TITLE OF DIPLOMA THESIS

A predictive system of service value of assets: Scientometric analysis, content analysis and database development for bridges

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ACADEMIC YEAR

2021-2022

ABSTRACT

Predictive maintenance has attracted substantial attention from academics as well as the manufacturing and transportation industries. However, a bridge network level is particularly complex due to the considerable level of heterogeneity encompassed across various bridge types and components. Predictive deterioration models are extremely important for effective maintenance decision-making. However, the lack of enough inspection data between maintenance activities as well as the subjectivity of inspections complicates the development of sustainable predictive models.
This thesis provides a review of literature on predictive systems of infrastructure assets and pinpoints paths for future research on topics in five basic categories:
(1) Bridge Management Systems (BMS), (2) Building Information Modelling (BIM), (3) Multi-System Multi-Component Networks (MSMCN), (4) Smart Asset Management, (5) Machine Learning (ML). For a componentized service value predictive system to progress further, we believe that attention should be paid in the following points:
First, asset managers have to deal with a multi-objective optimization problem and simultaneously take into consideration the available budget and scheduling maintenance in order to achieve network sustainability.
Second, BIM-based bridge management systems could improve management efficiency and satisfy the need for infrastructure maintenance. Strategic mining of data using big data technology could make the system promising and provide a better platform for efficient infrastructure management.
Third, bridges and bridge components have unequal levels of importance within a network since they serve different amounts of traffic, connect areas with various characteristics and their failure has a different impact both on the network and society.
Fourth, asset managers must decide an ideal prioritization strategy so that bridge maintenance will be sustainably effective.
Fifth, simultaneous application of maintenance activities to groups of elements is financially more effective, since execution of maintenance requires only one setup.
Sixth, the perspective in predicting methods is to further automate the condition assessment procedure and reduce the subjectivity.

KEYWORDS

Asset management, predictive system, predictive model, infrastructure, bridge