Improving the SIPP approach for staffing service systems that have cyclic demands*

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Abstract

This paper evaluates the practice of determining staffing requirements in service systems with random cyclic demands by using a series of stationary queueing models. We consider Markovian models with sinusoidal arrival rates and use numerical methods to show that the commonly used "stationary independent period by period" (SIPP) approach to setting staffing requirements is inaccurate for parameter values corresponding to many real situations. Specifically, using the SIPP approach can result in staffing levels that do not meet specified period by period probability of delay targets during a significant fraction of the cycle. We determine the manner in which the various system parameters affect SIPP reliability and identify domains for which SIPP will be accurate. After exploring several alternatives, we propose two simple modifications of SIPP that will produce reliable staffing levels in models whose parameters span a broad range of practical situations. Our conclusions from the sinusoidal model are tested against some empirical data.

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