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Date: Jumat, Desember 25, 2020

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Optimization of Time Delay based Preventive Maintenance using Markov Decision Process Marsetio<sup>1</sup>, Supartono<sup>1</sup>, Amarulla Octavian<sup>1</sup>, Ahmadi<sup>2</sup>, Rajab Ritonga<sup>3</sup> and Rudiyanto<sup>4</sup> <sup>1</sup>Indonesia Defense University, Bogor, West Java, Indonesia <sup>2</sup>Sekolah Tinggi Teknologi Angkatan Laut, Surabaya, East Java, Indonesia <sup>3</sup>Universitas Prof Dr Moestopo (Beragama), Jakarta, Indonesia <sup>4</sup>Biro Klasifikasi Indonesia, Jakarta, Indonesia  
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Abstract In operating Indonesian Navy Vessels (KRI), users often find some indicators leading to the prediction that the system experiences a decline in performance or a breakdown, and requires repair at great expense.

To support the reliability-based maintenance system, an analysis is required to determine the exact breakdown rate and the state of the system based on time delay. In time-delay-based maintenance, before experiencing a breakdown, the system will show a decline in performance. However, time-delay-based maintenance is difficult to apply in the field since it requires the appropriate data to form the model.

In this study, time-delay-based maintenance is applied in combination with policy patterns in the operation and observation, using Markov Decision Process. By applying time-delay-based preventive policy, it can be concluded that the policy pattern 1, 2, and 3 in this study can minimize operational and maintenance expenses when KRI experiences a breakdown in general.

Keywords: Time delay; Preventive maintenance; Markov decision process; Reliability

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