Analysis of Tanzanian Energy Demand Using Artificial Neural Network and Multiple Linear Regression

Abstract

Analysis of energy demand is of a vital concern to energy systems analysts and planners in any nation. This paper present artificial neural network-multilayer perceptron (ANNMLP) and multiple linear regression (MLR) techniques for the analysis of energy demand in Tanzania. The techniques were employed to analyze the influence of economic, energy and environment indicators models in predicting the energy demand in Tanzania. Statistical performance indices were used to evaluate the prediction ability of economic, energy and environment indicators models using ANN-MLP and MLR techniques. Predicted responses values of ANN-MLP and MLR techniques were then compared to determine their closeness with actual data values for determining the best performing technique. The results from ANN-MLP and MLR techniques showed the best model for predicting the energy demand in Tanzania were from energy indicators as opposed to economic and environmental indicators. The ANN-MLP prediction values had a correlation coefficient (CC) of 0.9995 and mean absolute percentage error (MAPE) of 0.67% outperforming the MLR technique whose CC and MAPE values were 0.9993 and 0.83% respectively. ANN-MLP technique graphical presentation of actual against predicted values showed close relationship between actual and predicted values as opposed to the MLR technique whose predicted values deviated much from actual values. Analysis of results from both techniques conclude that ANN-MLP outperform MLR technique in predicting energy demand in Tanzania