A Study to Investigate the Effect of Day Type on Electricity Consumption in Residential Buildings: A Smart Grid Initiative to Establish Efficient Load Forecasting Model in Tanzania

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Abstract

Predicting future power consumption demand is an important phenomenon in smart grid architecture because its output can be used by other agencies such as load balancers and maintenance schedulers to mention a few. However, effective design of the load forecasting model requlres a critical investigation of load consumption determinants. Many research works have attempted to investigate the degree of relationship between electricity consumption and day type. The findings of the investigation differ in terms of the magnitude of the effect due to social, economic, and technological diversification grounds. Therefore, country- specific research to investigate power consumption determinants should be conducted. This is the first study in Tanzania attempting to investigate the impact of day type, that is; weekday, weekend, and holidays (Easter, Eid, and Christmas) on daily electricity consumption. Four-year load data from Tanzania Electric Supply Company (TANESCO) is used for this purpose. The visual analysis technique is used to analyze daily load characteristics and the Euclidian distance is applied to quantify the gap between weekday and holiday consumption. Results indicate that there is a significant deviation in power consumption for about 5.5KWh between weekdays and weekends. The findings in this study confirm the significance of day type on electricity consumption variation in Tanzania, such that the load modelling processes can account for it.

Keywords: Electric load forecasting, Day type, Power consumption factors, Smart grid.