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ROUMPORN RUANGROJ : A COMPARISON ON POWER OF TESTS  
FOR NORMALITY AMONG CHI-SQUARE, SHAPIRO-WILK  $W$  STATISTIC  
AND SHAPIRO-FRANCIA  $W'$  STATISTIC. THESIS ADVISORS : THAVATCHAI  
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Normal distribution is an important assumption of parametric statistics, especially in parameter estimation and hypothesis testing. Before all else, the researcher should check whether the studied data have the normal distribution, or not. Therefore, the appropriate powerful statistical test for normality is required.

The purpose of the present study was to compare the power of tests for normality testing by using the Chi-square test, Shapiro-Wilk and Shapiro-Francia statistic. The studied data are made under normal distribution with mean  $\mu = 0$  and variance  $\sigma^2 = 1$  and contaminated normal distribution with scale factors of 3, 5, 7 and 10, and 5, 10, 20 and 30 percents of contamination in equal samples of size  $n = 10, 30, 50$  and 100 at 0.01, 0.05 and 0.10 levels of significance by the Monte Carlo simulation technique compatible with FORTRAN 90 language. A FORTRAN program was designed to calculate the probability of type I error and the power of all three tests in 1,000 replications for each condition.

.Results indicate that the Chi-square test and the Shapiro-Francia statistic are the best statistics of controlling type I error, whereas the Shapiro-Wilk statistic is the worst one. The increment of sample size, level of significance and percent of contamination affects the increasing power of the Chi-square test, whereas the increment of sample size, level of significance and scale factor affects the increasing power of the Shapiro-Wilk and Shapiro-Francia statistic. Most cases of power of the Shapiro-Wilk and Shapiro-Francia in the sample sizes of 10 and 30 are not different, but the power of both is rather low in a sample of size  $n = 10$ . In the sample sizes of 50 and 100, the power of the Shapiro-Wilk and Shapiro-Francia statistic is significantly greater than the power of the Chi-square test which is rather low. Furthermore, the power of the Shapiro-Francia is significantly greater than that of the Shapiro-Wilk at the scale factors of 3 and 5, but there is no difference at the scale factor of 7 and 10.

The results suggest that none of these tests should be used for a sample size of 10; however, the Shapiro-Wilk statistic should be used for a sample size of 30 and the Shapiro-Francia statistic for the sample sizes of 30, 50 and 100.