Sunchai Tongsuksai 2015: Efficiency Comparison of Quality Control Charts to Detect the Mean Shift in Process. Master of Science (Statistics), Major Field: Statistics, Department of Statistics. Thesis Advisor: Assistant Professor Juthaphorn Sinsomboonthong, Ph.D. 193 pages.

The objective of this research is to compare the efficiencies of four control charts —the run sum (RUNSUM) control chart, the exponential weighted moving average control chart with fast initial response (FIR-EWMA), the combined Shewhart-CUSUM (CS) control chart and the robust exponentially weighted moving average (REWMA) control chart— when the data are normally distributed. The studied factors consist of the mean shifts (¢±) at 0.2σ, 0.4σ, 0.6σ, 0.8σ, 1.0σ, 1.2σ, 1.6σ, 2.0σ, 5.0σ, sample sizes (n) which are 2, 3, 4, 5, 6, 7, 10, 14, 20, 30 and subgroup size (l) at 20, 40 and 100. Furthermore, the criterion used to examine efficiency is in term of an average run length (ARL_1). A simulation study is conducted by Monte Carlo technique with 1,000 repetitions.

It is found that, FIR-EWMA control chart has the best efficiency for a small shift in the mean (¢ = 0.2) and sample sizes (n) = 2, 3, 4. However, the efficiencies of three control charts—FIR-EWMA, REWMA and RUNSUM control chart —seem to have no difference for n > 4 and large shift in the mean (¢ >1.6). Moreover, the CS control chart has a poor performance in detecting mean shift among four control charts for all situations of the study.

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