

UNIVERSITI TEKNOLOGI MARA



**THE BEST-FIT DISTRIBUTION MODEL OF WATER
CONSUMPTION**

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ABSTRACT

Water is an essential part of human life. Water consumption means the freshwater that is taken from ground or surface water sources and transfer to the place of use. Recently, some of state in Malaysia faced a water crisis due to increase in demand, insufficient water supply, lack of river basin management and growth of population. Moreover, demanding for water consumption that increases per year will lead to the more serious problem in Malaysia. Water consumption research has been conducted for decades. A statistician needs to play their role in conducting a research related to the water consumption. Hence, this study aims to identify the best fitted distribution model for water consumption data. A secondary data that consisted of 221 different locations for year 2017 has been used in this study. Three distributions namely as normal, lognormal and loglogistic distributions have been used to model the water consumption data. Furthermore, the best parameters for each distribution has been estimated based on Maximum Likelihood Estimation (MLE) and Least Square Estimation (LSE) methods. Based on this study, it is found that LSE give the best parameter estimation for each distribution since the value of Mean Square (MSE) was smaller as compared to MLE. Anderson darling goodness of fit was used to determine the best fitted model for water consumption. Based on the comparison of the fitted model, it seems that loglogistic distribution give the better fit for water consumption data as compared to normal and lognormal distributions. The loglogistic showed the smallest Anderson darling value ($AD=0.3720$) with critical value ($CV=2.5018$) respectively. Therefore, the best fitted distribution found in this study can be used by water authorities in Malaysia to evaluate the level of water demand and forecast water consumption for the future.

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