Sakara Khammeesaeng 2007: A Comparison on Data Transformation Methods when Data are Unconformed to the Analysis of Variance Assumptions in Randomized Complete Block Designs. Master of Science (Statistics), Major Field: Statistics, Department of Statistics. Thesis Advisor: Associate Professor Ananchai Khuantham, M.S. 141 pages.

The purpose of this research was to compare transformation methods when data are against the underlying assumptions for analysis of variance (homogeneity of variance and additivity for testing differences between treatment effects) in Randomized Complete Block Designs by comparing two parametric methods which are the Tukey transformation approach and the Box and Cox transformation approach, and a nonparametric method, the Rank transformation approach. This research generated data which were separated into major three cases : data that have heterogeneity of variance, data that have nonadditivity and data that have both.The number of blocks used were 4, 8 and 12. The number of treatments used were 3, 4, 8, 10, 15 and 20.There were 108 cases and each case consisted of 1,000 runs generated from the Monte Carlo simulation technique using Microsoft Excel. The levels of significance were 0.05 and 0.01. The efficiency of transformation methods was compared, by using percentage of conformed data, probability of type I errors and power of the test.

The results can be summarized as follows: of the two parametric methods, Tukey has the highest efficiency when data have only nonadditivity, or both heterogeneity of variance and nonadditivity. In addition, Tukey has the lowest probability of type I errors, and also has the highest power of the test for these cases. Similarly, Box and Cox has the highest efficiency when data have heterogeneity of variance. The nonparametric method, Rank, has the highest of percentage of conformed data for all cases. However, this approach has the highest probability of type I errors, but has the lowest power of the test. Overall, Rank has the lowest efficiency of three transformation approaches.

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