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[Open Access](#)**Analysis and ratio of linear function of parameters in fixed effect three level nested design** (Article)Usman, M.<sup>a</sup>, Malik, I.<sup>b</sup>, Warsono<sup>a</sup>, Elfaki, F.A.M.<sup>c</sup><sup>a</sup> Department of Mathematics, Universitas Lampung, Indonesia<sup>b</sup> SMK Ma'arif 1 Kalirejo, Lampung Tengah, Indonesia<sup>c</sup> Faculty of Engineering, Department of Sciences, International Islamic University Malaysia (IIUM), Malaysia[View additional affiliations](#)[View references \(17\)](#)

## Abstract

The aims of this study are first to build the linear model of the fixed effect three level nested design. The model is nonfull column rank and has a constraint on its parameters; second is to transform the nonfull column rank model with a constraint into full column rank and unconstraint model by using method of model reduction; and third is to derive statistics for testing various hypotheses by using Generalized Likelihood Ratio (GLR) test and to derive the ratio of linear function of parameters by using Fieller's Theorem. Based on the full column rank and unconstraint model the analysis to be conducted is: to estimate the parameters, to derive statistics for testing various hypotheses and to derive confidence intervals of the ratio of the linear function of parameters. The estimation of parameters and the statistics for testing some hypotheses are unbiased. Based on the simulation results, it can be shown that the tests are unbiased and in line with the criteria given by Pearson and Please. The simulation results for the  $(1-\alpha)$  confidence interval of the ratio of the linear function of parameters  $\tau_i$ ,  $\beta_{(ij)}$  and  $\gamma_{k(ij)}$  are presented for different values of  $\rho$ 's and in all cases the values of  $\rho$ 's are contained in the 95% confidence intervals. © 2006-2016 Asian Research Publishing Network (ARPN).

## Author keywords

Estimation; Full rank model; Linear function; Model reduction; Nonfull rank model; Parameters; Ratio; Testing hypotheses

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