

## Improved Product Estimator for Finite Population Mean Under Simple Random Sampling

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### *Abstract*

*Sampling theory aims at devising suitable method of selecting a part from the whole population, termed as sampling procedure and the method of generalization, about the desired characteristics from the sample to the population, termed as estimation procedure. The random sampling theory deals with the determination of a combined procedure of sampling and estimation so as to infer about the population with minimum error and consequently minimizes the risk or loss which might be associated with the size of the sample which is directly related to the funds available for the survey. In practice, knowledge of the ratio of population totals of two characteristics is important and some times more important than, that of population totals and means. For instance, in socio-economic surveys one may be interested in such ratios as per household and per-capita income or expenditure, proportion of expenditure on different items, proportion of unemployed persons, sex-ratio, birth-rate, death rate, etc. So far it has been assumed that the characteristic Y under study and the auxiliary characteristic X are positively correlated. Many times, there may be negative correlation between the variables. In these situations, commonly used and more efficient estimator than the conventional estimator is the product estimator. In this paper an efficient modified product estimator for estimating population mean using auxiliary information is suggested. Under simple random sampling without replacement scheme, the expressions of mean square error up to the first order of approximation are derived. The results obtained have been illustrated numerically by taking some empirical population considered in the literature.*

**Key words:** Mean square error, product estimator, ratio estimator, percent relative efficiency

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