

UNIVERSITI TEKNOLOGI MARA

**PRICE PREDICTION MODEL OF
GREEN BUILDING BASED ON
MACHINE LEARNING
ALGORITHMS**

NUR SYAFIQAH BINTI JAMIL


MSc

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AUTHOR'S DECLARATION

I declare that the work in this thesis was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the results of my own work, unless otherwise indicated or acknowledged as referenced work. This thesis has not been submitted to any other academic institution or non-academic institution for any degree or qualification.

I, hereby, acknowledge that I have been supplied with the Academic Rules and Regulations for Post Graduate, Universiti Teknologi MARA, regulating the conduct of my study and research.

Name of Student : Nur Syafiqah binti Jamil
Student I.D. No. : 2019552069
Programme : Master of Science (Built Environment) – AP781
Faculty : Architecture, Planning & Surveying
Thesis Tittle : Price Prediction Model of Green Building Based on
Machine Learning Algorithms
Signature of Student : 
Date : January 2021

ABSTRACT

A green building, in its design, is the act of building structures and utilizing procedures that are wholly virtuous and productive throughout the building's life cycle, from its arrangement to outlining, building, operation, maintenance, remodelling and dismantling. In fact, the green building is known as a potential approach to improving the buildings performance where there are five different green building tools namely as, Energy Efficiency, Indoor Environment Quality, Sustainable Site Planning & Management, Material & Resources, Water Efficiency. However, although there are several world-class green buildings built in the recent years, the idea of green building development in Malaysia is only in its infancy. Moreover, the spill over influence of green building price prediction has yet to be discovered due to the limited research in this aspect. In the era of Industrial Revolution 4.0, Machine Learning Models become increasingly popular and influential as they are often used to solve different prediction problems in various industries, including the real estate industry. To obtain the best combination of these approaches for a good green building pricing model, it is important to identify what require extensive empirical experiments to work with identifying the best parameter configurations, techniques, and algorithms. This research seeks to provide experimental research by analyzing the relationships between transaction prices and the features affecting the green building price. In addition to measure the most significant features that can influence the price of green building first before applying more advanced models, an empirical experiment is performed by testing the Multiple Linear Regression Model. In addition, this research also develops price prediction model using Machine Learning Model based on green building datasets covering the District of Kuala Lumpur, Malaysia. The experiment involved five (5) common algorithms: Linear Regressor, Decision Tree Regressor, Random Forest Regressor, Ridge Regressor and Lasso Regressor. The results revealed that the features of lot area, Mukim – Kuala Lumpur, green certificate – gold, tenure, Mukim – Setapak, building facade, green certificate – silver, age of building and level of property unit contributed statistically to the transaction price. As the most important features towards transaction price, building security made the largest contribution to the Multiple Linear Regression Model. Meanwhile, experiments using five common algorithms, Random Forest Regressor Model outperforms four (4) other algorithms in predicting the price of green building condominium, by training and validating the data-set using Split approach. The selection features involved were based on Experiment 1 which included 17 IVs (all features) without excluding the most significant variable for this research.

Keywords: Green Building Index, Property Features, Machine Learning Model, Algorithms, Condominium property

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