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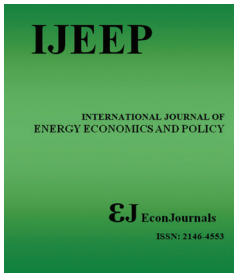

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Renewable Energy Consumption, ESG Reporting, and Fixed Asset Turnover: Does it Work in Asia?

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ABSTRACT

The purpose of this study is to provide empirical evidence on the effect of renewable energy (RE) use and environmental, social, and governance (ESG) reporting on fixed asset turnover of companies in the energy industry and basic materials industry in the Asian region. No one has tried to see the effect of RE consumption and ESG on the company's efficiency performance through fixed asset optimization, especially in the Asian region which is a strategic region for sustainability goals. The finding is RE does not affect the fixed assets turnover of companies in the energy industry sector and the basic materials industry in Asia. However, ESG reporting represented by ESG score has a significant positive influence on the company's fixed asset turnover. The company's overall internal readiness aspect is an important thing that must be considered first so that the implementation of business practices that prioritize natural resource management in achieving operational activity efficiency advantages can achieve its benefits. A higher ESG score is a representation of controlled activity performance management in generating sustainable corporate efficiency through a higher fixed asset turnover ratio, and vice versa.

Keywords: Renewable Energy, ESG Reporting, Fixed Asset Turnover, Sustainability
JEL Classifications: M41, Q42, Q56

1. INTRODUCTION

Economic growth, population, and world energy prices are basic assumptions that need to be considered to obtain a picture of future energy demand. Therefore, planning to cope with future energy demand is necessary by making the best use of natural resources. This is because given the scarcity of natural resources that will cause important problems for human survival in the next few years. The world energy outlook released that the projection of the global energy system in 2030 is that the utilization of clean technologies will become much larger than it is today, which implies that the proportion of renewable energy (RE) in the global electricity mix will approach 50%, up from around 30% today (international energy agency, 2023). Globally, the capacity of RE is increasing every year, this also shows the potential opportunities in applying RE such as geothermal energy, solar, wind, water, bioenergy, and ocean energy. Economic globalization positively impacts renewable energy consumption in OECD countries, promoting climate change mitigation and environmental concerns, and economic growth (Tlili, 2015; Poudyal et al., 2019; Gozgor et al., 2020; Zhe et al., 2021) and many policies are implemented globally to promote renewable energy-based power generation (Hasanuzzaman et al., 2017) and to address energy security (Tlili, 2015).

The data in Table 1 shows that Asia accounts for most of the growth in renewable electricity generation. Asia's global renewable electricity generation portion is also steadily increasing, reaching 42%. Asia accounts for most of the growth in global electricity generation, wind power generation as well and solar power generation.

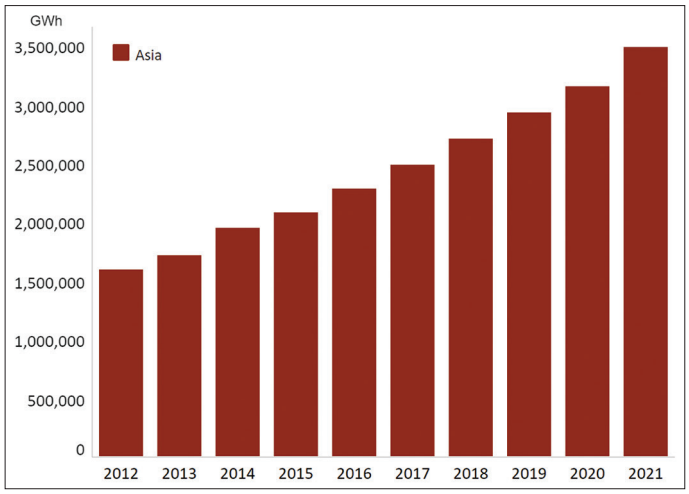
As can be seen from Figure 1 Asian RE utilization continues to increase. Asia is therefore transitioning to RE resources for the

Table 1: Renewable Electricity Generation by Region

Generation in 2020 (TWh)	Hydro	Wind	Bioenergy	Solar	Geothermal	Marine	Total
Africa	136	11	3	17	5		172
Asia	1873	556	212	448	29	<1	3119
Central America + Caribbean	29	6	8	4	5		51
Eurasia	303	26	5	12	10	<1	358
Europe	572	488	207	168	13	<1	1448
Middle East	29	2	<1	14			45
North America	701	397	73	138	23	<1	1332
Oceania	41	23	4	22	9	<1	98
South America	672	80	72	22	<1		846
World Total	4356	1589	584	844	95	1	7468

Source: International Renewable Energy Agency (2023)

Figure 1: Trends in renewable energy in Asia



Source: International Renewable Energy Agency (2023)

production sector, supported by overseas financial investments and encouragement to industries to adopt renewable technologies. With favorable government policy support, RE investment growth forecasts have become more optimistic. While fossil fuels still play an important role in every country's energy portfolio, the use of RE will continue to increase as part of efforts to improve energy efficiency. This certainly confirms that Asia is the right regional pathway to achieve the most RE targets. Asia can motivate other regions to make the transition to RE utilization faster. This commitment implies that the industrial sector needs to consider this issue in their operational activities where the use of RE can be an alternative.

RE consumption has a positive impact on economic growth in South Asian countries, where a 1% increase in RE consumption will result in a 0.66% increase in economic growth (Rahman and Velayutham, 2020). The transition from non-renewable to RE sources is necessary if developing Asian countries are to control carbon emissions and promote carbon-free economic growth (Hanif et al., 2019). Promoting the sustainable use of RE instead of reducing dependence on energy imports is believed to be a viable option for corporate profitability (Morina et al., 2021), reduce costs (Hickman et al., 2017; Hilpert et al., 2020), and contribute to building the company's market position, innovation, sustainable value creation, and positive brand image and equity (Liczmańska-Kopcewicz et al., 2020). There is a unique and new perspective on the relationship between RE investment and financial stability (Safarzyńska and van den Bergh, 2017). The real investment of RE companies can be realized if the company has a higher return on assets (Chang et al., 2019). Asset utilization efficiency and asset turnover rate can be used in assessing various RE projects (Rasmussen, 2011). However, their study only focused on indicators that can be used to evaluate projects, but not on the impact of RE consumption.

Furthermore, companies have now shifted from short-term profit-oriented goals to long-term environmental, social, and governance (ESG) goals. This is due to the realization that ESG has become an important source of corporate risk that can affect the company's financial performance and profitability (Zhao et al., 2018; Broadstock et al., 2021; Lee et al., 2021; Tommaso and Thornton, 2020), as this is also suggested by the United Nations Global Compact (Ortas et al., 2015). ESG scores can measure a company's exposure to long-term ESG risks. ESG performance will have a strong positive value if the company publishes an ESG report, either presented in a stand-alone or integrated manner (Mervelskemper and Streit, 2017) and lead to more stable dividend policies and better long-term alignment with shareholders and stakeholders (Matos et al., 2020).

To the best of the researcher's knowledge, no one has attempted to see the effect of RE consumption and ESG on the company's efficiency performance, especially in the optimization of fixed assets in driving operational performance to boost revenue through increased sales. The assumption for this belief is that companies may take RE use/consumption policies because they have future goals so that their fixed assets can operate more efficiently. This is also because investment in RE is a strategic expenditure with a large value, so of course the company hopes that the decision will contribute to the efficiency performance of its fixed assets. Researchers see this as an interesting opportunity for further exploration, especially in industrial objects in the Asian region which is a strategic region for sustainability goals.

The purpose of this study is to provide empirical evidence on the effect of RE use and ESG reporting on fixed asset turnover of companies in the energy industry and basic materials industry in the Asian region. The contribution of the research results will enrich the development of the scientific field of accounting and

sustainability management. The practical contribution of the research will also provide valuable input for policymakers related to RE consumption and its contribution, as well as for company management in regulating RE use policies in their operations, as well as managing ESG reporting.

2. METHODS

2.1. Population, Sample, Data

The population is energy and mining companies in Asia listed on Refinitv in the energy industry and basic material industry sectors. The population of the number of energy industry companies is 762 and the basic material industry is 3779. The amount of data in the population is 4541. The sampling method uses purposive sampling with the conditions that energy and mining companies are open on the Refinitiv website, report ESG scores in the 2019-2021 observation year, produce RE in 2019-2021, and have information on the fixed asset turnover ratio in 2019-2021.

After purposive sampling, this study used a sample of 36 companies with a total of 108 observational data. However, 21 of them were classified as outliers and eliminated, so the final observation data used was 87 data. The companies used come from China, India, Indonesia, Japan, Korea, Thailand, Taiwan, Hong Kong, and Kazakhstan. Secondary data sources are obtained from the Refinitiv official website.

2.2. Data Analysis

The stages begin with descriptive statistics and then data analysis with multiple linear regression. Previously, data quality was guaranteed through the classical assumption test; model feasibility through the F test, and hypothesis testing with the t-test.

Table 2: Environmental, social, and governance score range

Score range	Type	Description
0-25	First Quartile	Indicates relatively poor ESG performance and insufficient level of transparency in reporting material data to the public.
>25-50	Second Quartile	Relatively satisfactory ESG performance and a moderate level of transparency in reporting material data to the public.
>50-75	Third Quartile	Relatively good ESG performance and an above-average level of transparency in reporting material data to the public.
>75-100	Fourth Quartile	Relatively excellent ESG performance and a high level of transparency in reporting material data to the public.

ESG: Environmental, social, and governance, Source: Refinitiv data for sustainable finance ESG scores (Refinitiv, 2021)

2.3. Operational Variables

RE, measured by the amount of RE use (consumption) owned by sample companies in gigajoules, is a unit commonly used for energy. ESG Score (ESG), measured using the ESG score range criteria in the following Table 2.

Fixed assets turnover (FAT) is measured by asset turnover in generating sales volume. This ratio is measured by comparing sales with total fixed assets.

3. RESULTS AND DISCUSSION

3.1. Descriptive Statistics

From the presentation of Table 3, we can see that the level of RE use by companies in the energy and basic materials industry in Asia is quite diverse. While for ESG scores the average company has relatively good ESG performance and an above-average level of transparency in reporting material data to the public, this is within the third quartile ESG score. For fixed asset turnover, the average sample company can achieve efficient utilization of its fixed assets to generate revenue for the company. The total fixed assets owned can generate sales revenue almost twice the value of the total fixed assets.

3.2. Results of Data Quality Testing and Hypothesis Testing

The results of testing normality, multicollinearity, and heteroscedasticity show that they have met the assumption criteria so that the observation data can be used further for the next stage of regression analysis. The results are presented in Tables 4–6.

The F-test results are used to identify whether the estimated regression model is feasible or not (model feasibility). A feasible model can be used to explain the effect of independent variables on the dependent variable. From the F-test results the prob value. (Table 7) the F statistic is below the significance of 0.05. So, it can be concluded that the model is feasible to be used to explain the effect of RE and ESG Score on the FAT variable.

The calculation of the coefficient of determination (R^2) is used to determine the contribution of the independent variables used in the model to be able to explain the dependent variable, where it turns out that the RE variable and ESG score can explain 44.8% of the company's fixed asset turnover (Table 8). The remaining 55.2% is explained by other variables that are not in the regression model of this study.

The results of hypothesis testing show that the first hypothesis is rejected, the use of RE does not have a significant effect on the company's fixed asset turnover, indicated by a significance

Table 3: Descriptive statistics results

Variables	n	Minimum	Maximum	Mean	Standard deviation
RE	87	318.00	57926300.00	2500564.26	8598745.50
Environmental, social, and governance score	87	25.69	88.12	62.7648	14.09419
FAT	87	0.53	4.24	1.8745	0.97592
Valid N	87				

Table 4: Normality test results

Description	Results
n	87
Normal Parameters	
Mean	−0.4956539
Standard deviation	0.98405180
Most extreme differences	
Absolute	0.076
Positive	0.076
Negative	−0.036
Test statistic	0.076
Asymp. Sig. (2-tailed)	0.200[c,d]

Table 5: Multicollinearity test results

Variables	Tolerance	VIF
RE	0.991	1.009
Environmental, social, and governance	0.991	1.009

Table 6: Heteroscedasticity test results

Description	Standardized coefficients	t	Sig.
Model	Beta		
(Constant)	0.000	2.819	0.006
RE	−9.714E-09	−1.732	0.087
Environmental, social, and governance	0.003	1.045	0.299

a. Dependent Variable: ABS_RES2

Table 7: Multiple regression analysis results

Model	Sum of squares	df	F	Sig.
Regression	0.000	2	34.114	0.000[b]
Residual	0.000	84		
Total	0.000	86		

The multiple regression equation model is generated as follows: Y=0.000+0.0000000004958 Renewable Energy+0.041 environmental, social, and governance score

Table 8: Results of the coefficient of determination

R	R square	Adjusted R square	Std. error of the estimate
0.669	0.448	0.435	0.00024

Table 9: T-test results

Model	B	t	Sig.	Description
Constant	0.000	−1.806	0.074	
RE	4.958E-9	0.515	0.608	Not accepted
Environmental, social, and governance	0.041	7.904	0.000	Accepted

indicator that is more than 0.05. Meanwhile, the second hypothesis is accepted, the company's ESG score reporting has a significant positive effect on the company's fixed asset turnover. The results can be seen in Table 9.

3.3. Discussion

3.3.1. Use of RE on fixed asset turnover

The use of RE by the company does not have a significant effect on the company's asset turnover. Although companies in the energy industry sector and the basic materials industry in Asia have shown their commitment to start using RE, the impact of this use has not contributed to the performance of their total asset optimization activities. If we look at the results of descriptive statistics, companies in Asia still vary greatly in the level of use of RE and even tend to range the variance of RE consumption tends to be far. This could be one indication of why the contribution of its influence on the efficiency of the company's fixed asset turnover activity is not confirmed. Previous research that also found similar results revealed that increasing energy efficiency and the use of RE sources had no significant effect on the company's financial performance (Martí-Ballester, 2017). The burden of financing RE investments is an issue faced by companies, which means that companies must be able to balance these investment choices with increased profitability from the use of existing power plants (Safarzyńska and van den Bergh, 2017). Organizational effectiveness and cost efficiency are the most prominent factors for RE investment (Zhao et al., 2018).

Another argument that could explain this finding is that the electricity-energy transition relationship is highly sensitive to country income levels and macroeconomic stability (Taghizadeh-Hesary et al., 2021). This implies that Asian countries with different income levels need to first improve economic sustainability and resilience, followed by fossil fuel switching policies to green energy and technological efficiency in the power generation sector. Company-specific and country-specific factors also need to be considered in promoting RE goals to be sustainable (Morina et al., 2021). GDP and FDI as fundamental policy instruments need to be considered when making decisions on the use of RE in the financial sector to succeed (Kang et al., 2021).

There is a long-term relationship between RE consumption and financial development, where financial development triggers increased demand for environmentally friendly energy sources, namely RE (Shahbaz et al., 2021). For example, in research conducted in China, RE has indeed been considered an effective way to deal with environmental pollution and the energy crisis in China. However, the development of the RE sector depends on economic growth and financial issues (Wang et al., 2021). What also needs to be realized is the unevenness of energy supply in Asia. For example, South Asia is often the target of research that concentrates on energy access (especially electricity), while the central Asian region has not been the focus of energy research because energy supply in central Asia is very uneven between urban and rural areas (Mehta et al., 2021). This may explain why in the descriptive statistical results of this study there a considerable gap in the use of RE among the companies is studied. In addition, research findings suggest that more democratic countries tend to invest more in RE, considering other determinants (e.g., income, energy dependency, pollution emissions) of such investments (Sequeira, and Santos, 2018). Asia itself cannot yet be considered a fully democratic country, which is one indication that may explain the gap in RE use among the companies in our sample. Furthermore, for countries that are mainly dependent on coal, phasing out fossil fuels is a difficult task, especially considering the need for a fair and equitable transition for society, so coordinated efforts and global cooperation are needed for timely development. Furthermore, the use of RE does not have a special impact on

the company's financial statements due to several reasons such as the lack of information regarding the accounting treatment of RE assets, especially for companies that may still be new to implementing and developing RE so that RE assets are treated the same as fixed assets (Nuha and Nastiti, 2020).

In the perspective of the natural resource-based view theory (NRBV), the company's efforts to manage in such a way that its natural resources are owned through the practice of using RE, attention to carbon emission levels, environmentally friendly operational practices, and other environmentally oriented management efforts in producing sustainable resources can lead to competitive advantage (Anthony, 2019). In the context of the findings of this study, the company's overall internal readiness aspect is an important thing that must be considered first so that the implementation of business practices that prioritize natural resource management in achieving operational activity efficiency advantages can achieve its benefits.

3.3.2. ESG score reporting on fixed asset turnover

ESG score reporting has a significant influence with a positive direction on the company's fixed asset turnover. This means that the higher the company's ESG score, which reflects attention to ESG aspects, the better the performance of its fixed asset turnover to generate revenue, this reflects good activity performance for the company.

This finding is in line with the results of Ahmad et al. (2021) and Chelawat and Trivedi (2016) found that there is a significant positive effect of ESG impact on corporate financial performance, where companies with high ESG show high financial performance compared to companies with low ESG. Portfolios with high ESG ratings consistently deliver superior performance, and diversification efficiency, and mitigate lower overall financial risk compared to portfolios with low ESG ratings that exhibit low ESG performance (Lee et al., 2021; Broadstock et al., 2021). In line with De Lucia's (2020) findings, good ESG practices have a positive impact on financial performance where there is a stronger relationship when investing in environmental innovation, labour productivity, diversity, and equal opportunity policies. ESG efforts are part of social innovation, circularity, and energy transition (Popescu et al., 2020), this could be an indication of the company's behaviour in using its fixed assets.

Other findings also reveal that ESG performance has a positive impact on financial performance, explaining that the presence of CEO power can strengthen this relationship (Velte, 2020). The CEO's role in providing direction, managing, and organizing operational activities, and making important company decisions strengthens the influence of ESG performance on the company's financial performance. CEO power can intervene in how the company practices ESG so that it also contributes to managing its total assets so that they can be optimized in achieving sales performance to increase revenue. Financial firms' ESG scores grow in a linear trend over time, and this trend is amplified by their size and profitability, which coincides with the economic and social development of the countries in which they operate; Although the ESG pillars follow independent patterns (Crespi and Migliavacca, 2020). In a review of financial economics-based research by Gillan et al. (2021), they found that ESG activities have relationships with various aspects of the firm, and some results are quite robust. Measuring the relative impact of ESG issues can be beneficial if done with a human impact approach, even for those interested in making a positive impact when investing (Katz, 2022).

So, from the discussion above, if the company has a high ESG reporting score, it can be interpreted that the company has tried to carry out good governance of its activities, including the management of its fixed assets in generating increased revenue for the company. This is also reflected in the descriptive statistical results of sample companies which on average have fixed asset turnover performance that can be used optimally in generating sales to almost double the total assets. Companies that can produce their performance efficiently can be seen from the fixed asset turnover ratio. The findings of this study are in line with the NRBV perspective, where the achievement of the ESG score is a representation of the company's performance in its efforts to pay attention to the management of natural resources and the environment.

4. CONCLUSION

The results show that RE does not affect the turnover of fixed assets of companies in the energy industry sector and the basic materials industry in Asia. However, ESG reporting represented by ESG score has a significant positive influence on the company's fixed asset turnover. This shows evidence that a higher ESG score is a representation of controlled activity performance management in producing sustainable corporate efficiency through a higher fixed asset turnover ratio.

The findings of this study provide several implications. First, for the development of NRBV theory, the company's natural resource management strategy will become a competitive advantage if it is seen in the long term in a state of company stability in financial performance and activity performance. So, there is a contingency assumption that accompanies the application of this theory. Second, company management needs to consider internal and external complexities carefully and thoroughly before making strategic decisions on the use of RE. This is because efficiency using RE is quite complex in practice. After all, many determinants are indicated to be considered by the company, such as macroeconomic factors, company revenues, RE investment costs, and specific characteristics of the country, before the benefits of RE use can be felt by the company. Third, companies in the energy and basic materials industry sector in Asia can continue to improve the quality of their ESG reporting, which reflects good operational management activities.

The limitation of this research is that there are still limited energy industry sectors and basic material industries in Asia that use RE for company activities. This makes it difficult for researchers to obtain comprehensive data. However, the results of this study can be a good first step in exploring Asia as a region that is considered strategic in implementing global sustainability goals.

Some suggestions are given as follows. First, future research can use other data sources besides those presented in Refinitiv to expand the potential for broader data acquisition. Second, further research can test various other determinant variables that are predicted to affect the relationship as expressed in the implications above, including the potential presence of mediating and intervening influences among them.

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