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**Title of Thesis:** The Performance of the Adaptive Exponentially Weighted Moving Average Control Chart with Estimated Parameters

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**Abstract :**

The Adaptive Exponentially Weighted Moving Average (AEWMA) control chart has the advantage of detecting in balance mixed range of mean shifts. Its performance has been studied under the assumption that the process parameters are known. Under this assumption, previous studies have shown that AEWMA provides superior statistical performance when compared to other different types of control charts. In practice, however, the process parameters are usually unknown and are required to be estimated. Using a Markov chain approach, it is shown that the performance of the AEWMA control chart is affected when parameters are estimated compared with the known parameters case. The effect of different standard deviation estimators on the chart performance is also investigated. Finally, a performance comparison is conducted between the EWMA chart and the AEWMA chart when the process parameters are unknown. We recommend the use of the AEWMA chart over the ordinary Exponentially Weighted Moving Average (EWMA) chart especially when a small number of Phase I samples is available to estimate the unknown parameters.

**Keywords:**

AEWMA; Estimation effect; Markov chain; Average run length; Statistical process control.