

Summary

In this thesis, ratio type estimators, exponential ratio type estimators, product type estimator, exponential product type estimators and generalized exponential estimators have been proposed to estimate population variance of the study variable with the help of auxiliary variable under adaptive cluster sampling.

In chapter 1, the use of auxiliary information and adaptive cluster sampling procedure has been discussed. In chapter 2, significant literature to estimate population variance in conventional sampling design has been discussed.

In chapter 3, some existing estimators have been discussed in simple random sampling to estimate population variance of the study variable. The notations for the population variance in simple random sampling have been discussed. The equation of bias and Mean Square Error (MSE) of these existing estimators have been discussed.

In chapter 4, the symbols and notation for estimate the population variance in Adaptive Cluster Sampling (ACS) are developed. Three ratio estimators are proposed to estimate population variance for the study variable using the help of auxiliary variable. The proposed estimators in ACS are Isaki, (1983), Kadilar & Cingi, (2006), and Singh *et al.*, (2011). Bias and MSE of all estimators up to first order approximation are derived.

In chapter 5, two generalized exponential variance estimators are proposed to estimate the variance of population of the variable of interest using the auxiliary variable. Special cases of proposed estimators are given. Bias and MSE of both generalized estimators up to first order approximation are derived.

In chapter 6, some existing estimators have been discussed in simple random sampling (SRS) to estimate the variance of population for the variable of interest when there is a negative association between the variable of interest and the auxiliary variable. Bias and MSE of these available estimators are also given.

One product variance estimator and three exponential product variance estimators are proposed to estimate the variance of population for the variable of interest using help of auxiliary variable. Two proposed

estimators in ACS are (Robson, 1957) and (Singh et al., 2011). Bias and MSE of all estimators up to first order approximation are derived.

In chapter 7, simulation study of proposed estimators has been performed with real and simulated populations and compare the efficiencies and precisions of the estimators. Bias, MSE and percentage relative efficiencies have been obtained and presented in the design of tables. The proposed efficiency condition for the adaptive cluster sampling has been obtained. The comparison has been made with variance estimators in conventional probability sampling design and the adaptive cluster sampling design.