Studi Risiko dan Kontribusi Palm Oil Biodiesel Terhadap Trilemma Energy Nasional dengan Simulasi Machine Learning-Big Data Analytic = Risk and Contribution Study of Palm Oil Biodiesel to National Energy Trilemma Using Machine Learning-Big Data Analytic Simulation

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Abstrak

Pemanfaatan Palm Oil Biodiesel mulai berkembang sejalan dengan pelaksanaan kebijakan mandatori BBN dari 2.805 Ribu kL di 2013 menjadi 4.706 Ribu kL pada 2018. Keberhasilan transisi energi melibatkan sektor keuangan dan keseimbangan tiga dimensi energi yaitu keamanan, kesetaraan, dan keberlanjutan lingkungan. Diperlukan teknologi Big Data untuk menangani berbagai variasi dan komparasi data yang disesuaikan dengan parameter Keuangan dan Trilemma Energi pada penerapan Palm Oil Biodiesel. Tahapan penelitian ini melalui proses pengelompokan data numerik dan kategorik yang kemudian melewati tahap training dan pengujian data. Output nya berupa hasil studi Big Data pada risiko kebijakan energi dalam penerapan Palm Oil Biodiesel. Simulasi tersebut dilakukan dengan menggunakan pemprograman Python. Badan Usaha BBN (SMAR.JK, TBLA.JK, dan CEKA.JK) menghasilkan Stock Return sebesar 28%. Kovarians terkecil terjadi antara saham SMAR.JK dan TBLA.JK, dengan korelasi dari ketiga saham tergolong rendah. Sharpe Ratio ketiganya menghasilkan 0,83-0,84. Skenario penerapan Biodiesel ini memberikan dampak progresif terhadap pertumbuhan energy equity dan energy security namun terjadi arah penurunan pada aspek environmental sustainability dengan penjabaran tahun 2020 aspek energy equity; environmental sustainability; energy security [0,72; 0;65; 0,79] diproyeksikan tahun 2023 [0,83; 0,53; 0,83]. Dalam penerapan kebijakan energi dalam penerapan Palm Oil Biodiesel tersebut terdapat risiko yang perlu diperhatinkan terhadap pelaksanaannya. Pada krisis tahun 2008 yang menunjukkan ketidaksbilan pada sektor keuangan. Dari Grafik 4.1. Total Badan Usaha BBN Stock Return menunjukkan SMAR.JK mengalami krisis paling berat. TBLA.JK paling stabil dan CEKA.JK tidak mengalami penurunan yang signifikan. Ketika DMO (Domestic Market Obligation) Palm Oil tidak terpenuhi maka biaya lingkungan tidak tercapai

.....The utilization of palm oil biodiesel begins to develop rapidly in conjunction with the implementation of the biofuel mandatory policy, from 2,805 thousand kL in 2013 to 4,706 thousand kL in 2018. Achieving the transition involves the financial sector and the balance of three energy dimensions: security, equity, and environmental sustainability. Big Data Technology is required to handle numerous data variations and comparisons adjusted with the Finance and Energy Trilemma parameter in palm oil biodiesel implementation. This research begins with grouping numerical and categorical data and then continues to data training and data testing. The output will be the results of Big Data analysis on the risks of energy policy in palm oil biofuel implementation. Python software is used to perform the simulation. Biofuel companies (SMARJK, TBLA.JK, and CEKA.JK) yield 28% stock return. The smallest covariance exists between the stocks of SMAR.JK and TBLA.JK, while the correlation between the three companies' stocks is considered low. The Sharpe Ratio of the three ranges from 0.83 to 0.84. This biodiesel implementation scenario contributes a progressive impact on the growth of energy equity and energy security but lowers

environmental sustainability. The value of energy equity, environmental sustainability, and energy security in 2020 is expressed consecutively as [0.72, 0.65, 0.79], which is projected to 2023 with the value expressed as [0.83, 0.53, 0.83]. Risks in conducting the energy policies of palm oil biodiesel should be considered. The crisis that occurred in 2008 displayed instability in the financial sector. Based on Chart 4.1. Total Stock Return of Biodiesel Companies, SMAR.JK suffered from the crisis the most. TBLA.JK was the most secure, and CEKA.JK did not experience a significant decline. If the DMO (Domestic Market Obligation) of palm oil is not met, the environmental cost will not be attained.