



POSSIBILITIES OF CRISIS MANAGEMENT IN TRANSPORT INFRASTRUCTURE PROJECTS

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Abstract:

Project crisis management is a sub-category of project management whose principles cannot be clearly defined on the basis of exact research. In finding the best way to bring the project out of the crisis, we must start from the essence of the best practice method - ie generalization of best experience. However, this path is very difficult because no reasonable subject is interested in sharing information that his project is in crisis and the project management system has failed. Therefore, we are often forced to resort to the reverse procedure, by analyzing the worst practice. Opportunity to search for possible crisis management procedures for transport infrastructure construction is the crisis of the key public contract of the Czech Republic - "D1 modernization - section 12, EXIT 90 Humpolec - EXIT 104 Větrný Jeníkov" worth EUR 69 million. The crisis of this unfinished public contract consists in the departure of an international consortium of contractors from construction due to unresolved disputes.

Key words: *project, crisis, management.*

JEL code: M11, D21

Introduction

An increasing pressure on speed, safety and comfort of transportation necessitates the provision of relevant quality of transport infrastructure and the associated allocation of sufficient funding for the realisation of road and motorway structures.

Financial support from EU funds for the transport sector in the Czech Republic in the 2014–2020 program period is realised specifically by the means of the Operation Program Transportation (OPT). OPT is the largest EU operation program in the Czech Republic – it accounts for EUR 4.695 billion; that is roughly 20 % of all funding for the Czech Republic from EU funds for 2014–2020.

The right balance needs to be struck between the available funding the Government and EU plans to invest into the transport infrastructure and the achievement of the desired objective, which is the provision of relevant technology and quality standards of road and motorway structures.

Besides allocation of funding, the key prerequisite to achieve those goals is also to improve the legislation framework in order for the building process to simplify, accelerate and make the contractor selection process more transparent and quality Project management.

There are proven EU standards for allocating sources of finance and is seamless. The opposite is in the preparation and implementation of constructions. Although the Ministry of Transport of the Czech Republic accepted the use of models of FIDIC international contract terms and recommended methodologies for their use, there are still problems in implementation and procurement. This paper will try to briefly analyse the issue of the D1 motorway modernisation crisis project and look for a possible starting point for solving other projects using the best practice method.



Research results and discussion

Case study- Crisis of Project D1 Motorway modernisation in section No.12

The D1 motorway, connecting Prague, Brno and Ostrava, is the busiest road on the entire motorway network in the Czech Republic. Intensities in both directions in 24 hours: almost 100,000 vehicles near Prague. The total length is 366 km. The main section between Prague and Brno has been in operation since the age of 80. of the last century, other sections have been completed in the last 30 years. The need to modernise the oldest Czech motorway is obvious when driving through the unrepaired sections. The Portland cement concrete pavement shows defects in the form of ruptures and vertical shifts of cement concrete slabs, which reflects in uncomfortable bumping. The asphalt concrete surface also shows tracks worn by vehicles and surface disintegration. Local repairs of those defects are no longer effective plus they do not tackle the shift of cement concrete slabs. Most of the bridges are in very bad technical condition, parameters of exit lanes and connecting lanes are in violation of technical regulations and do not meet safety requirements. The condition of rest stops is also inadequate; they are missing in some places and are obsolete in others.

Focus of Project D1 Motorway modernisation

Modernisation of the section is designed to extend the existing width from 26.5 metres to 28 metres. It widens the hard shoulder (emergency stopping strip) of the motorway on each side by 0.75 metres, which increases safety in case of emergency vehicle stopping. That involves the possibility to lead traffic in 2 + 2 lanes in one direction during one lane closure. At this time, the 2 + 2 mode is not possible in the existing lanes and that is why any closure or accident results in congestion caused by narrowing of the traffic flow into single lane, i.e. in the 2 + 1 overall. Motorway modernisation furthermore involves renovation of the road construction, alignment of turn and merge lanes and median strip crossovers. Pavement widening has to go hand in hand with widening of motorway bridges and overpasses need to be broadened. The modernisation also includes renovation of sewage with the addition of new safety features. Guard rails are replaced throughout the section and the existing SOS emergency calling system is modernised. Renovation also applies to all cable lines in the median strip, and noise control systems are added. In line with modern traffic management on motorways, the telematics systems are also planned to be added.

The modernization is divided into 20 sub-interjunction sections. Part of the construction section is always part of the traffic restriction one level crossing. These conditions result in the start and end of the constructions of individual sections, which are between 3 and 14.7 kilometers long. For each section, there is a separate preparation of the building, including a project design, a permit of construction and a tender for suppliers.

Identification of the crisis

In 2017 the Road and Motorway Directorate concluded (RMD) a tender for the modernization of the 14 km long section No. 12 - EXIT 90 Humpolec – EXIT 104 Větrný Jeníkov.

The winner of the contract was the international TGS Joint Venture, formed by Toto S.p.A. Costruzioni Generali (Italy), GEOSAN GROUP a. s. (Czech Republic) and SP Sine Midas Story (Kazakhstan). The contract price was CZK 1.75 billion (EUR 69 million). The completion date was set for 2020. In D1 modernization contracts, this is the first case in which companies that have not yet built anything in the Czech Republic will start work. In view of the practice and EU funding of the project, revised FIDIC contracts were used. The announcement



of the winner was delayed over a year. The RMD first checked for a long time whether the company made a mistake in the offer or whether some budget items were too low. Then the closure of the competition delayed the disintegration of the Children of the Earth against the building permit. During the implementation of the work, the contractor discovered hidden obstacles concerning the site of the work, namely in the form of a collision of the newly built sewerage system with the existing highway body and gas pipeline, and also in the form of different geological conditions at the site of the newly built bridge. The Contractor immediately notified both of these hidden obstacles to the Client and proposed to him to change of work. However, an agreement on the amendment of the contract for work has not been reached.

The process of work has reached a considerable slip as a result of unresolved claims. The RMD applied sanctions and the dispute was also publicized in the media. The disputes were so high that the supplier withdrew from the contract at the end of 2018. At the same time, the RMD declared that it was unilaterally cancelling the contract. The next procedure in the case shall be decided by the conduct of the interested parties or, where appropriate, by the competent court. In order to secure the work in progress and to complete the order, it was necessary to launch a new tender according to standard procedures. Thus, the order will not be completed at the scheduled time. New supplier Skanska a.s. was definitely confirmed in early 2020. The construction will be completed in 2021 for the price of 2.44 billion CZK (EUR 94 million). The costs paid to the original supplier have not yet been published.

General knowledge on crisis management

As a **Project Crisis**, we can consider an unstable situation in which the balance of the basic characteristics of the project is disturbed and which poses an imminent and serious threat to the project's priority objectives. The crisis can occur unexpectedly and with little probability. It is an extraordinary event in which control of the project is lost.

Then **Crisis Management** is a process that involves capturing and evaluating crisis signals and introducing measures to overcome the crisis and minimise damage.

Crisis situations arise by accumulating more risks or activating a high risk. Not all risks can be assumed and the following list in Table 1 presents possible examples of crisis situations in the construction of line structures.

The Early Warning System enables the management of a construction project to monitor symptoms and indicators of crisis situations using standard management procedures. This system provides the managing elements with information on when the construction project is already in crisis and when it is therefore necessary to start crisis management of the project. The system consists in monitoring negative trends in the project using standard mechanisms. The parameters of the crisis condition and the definition of negative trends of the construction project are compiled in the design of the Early Warning System matrix in Table 1. The individual segments of the matrix are dependent on the project contract parameters, building control mechanisms, financial stability and human resources quality in a specific organization

FIDIC is international standard forms of contract for use on national and international construction projects. These documents cover a range of issues including risk management, project sustainability management, environment, integrity management, dispute resolution techniques and insurance and a number of guides for quality-based selection, procurement and tendering procedures.



Table 1

Design matrix to detect the symptoms of a crisis in the early warning system for transport projects

Symptoms of crisis	Quantifiable negative trends	Non-quantifiable negative trends
Signals affected inside the project	<ul style="list-style-type: none"> - Continuous economic evaluation of the project - Track and evaluate time progress - Errors in the implementation documentation - Frequent project changes - Quality tracking and records - Deploying Work Capacities - Occupational safety - Risk accumulation 	<ul style="list-style-type: none"> - Interpersonal problems in relation: - client – contractor - contractor – designer - client – building manager - building manager – contractor - construction manager - designer - Passive access of project participants - Loss of motivation - Liqueur in problem solving - Frequent replacement of contractors
Signals affected outside the project	<ul style="list-style-type: none"> - Insolvency proceedings conducted with the contractor - Changes in legislative, environmental and technical conditions of construction - Secondary insolvency - Obtaining bank guarantees - Change in bank financing conditions - Limitation of budget chapters of the state budget 	<ul style="list-style-type: none"> - Reaction of activist movements - Change in political support for construction - Changes caused by economic and social situation

Source: author's construction based on best practice analysis

Discussion

A detailed analysis of the crisis of project D1 Motorway modernisation EXIT 90 Humpolec – EXIT 104 Větrný Jeníkov identified three underlying causes of the occurrence of a crisis condition.

- **Underestimating the Preparation** of the project by the client in the form of insufficient initial surveys, poor-quality initial project documentation, long period of competition.
- **Inappropriate** choice of the **Delivery system** by Design-Bid-Build according to the FIDIC Red Book, where the client is responsible for the completeness and correctness of the project documentation in the measured contract



- **Project management** failures that failed to respond in a timely manner to risk activation and incentives from the Early Warning System.
- Absolute **Absence of Crisis Management** method was detected in the project.

Possibilities of crisis management in transport infrastructure projects

The starting point for similar crises may be the start of application of the methodology for the preparation of the construction by the Design – Build method according to the FIDIC Yellow Book, which was already prepared for The SFDI (State Transport Infrastructure Fund) in 2015 by Deloitte Touche Tohmatsu's 2015 study and Methodology for preparation of transport infrastructure construction in Design-Build delivery system approved by the Ministry of Transport of the Czech Republic.

The essence of the Design – Build method according to the FIDIC Yellow Book method is to transfer responsibility for the completeness and correctness of the project documentation to the construction Contractor. However, this means a very significant increase in the risk on the part of the Client in the form of loss of control over the project documentation and thus to the mark-up of the whole project. Therefore, the client must develop increased activity in the preparation of the construction. It must clearly define responsibilities in the internal structure of project management, clearly define project objectives, project parameters, and define the scope of the construction. Very important is in the implementation phase of the project is setting the procedures for checking the Design – Build project documentation of the Contractor. The draft procedures for checking project documentation are drawn up in Table 2.

The proposed crisis management procedures form a process that has been organised in two phases.

The first phase is preparatory and is focused on proactive crisis management-prevention, on which, in direct dependence, the emergence of a possible crisis situation is solved by the second phase. When the crisis situation arises, the response rate is decisive, which determines the severity of the impact or impact on the risk situation, or the size of the damage caused and thus the nature of the response.

A crisis situation must be declared in the resolution of the crisis situation, that is to say, a special regime for the management of relevant activities to the process in which this risk situation arose – responsibility and competence for the coordination and complexity of the solution shall be taken over by the Crisis Staff and persons designated by that staff to deal with specific activities or measures. The solution of crisis communication is also external and internal communication. Openness within an investor organization and communication of experience is a prerequisite for effective internal crisis communication. The course of the crisis situation is monitored and an evaluation of the effectiveness of the system is carried out after the end of the crisis situation and, where appropriate, measures are taken to improve it. This way of management can be called follow-up crisis management.

The draft of proactive crisis management procedures for transport projects are drawn up in Table 3. The draft of follow-up crisis management procedures for transport projects are drawn up in Table 4.



Table 2

The draft procedures for checking project documentation

Legend:				Responsibility in the Client's team, Client's Architects and DESIGN/BUILD Contractor					
CD Conceptual design HMG Time schedule SOW Scope of works ZPD Zoning permit documentation (P)DBP (Proposal)Documentation for building permit BP Building permit K Approval for use DD Detail design		ASA approve of state authorities BD basic design P1,P2,Pn Proposal for a definitive solution of BD A1, A2, An Approved for implementation ABD As build documentation OM Operation manual !!! Client's control milestone		R -responsibility, S -synergies, I -information, C - control					
	Inputs	Procedure	Outputs	DG Section	Construction section	Project Manager	PM.deputy on site	Client' s Architects	DESIGN/BUILD Contractor
1.	CD			S	R			S	
2.	HMG			I	R			S	
3.	SOW				R			S	
4.	ZPD			I	R			S	
5.		PDBPP	DBP		I			C	R
6.		!!!			R	C		S	I
7.	ASA	BD	BP	I	I	I		I	R
8.		P1				I	C	S	R
9.		P2				I	C	S	R
10.		PN				I	C	S	R
11.		!!!			I	R	C	S	I
12.			A1			I	R	S	I
13.			A			I	R	S	I
14.			DD			I	C	S	R
15.		ABD	K	I	I	C	C	S	R
16.			POM	I	I	R	S	S	S

Source: author's construction based on best practice analysis



Table 3

The draft of proactive crisis management procedures for transport projects

	Activity	Project phase	Procedure S – start, F- finish, 1-n - steps	Responsibility in client's team R-responsibility, S-synergies, I-information						
				Directorate Section	Construction control section	Communication Unit	Crisis team	Project Manager PM	Project Manager deputy on site	Each employee
1	Analysis of possible crisis situations, creation of crisis scenarios	Preparatory phase of the project			R			S	S	S
2	Crisis readiness-processing plan				R			S		
3	Build a crisis team			S	R		I	S		
4	Set up an early warning system				R			S	S	
5	Approval of crisis preparedness plans, Coordination			I	R	I	I	I		
6	Application of preventive measures	Implementation phase of the project						R	S	S
7	Monitoring of the occurrence of a possible crisis situation							R	S	S
8	Identification and analysis of the causes of a possible crisis situation							R	S	S
9	Proactive measures to eliminate the occurrence of a crisis situation, evaluate the effectiveness of the measures taken,				I				R	S

Source: author's construction based on best practice analysis



Table 4

The draft of follow-up crisis management procedures for transport projects

Emergency status/response detection	Procedure	Responsibility in the client's team							
		Directorate Section	Construction control	Communication Unit	Crisis team	Project Manager/PM	PM deputy on site	Each employee	
1. Possibility of negative medialization with influence on project objectives	1				R		S	S	S
2. Occurrence of an emergency	2 ← (S)						I	I	R
3. Immediate response to suppress or stop an emergency	3						S	S	R
4. Submission of emergency information	4		I				R	S	S
5. Evaluation of the emergency information obtained	5		R	I			S		
6. Emergency is not a crisis situation – solutions with standard procedures	6	I	R	I			S		
7. Immediate submission of emergency information and evaluation of the status quo	7	I	I	I			R		
8. Decision of section GR and section of construction management on convening of the crisis staff	8	R	S	I	I	S			
9. Crisis analysis	9				I	R	S		
10. Adoption of resolution decisions	10	I	I	I	R	S			
11. External crisis communication	11	S			R	S			
12. Internal crisis communication	12	I	S	R	S	S			I
13. Crisis management	13	I	S		R	S	S	S	
14. Solving operational tasks	14				I	R	S	S	
15. Analysis and evaluation of the effect of the measures carried out, proposal for preventive measures	15	I	S		R	S			
16. Taking preventive measures	16	R	I	I	S	S	S	S	

Source: author's construction based on best practice analysis

Conclusion:

This contribution responds to some adverse situations and negative phenomena that are currently reflected in the implementation of transport constructions in the Czech Republic in the traditional supplier-customer arrangement **Design-Bid-Build**, i.e. in the measured contract (FIDIC Red Book). These are, for example, non-compliance with the basic parameters of the project in the field of dates and budgets, disputes due to faulty project documentation and insufficient preparation of the building, the departure of the supplier from the construction and many others.

The use of contractual provisions in the form of sanctions under the contract for work in the enforcement of the rights of the Client is part of reactive management. However, as the latest experience in the reconstruction of the large Humpolec – Větrný Jeníkov motorway section shows, they are not effective enough and their implementation is extremely complicated for the investor. Reactive management and the bad interactive relationships of the participants of the construction project are high-risk for the success of the project and result in a project crisis. For the implementation of similar projects, it seems appropriate to consider the use of the alternative Design-Build supply system (FIDIC Yellow Book). The investor management of the preparation of transport infrastructure buildings should then be focused on proactive project management involving crisis management and the creation of a confidential cooperative environment with supply entities. The procedures for correctly defining the factual objectives of the project and project documentation are designed in Table 2.

The draft of proactive and follow-up crisis management procedures for transport projects are drawn up in Table 3 and Table 4. Both procedures are based on best practice and general knowledge of project management including crisis management.

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