ON OPTIMAL SAMPLING STRATEGIES FOR ESTIMATION OF PARAMETERS

ABSTRACT
of
THESIS

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Abstract

The present thesis entitled "On optimal sampling strategies for estimation of parameters" is concerned with improved sampling strategies over existing optimal sampling strategies for estimation of parameters like population mean and population variance. This thesis contain various sampling strategies which are unbiased and efficient in the sense that they have minimum mean squared error among the class of estimators. In this thesis, we have worked on various optimal unbiased sampling strategy as well. It includes many class of sampling strategy which are better than simple random sampling scheme using existing mean per unit estimator, variance estimator, ratio estimator, product estimator and linear regression estimator and many more existing sampling strategy for estimation of population mean and variance under simple random sampling and varying probability. Moreover, the idea of estimation of population parameters involving auxiliary information in form of variable and attribute under double sampling using varying probability, is relatively new as compared to any such sampling strategies. The present work appeals, survey planners to use the proposed sampling strategies which will give more valid and efficient estimates for the estimation of parameters under simple random sampling and varying probability sampling in the field of socio- economic surveys.

This thesis has nine chapters and the work done in these chapters are discussed below.

Chapter 1 is the brief summary of my research work performed in the thesis.

Chapter 2 introduces a new family of unbiased sampling strategies for estimation of population mean. We obtained the expression for unbiasedness and variance of proposed sampling strategy. An unbiased estimate of variance of the proposed sampling strategy is also derived.

Then, we compare them with many existing estimators and found to be equally efficient than regression estimator. Another improved generalized ratio estimator under Midzuno-Lahiri-Sen type sampling scheme is proposed and it comes to be better than conventional estimator. Further, efficiency comparison is also given about the proposed strategy. A numerical study has been given in support of the present work done.

In Chapter 3, a new family of unbiased sampling strategies has been introduced for estimating the population mean under double sampling. We derived the expressions for unbiasedness and variance of proposed sampling strategy upto the first order of approximation. An unbiased estimate of the variance is also obtained under double sampling. A numerical study is carried out over different population in support of the proposed work.

In Chapter 4, we present the family of unbiased sampling strategies for estimation of population variance. The expressions for the unbiasedness and variance for the proposed sampling strategy are derived up to the first order of approximation. The comparison of proposed sampling strategy with respect to some existing estimators were made. Finally, numerical illustration is also given in support of the present study.

In Chapter 5, we construct a new family of unbiased sampling strategies for estimation of population variance under double sampling. The expressions for the unbiasedness and variance of the proposed sampling strategy are derived up to the first order of approximation. The proposed sampling strategy is equally efficient to regression estimator. The comparison of proposed sampling strategy with respect to some commonly known estimators have been performed. Finally, numerical illustration is also given in support of the present study.

Chapter 6 proposes a log-type estimator using auxiliary information in form of variable and

attribute for estimating the population variance. We acquired the bias and mean squared error for the proposed estimator. Further, the efficiency comparison for the suggested estimator with various preliminary estimators have been done. The empirical study is the evidence of present work.

Chapter 7 exhibits the idea of proposing a log type estimator under double sampling. We found the bias and mean square error for the preferred estimator under double sampling. Further, a more generalized class of log-type estimators are also proposed and we deduce it's properties up to the first order of approximation. Then, we compare the efficiency of advocated estimator with prevailing estimator. An empirical study shows that the proposed estimator is better than existing estimators.

Chapter 8 contains the variance estimator which utilizes the prior knowledge of study variable. We procure the bias and mean square error for the recommended estimator. We acquire the efficiency conditions for the suggested estimators. This result is proved theoretically and numerically.

In Chapter 9 an improved class of log-type estimators are proposed for estimating the population variance using two auxiliary information in the form of variable and attribute under double sampling. Further, the proposed estimator is found to be more efficient than existing estimators. A numerical study is included as an illustration.