SO MANY FACTORS, SO LITTLE TIME... SIMULATION EXPERIMENTS IN THE FREQUENCY DOMAIN

Abstract

We illustrate how an efficient methodology called frequency domain experimentation can be used to gain better insight into the behavior of production systems. With the full factorial designs commonly used for simulation experiments, the number of runs grows exponentially with the number of factors involved, while the run length remains constant. In frequency domain experiments, the number of runs is independent of the number of factors, while the required run lengths increase relatively slowly. We describe the method, illustrate its effectiveness at identifying important main effects, two-way interactions, and quadratic terms for a known model, demonstrate the approach by evaluating a kanban system involving 34 factors, and provide links to software. We also present computational requirements for running simulation experiments that combine a batch means approach with efficient run-oriented designs for a variety of systems. The results indicate that frequency domain experiments perform very favorably for systems, such as queueing networks, where the simulations output stream exhibits high positive autocorrelation.

Full citation:

Sanchez, S. M., F. Moeeni, and P. J. Sanchez(2005), "So Many Factors, So Little Time...Simulation Experiments in the Frequency Domain," *International Journal of Production Economics*, forthcoming.