



# Structural Health Monitoring of Existing Bridges using Bridge Weigh-in-motion Measurements – Value of Information Analysis

**Dominik Skokandić, Ana Mandić Ivanković**

*University of Zagreb, Faculty of Civil Engineering, Zagreb, Croatia*

**Aleš Žnidarič**

*Slovenian National Building and Civil Engineering Institute, Ljubljana, Slovenia*

Contact: [dskokandic@grad.hr](mailto:dskokandic@grad.hr)

## Abstract

Implementation of Value of Information (VoI) analysis regarding Structural Health Monitoring (SHM) data and corresponding assessment results of Case Study bridge is presented in this paper. SHM data (traffic and structural), obtained with bridge weigh-in-motion (WIM) measurements, are implemented in the probabilistic assessment of load carrying capacity of a Case Study Bridge.

In the first part of the paper, a short overview of SHM measurements and description of Case Study Bridge is presented, along with the assessment results. Link between SHM data and the corresponding structural performance is defined, and it is shown that application of WIM measurements in the assessment of existing road bridges can increase their reliability level and, therefore, extend the predicted service life of these bridges.

In the second part of the paper, implementation of VoI analysis on Case Study Bridge is discussed and all the factors of interest are presented in the VoI flowchart. Furthermore, decision tree for VoI analysis is defined, along with correspondent outcomes, actions and resulting system states.

Further steps and recommendations are discussed in the final part of the paper, including correlation factors, possible outcomes and, finally, discussion of resulting indicator as a benefit/cost ratio of Bridge WIM measurement implementation in assessment of existing bridges.

**Keywords:** Assessment, existing bridges, Bridge Weigh-in-Motion, Value of Information analysis, bridge management, decision tree.

## 1 Introduction

Assessment of existing bridges, being a part of infrastructure networks, presents an important issue for European bridge owners. Due to increasing traffic volume and loading over the last years, fluent traffic flow is a priority on major highways. Current

European standards for design of new bridges [1] are based on conservative assumptions, which result in safe and cost-effective new bridges, but their application in assessment of existing ones may show that majority of these bridges need to be strengthened or even replaced [2,3]. Assessment of these bridges as a part of bridge management