

Reliability and Sensitivity Analysis of a System with Warm Standbys and a Repairable Service Station

Kuo-Hsiung Wang*, Yu-Ju Lai, and Jyh-Bin Ke

Department of Applied Mathematics, National Chung-Hsing University, Taichung, 402, Taiwan, R. O. C.

Abstract—We study the reliability and sensitivity analysis of a system with M operating machines, S warm standbys, and a repairable service station. Failure times and service times of each machine (operating or standby) are assumed to be exponentially distributed. While the service station is working, it is subject to breakdowns according to a Poisson process. When the station breaks down, it requires repair at a repair facility, where the repair times follow the negative exponential distribution. The K out of $M + S$ system is analyzed where $K = 1, 2, \dots, M$. This paper presents derivations for the system reliability, $R_s(t)$, the mean time to system failure, $MTTF$, and numerical illustration. Several cases are analyzed to investigate the effects of various parameters on the $R_s(t)$ and the $MTTF$. Sensitivity analysis for the $R_s(t)$ and the $MTTF$ is also studied.

Keywords—reliability; sensitivity analysis, station breakdowns

* Corresponding author's email: khwang@amath.nchu.edu.tw