

ABSTRACT

In this study systematic sampling is used for estimating the population mean. It is such a statistical technique of selecting sample in which elements are selected through a well-arranged sampling frame. A sample is selected from a big population by selecting the first unit at random and other units are selected through fixed interval.

The purpose of this study is to propose generalized systematic estimator for estimating the population mean. There are five estimators three with one auxiliary variable and two with two auxiliary variables at single and two phase sampling following the systematic sampling technique. The generalized systematic estimators are denoted by $\bar{y}_{gs,i}$ where $i=1,2,3,4$ and 5. Moreover, its Mean Square Error, un-biasness has been derived. Furthermore it is compared to usual mean estimator, Swain(1964) estimator, Bhal and Tuteja (1991) estimator and Singh and Singh (1998) estimator. The Repetitive EWMA control chart is proposed based on different ratio estimators under systematic sampling scheme and its efficiency is checked by computing ARL's and graphical representation is also shown..

The numerical results through real life data shows that proposed estimators $\bar{y}_{gs,i}$ where $i=1,2,3,4,5$ are more efficient by having small MSE's and also consistent, as by increasing sample size MSE decreases. The ARL's are used for comparison in EWMA control chart and shows that the EWMA chart based on proposed estimator $\bar{y}_{gs,2}$ is more effective compared to others by detecting the shifts earlier than others. The graphical representation of ARL's also showing minimum ARL values based on $\bar{y}_{gs,2}$.