Maintenance Objective Selection Framework Applicable to Designing and Improving Maintenance Programs

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Abstract. Maintenance optimization is applied by organizations to develop robust maintenance programs while attempting to establish a trade-off between competing maintenance requirements and resources. For this reason, maintenance decisions derived from maintenance optimization models are adversely affected, if (a) the maintenance objective(s) applied as input to the optimization models is not dynamically reviewed as the organizations environment context changes, and (b) there is continued use of historical maintenance objectives, oftentimes the practice for organizations lacking a framework for selecting maintenance objectives (MO's). To address this, an interactive maintenance objective selection framework for stakeholders that aligns with and considers changes in the organization's business, operational, and technical context, where dynamic maintenance objectives are selected and prioritized for application in real-life maintenance optimization models is proposed. The framework uses an analytic network process (ANP) based methodology, for selecting the relevant MO's in view of competing dynamic criteria, for instance, employing remanufactured spares to optimize availability and maintenance cost. The applicability of the framework is demonstrated in case studies of companies operating in diverse industries like aviation and manufacturing in Africa. The study highlights the effects of dependencies between competing maintenance objectives, where the dependencies invariably influence how organizations prioritize MO's to use for maintenance optimization programs. The additional value of the proposed framework lies in assisting organizations select maintenance objectives applicable to the organization while considering competing objectives and evolving business context.