

Abstract

Operation and maintenance phase is one important part of pavement management system on non-toll national road (ntNR) because its management cost is relatively high. Therefore, it needs to be managed more optimal. The facts showed, ntNR management practices indicated is poor and inefficient. One of many ways can be used to improve management practices and efficiency of ntNR's outcome treatment is applying the principle of result accountability that should be accounted for. According to the Law on construction service, the accountability of a facility in operation and maintenance phase can be measured if the pavement condition may be related to clause of building failure. Unfortunately, the Law on construction service related to building failure is still very difficult to implement because the operational restrictions of building failure about pavement is not clearly yet. Besides, the failure category such as PCI (pavement condition index) < 10 is considered less comprehensive because mostly the PCI is just representing the functional service of pavement. This research aims to develop more objective and comprehensive characteristics of road damage as fail category, and plying the design terminal service as a benchmark to categorize road failing.

In this research, failure ontology approach was used to formulate the level of domain and the application of failure axiom, failure taxonomy, and the relationship between failure axioms and taxonomy used. Axiom of failure is a condition that did not achieve the desired objectives. While the failure taxonomy consists of: collapse, the strength under the minimum strength, very uncomfortable to use, very unsafe to use, and very expensive repair costs. In its application, the failure of the pavement is the state of the service (PSI) under terminal services (PSI_T). PSI is the actual service capabilities as a function of the integration between functional and structural services. After ontology failure was defined, the next steps were to verify fail criteria on pavement, to develop the damaged road characteristics as fail category (DRCs-FC), and to test the validity of the proposed concept of the DRCs-FC.

The significance test showed that fail criteria: collapse, and actual strength below the minimum strength were significantly approved as failing criteria on pavement, while failing criteria: very uncomfortable, very unsafe to be used, and very high repair cost were not significant as fail criteria on pavement. Besides, the validity test showed that the opinions of the respondents did not differ significantly due to the differences in the profession, education, and experience, so that the opinions of respondents are valid. Based on the frequency of the criteria for approval the respondent failing obtained functional and structural weight were 30% and 70% respectively. By using functional and structural weight in the first stage, and perform sensitivity analysis, is obtained 15 types of DRCs-FC to $PSI_T = 2$, and 12 types of DRCs-FC to $PSI_T = 2,5$. Next, testing the validity of the concept showed that the concept built is able to describe 85.29% field conditions. In addition, at 95% confidence level, the whole sample which have $PSI < PSI_T$ is significant to be part of the DRCs-FC as a proposed concept, thus the DRCs-FC concept is valid.

The results of this study indicate that the design becomes a key factor at outcome evaluation system, which is still rarely used. The results also can be used to initiate the implementation of the Law on construction service (UUNo.18 / 1999) and the Government Regulation (PP No. 59/2010) related to building failure. If the Law and Government Regulation of construction can be applied to the badly damaged roads, then the amount of the losses can be reduced, and the benefit will be got as part of penalties. However, to categorize DRCs-FC as part of building failure, need to consider the time of occurrence and natural conditions. The DRCs-FC are considered as a part of the building failure, if it's occur within the period of service life, and are not affected by disaster.

Keywords: failing criteria, functional service of pavement, present serviceability index, road damage, structural capacity of pavement, and terminal serviceability index