A new cumulative sum control chart for monitoring the process mean using varied L ranked set sampling

Muhammad Awais, author

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Abstrak

Recently, a varied L ranked set sampling (VLRSS) scheme has been introduced in the literature for estimating the population mean. The VLRSS scheme is a cost-efficient alternative to the classical ranked-set sampling (RSS) and median RSS (MRSS) schemes. In this paper, we construct a new cumulative sum (CUSUM) control chart for efficiently monitoring the process mean using VLRSS, named the CUSUM-VLRSS chart. The CUSUM-VLRSS chart encompasses the existing CUSUM charts based on RSS and MRSS schemes, named the CUSUM-RSS and CUSUM-MRSS charts. We use extensive Monte Carlo simulations to compute the run length characteristics of the proposed CUSUM chart. It is shown that the CUSUM-VLRSS chart is able to perform uniformly better than the CUSUM-RSS and CUSUM-MRSS charts when detecting different kinds of shift in the process mean. A similar trend is observed when the proposed CUSUM chart is constructed under imperfect rankings. A real data-set is also used to explain the implementation of the CUSUM-VLRSS chart.