L	XL	
	Probability of occurrence					

Table 3 Expert evaluation of the significance of identified risk factors

It was also based on the study of available documents mapping particular stages of the megaproject.

In the case of low intensity of impact, it is not necessary to analyze risk factors located in the “gray zone” in detail and eliminate them. It is sufficient merely to monitor and continuously evaluate them. Risk factors located outside the gray zone, on the other hand, may significantly affect the project. For this reason it is necessary to perform a detailed analysis of these risk factors to assess the magnitude of the risk associated with these factors and make a proposal of protection against these risks (risk elimination, insurance).

Table 4 shows the quantified significant risk factors evaluated in the project depending on their probability of occurrence and intensity of their expected impacts. The significance of risk factors is determined by multiplying the scores of probability and intensity of impact.

Risk factors F1 and F3 are associated with a relatively long period of preparation and realization of the project as a whole and its individual stages.

Due to ongoing inflation of 3% annually (even in the Czech Republic not too high), the increase of prices during the first stages of the life cycle occurs and thus risk F1 becomes more important, because each part of the project is based on the selection procedure choosing the supplier company with agreed price of the construction, which costs are in the public budget allocated in advance. The risk factor F1 in many cases leads to additional changes in the project, which in turn leads to the assurance of the expected amount of costs.

The risk factor F3 has a long-term character. It is connected with the project as a whole and in some stages of the project it is usually eliminated. This means that this risk arises mainly in relation with long-term suppositions about the costs of the megaproject; the realization of partial areas eliminates the risk already with the realization documentation and with the price agreed in the contract for work with selected supplier.

In the case of the Large City Road Circuit in Brno this concerns mainly a major change in requirements for security systems in tunnels, which are connected with fast developing technology and technical capabilities. Those changes are reflected in the increased realization and operation costs. Risk factor F3 also has a strong connection with risk factor F9 when the number of security measures, such as fire safety, are also required by current legislation.

The Large City Road Circuit in Brno also showed a significant F4 risk factor, whose trigger is the process of approval of the land use plan of the city of Brno and the subsequent purchase of land. Considering the length of the period, there may occur (and indeed does occur) land price speculation that may cause considerable cost overruns and project delivery delays.

A significant project risk in the Large City Road Circuit in Brno is F10. Czech legislation allows stakeholders to enter into construction projects both in the process of approval of individual stages of the design documentation and in their realization phase. Some parts of the project, such as tunnels, were discontinued in the design and

Nr.	Description	Importance
F1	increase in prices of materials and construction work	9
F2	changes in the project documentation for construction	8
F3	changes in technology of construction or security systems	12
F4	complications of land purchases (or expropriations)	12
F5	lengthy administrative processes	6
F6	gaps in project financing due to absence of promised financial resources	16
F7	incorrect forecasts	6
F8	changes in user preferences	4
F9	legislative changes	6
F10	interference with stakeholders (especially civic associations)	20

Table 4 Significance of risk factors under semi-quantitative evaluation, Risk factors F1 and F3 are associated with a relatively long period of preparation and realization of the project as a whole and its individual stages.

realization phase several times because of complaints of the civic association of people who own property above these tunnels. All complaints must be solved according to the law. Ceasing work and re-launching construction caused cost overruns. As an example, it is possible to cite Tunnels Dobrovského, put into operation on September 1, 2012. In this case, due to protests by the civic association of people, the realization was stopped six months, and the costs for lost profit of suppliers were calculated at 2 million euro per month.

Discussion

Following the main objective of the paper it is necessary to discuss conclusions resulting from the presented case study.

By studying and analyzing the Brno megaproject, it can be confirmed that the existing categories of risk are adequate. Some special subcategories of risk, which were identified in this case study, are likely to be very strong in the Czech Republic, in particular the legislative measures in the protection of public interest which lead to some common recommendations, at least for similar projects realized in the traffic infrastructure. It is important to take into account mainly the following risk factors (in descending order according to the importance of the risk factor):

- ▶ interference with civic associations and households,
- ▶ absence of promised financial resources,
- ▶ complications in land purchases,

- ▶ changes in technology of construction or security systems,
- ▶ increase in prices of materials and construction work,
- ▶ changes in the project documentation for construction.

Other, less important risk factors are defined in table 4. The description of mentioned risk factors can be found in the previous chapter.

According to the results of the case study it is possible to define the following recommendations:

- ▶ to take care with public relations and communicate with the public about the project and its possible impacts on its surroundings,
- ▶ to determine legislative conditions under which the public will no longer be able to easily enter the project in its realization phase, in order to protect the public interest,
- ▶ to make some financial reserve for the event of failure in the flow of funding, if possible,
- ▶ to communicate with land owners as soon as possible and to prepare a good legislative framework for the next proceedings on the purchase,
- ▶ to take care with development in the area in related technologies and the preparation of an appropriate financial reserve for the coverage of increasing requirements.

Other risk factors are hard to prevent, but it is necessary to monitor them and to make calculations with the possibility that they could arise.

CONCLUSIONS

This paper is focused on presenting the basic data about the megaproject of the Large City Road Circuit in Brno and defining the basic approaches to assess its risks. In the first part of the paper, a brief summary of relevant literature and approaches related to the theme under discussion was presented. In the following part of the paper, a specific approach to the megaproject risk clas-

sification was defined together with a method of risk identification and risk assessment.

The major part of the paper was focused on the introduction into the risk analysis of the megaproject solved in the frame of the case study. The megaproject was determined from a material and time aspect, followed by the introduction of other relevant available attributes specific to this project. The structure of interested parties (stakeholders), including their mutual relationships, was presented. The issue of the project efficiency evaluation and its financial assessment were mentioned. In the second part of the paper, the issue of risk assessment of the project was discussed, with an emphasis placed primarily on identifying the basic risk factors, a description of their creation and assessment of their significance.

However, an analysis of risk does not end with these steps. In subsequent phases it is necessary to evaluate the identified risk to be able to effectively protect the project against risk by means of its elimination or by some form of protection or insurance.

One of the main results of this research is that analysis of this case study showed that the existing categories of risk are adequate.

From the research, it is clear at this stage that megaprojects are likely to be generally susceptible to additional costs associated with changes in technology and changes in requirements for safety of projects, as well as the interventions of individual stakeholders, whose preferences and requirements during the long construction period are significantly changing.

In view of financing of megaprojects in urban-type areas of inter-regional character, the authors believe that these projects should also be in the next programming period of the EU included in programs of EU funding (structural funds, Cohesion Fund).

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