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TITLE OF DIPLOMA THESIS:

Comparative evaluation of Monte Carlo and ECM (Event Chain Methodology):
Quantitative risk analysis in the construction of the Venetikos river bridge using
Pertmaster and RiskyProject software

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ABSTRACT

Risk Management has a powerful scientific infrastructure and it is systematically applied in numerous project activities. Uncertainty and risk, included in every real project, lead to the excess of the initial schedule and budget. Risk Management plays a fundamental role in construction projects, being essential on the successful execution of the project. Consequently, risk management is not an optional but, on the contrary, it is a significant procedure for the successful project management. Quantitative Risk Analysis becomes a fundamental step for the effective Risk Management, following normally the Qualitative Analysis and preceding Risk Response Planning. Quantitative Analysis examines numerically the impact of the risks and uncertainties on the generic objectives of the projects, producing quantitative risk information that can be used during decision making, to minimize these risks. There are plenty of techniques and methods based on different principles and focal points for the implementation of a quantitative risk analysis. The objective of this thesis is to present the quantitative risk analysis methods in the constructive industry. The practical implementation of this analysis is examined in the construction of the Venetikos river bridge, on the basis of the methodologies Monte Carlo and ECM (Event Chain Methodology) and using the Pertmaster v8 and RiskyProject Professional 6.1 software. At first, the characteristics of the methods of quantitative «Monte Carlo» and «Event Chain Methodology (ECM)» analysis are presented. Then, the implementation of these two techniques in risk analysis for the construction of the river Venetikos bridge is examined. Based on the construction schedule of the bridge, the quantitative risk analysis is executed, by applying Monte Carlo and ECM methodologies, using Pertmaster and RiskyProject software. The implementation of Monte Carlo method studies four different risk scenarios using the Pertmaster software, while three of them are studied using the RiskyProject software, in order to be compared. The implementation of the Event Chain Methodology (ECM) uses a list of the possible risks (events) assigned to activities, resources and calendars of the project, finding simultaneously their correlations. The comparison of software and results demonstrates the necessity of exploitation of the examined methodologies, in order to support and strengthen the Project Manager role.

KEYWORDS



Project Risk Management, Quantitative Risk Analysis, PERT (Program Evaluation and Review Technique), Monte Carlo Analysis, Event Chain Methodology (ECM), Pertmaster, RiskyProject, Venetikos river bridge.