



*“Gheorghe Asachi” Technical University of Iasi, Romania*



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## **A MONTE CARLO SIMULATION METHOD FOR RISK MANAGEMENT IN ROAD PAVEMENT MAINTENANCE PROJECTS**

**Raluca Arba, Sergiu Jecan\*, Lucia Rusu, Dan-Andrei Sitar-Taut**

*Babeş Bolyai University, 1 M. Kogălniceanu, Cluj-Napoca, 400591, România*

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### **Abstract**

Road pavement management and maintenance are responsible for a considerable amount of resources and energy consumption, with limited options to forecast due to the fact that projects have different sizes, are taking place in regions with various types of soil, landforms or types of distress.

The objective of this paper is to offer a solution for risk management using Monte Carlo simulation by taking into consideration three key aspects for the management of any project: costs, time, quality and the most important road parameter, that may cause the failure of the project - type of road distress. As a module of PAV3M maintenance and management project, Risk3M application uses the Pavement Condition Index (PCI) and the Long-Term Pavement Performance Program (LTTP) in order to identify and classify risk based on the type of road distress, using a scale from 1 (very poor) to 5 (very good). The impact on costs ( $R_c$ ), on risks depending on the time span ( $R_t$ ) and on the overall quality of the project ( $R_q$ ) where classified in a scale from 1 to 5. This paper uses Monte Carlo simulation procedures with evaluation of risk scales and type of road distress (PCI) and specifications of correlations between the simulated variables ( $R_c$ ,  $R_t$ ,  $R_q$ ).

*Key words:* risk assessment, road management and maintenance system, road distress, quality

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\* Author to whom all correspondence should be addressed: e-mail: [sergiu.jecan@econ.ubbcluj.ro](mailto:sergiu.jecan@econ.ubbcluj.ro); Phone: +40 264-41.86.52/3/4/5; Fax: +40 264-41.25.70