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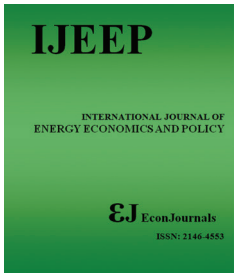

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The Effects of Green Technology, Energy Efficiency and Environmental Concerns to improve Sustainable Environment: Moderating Role of the Organizational Awareness

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ABSTRACT

Sustainable environment has the demand of the entire world due to extensive environmental degradation and this aspect needs the foremost intention of recent studies. Thus, the present study investigates the impact of green technology, energy efficiency and environmental concerns on sustainable environment in Indonesia. The study also investigates the organizational awareness as moderator among predictors and predictive variables. The study gathered the primary data with the help of survey questionnaires form the employees of the oil industry in Indonesia. The study also used the smart-PLS to examine the association between the constructs. The outcomes indicated that the green technology, environmental concerns and energy efficiency has a positive and significant association with sustainable environment. The results also revealed that the organizational awareness also moderate the association among green technology, environmental concerns, energy efficiency and sustainable environment. The study provides the guidelines to the policymakers in making significant policies related to achieve the sustainable environment using energy efficiently, high concerns of environment and effectively using green technology.

Keywords: Green Technology, Environmental Concerns, Organizational Awareness, Energy Efficiency, Sustainable Environment
JEL Classifications: O13, Q56, P48, Q42, R11, F64

1. INTRODUCTION

The sustainable environment developed by both profit-making and non-profit making institution especially the organizations engaged in industrial practices, has considerable worth to an economy. A sustainable environment is one having clean atmosphere, abundant natural resources, and natural resources with good quality, healthy living natural resources, all those living in air, under the water surface, and on land. Also it has balanced climate for human being to survive and perform Xiang et al. (2021). According to the views of Suki et al. (2020), sustainable environment is the environment where there is potential to preserve the natural resources, living and non-living natural creatures that are taken as the raw material and other resources to businesses. It is the environment having the capability to maintain the human health, humans from those active, talented, and efficient human resources come into business. It is not just for the present needs but providing for the future economic and social people's needs. A sustainable environment facilitates an economy to build active human capital like administrators, regulators, employees, social reformers, healthy customers, and public with sound mind and body. Where country people have sound health, the country experiences high probability in getting progress at a high rate hitting the point that humans are those taking part in business operations and carrying out business operations. Moreover, natural resources are fundamental to businesses providing for energy and

raw material that's only possible in a sustainable environment (Ahmed et al., 2020).

The business practices for large use of energy, chemicals, and toxic materials cause wastes, toxic gases, and other harmful substance which disturb nature. There are some factors like green technology, energy efficiency, and environmental concern which overcome these environmental issues and develop sustainable environment. Green technology is the use of technology, knowledge, and techniques for reducing the human impacts on natural environment. It is to create products and services that are environmentally friendly and assist operational performance while reducing wastes, energy consumption, dirty water flow, harmful chemical emissions, or any other negative impact on environment. Thus, a company applying green technology sustain environmental quality (Javaid et al., 2022; Ramli et al., 2022a). Energy efficiency means to use less amount of energy in order to have same outcomes about the accomplishment of certain tasks. Energy is the major part in business running all operations but it causes pollution and damages natural environment. The use of energy in relatively less amount overcome the impacts of energy combustion on atmosphere, weather conditions, and natural resources. Hence, applying energy efficiency, environmental sustainability can be achieved (Zakari et al., 2022). Environmental concern refers to the level people have knowledge or understanding of ecological problems, people's support for the activities as solution to environmental issues, and intensity of inclination to make contribution to solutions. If environmental concern is high, ecological-friendly technologies and processes have encouragement (Ramli et al., 2022b; Saari et al., 2021).

The current study investigates the sustainable environment is Indonesia. Indonesia is a developing economy and carries an upper-middle-income economy. The current study how interested particularly for environmental sustainability oil industry that is one of the Indonesian grand industries. It shows a critical role in the country's economic growth as 10.17% contribution is made by oil industry to Indonesia annual GDP. Country's export of oil is considerable higher in value than the oil imports by the country. The statistical data from the Central Statistics Agency of Indonesia pointed out that the production of CPO has been increasing since 2016 with the level of 31.49 million tons to 44.76 million tons in 2020. The area of oil palm plantations in Indonesia during the last 5 years tends to increase. Indonesia's oil palm plantation area was also recorded in increase from 11.20 million ha to 12.38 million ha in 2017. In 2018, the total area of oil palm plantations to 14.33 million ha. Furthermore, in 2019 the area of oil palm plantations has increased again to 14.46 million ha and in 2020 to 14.59 ha. The level of plantation area will continue to increase due to the high demand of CPO and PKO (Johan, 2019). The production process of the crude palm oil in the palm oil mill start from the sending of fresh fruit bunches (FFB) harvest from the plantation which is then processed into crude palm oil (CPO) and palm kernel oil (PKO). The processing of FFB into CPO involve sterilizing and threshing which continue with digesting and pressing. Palm oil will then be clarify into clear oil through the purification process and later store in the storage. The palm kernel nuts inside the palm fruit will be dried and crush into palm kernel oil from the palm kernel shell. The palm oil mill waste will be separated from the sludge in the ponds and the empty fruit bunches (EFB) as the crude palm oil waste or palm oil mill effluents (POME) (Iswanto et al., 2020). That's why, the production of hazardous gases and chemicals, impart adverse effects on the natural environment, natural resources, and the health of the people negatively influencing the firms' performance. Nowadays, firms in oil industry integrate in the lean and green upstream supply chain. It is an initial step to control the associated social and environmental issues (Syah, 2019).

The oil industry is Indonesia's major economic sector contributing to country GDP as well as raising foreign exchange providing for company exports. The industry is rapidly but unfortunately, the industry emits harmful gases and chemicals and thereby, pollutes the environment. Although, some steps for ecological-friendly improvement and mitigation of environmental pollution have been taken, these steps are unsatisfactory and the situation is still worse. The present study gives solution. The objective of the study is to explore the influences of green technology, energy efficiency, and environmental concern on sustainable environment. It is also to examine the role of organizational awareness between green technology, energy efficiency, environmental concern, and sustainable environment.

The present study has picked its subject of sustainable environment from existing literature but makes significant further contributions to literature. First, in the previous literature, there are studies which examines the impact of green technology, energy efficiency, and environmental concern on sustainable environment. But these studies have individually checked these factors relationship with sustainable environment. The current article which conducts a combine research for analyzing the association of green technology, energy efficiency, and environmental concern with sustainable environment, adds to literature. Second, there has been a literary record of organizational awareness as contributing to sustainable environment. But there are a few studies which talk about the moderating role of organizational awareness between green technology, energy efficiency, environmental concern, and sustainable environment. The current piece of literature makes contribution to literature by analyzing the moderating role of organizational awareness between green technology, energy efficiency, environmental concern, and sustainable environment. Third, though several studies have dealt with role of green technology, energy efficiency, and environmental concern in improving sustainable environment with reference to different economies mostly other than economy of Indonesia. The present article saves an exceptional place in literature by analyzing the impacts of green technology, energy efficiency, and environmental concern on sustainable environment in Indonesia.

This study comprises of five part: Next to introduction, there is literature review to construct the research hypotheses about the association among organizational awareness, green technology, energy efficiency, environmental concern, and sustainable environment in light of previous studies. The second part is about the short description of research methods. In fourth part, data is analyzed and hypotheses are tested. In the last part, results are

compared with existing studies and study conclusion, limitations, and implications are given.

2. LITERATURE REVIEW

Different authors have written their views about the association among organizational awareness, green technology, energy efficiency, environmental concern, and sustainable environment. The views differ in different studies. In further paragraphs, different studies are examined to construct hypotheses for relationship among organizational awareness, green technology, energy efficiency, environmental concern, and sustainable environment.

Adoption of green technologies, allow the organizations to overcome environmental issues which they face during business practices like heating, lightening, or cooling a place, manufacturing, transportation, and marketing etc. The reduction in environmental issues associated with the business like health damaging wastes, smoke, greenhouse gases, and destructive chemical discharge, etc. adds to environmental sustainability (Bradu et al., 2022). Hussain et al. (2022), investigates the relationship of green technology, green growth, and sustainable environment. The research was conducted in high-gross domestic product (GDP) countries and secondary data were obtained for years of 2000-2020. A cross-sectional autoregressive distributed lags estimator was employed for analysis. The study highlights that with the passage of time and as per the environmental requirements, the need for the use of green technologies which gives environmental outcomes, increases. The firms which apply green technologies to undertake business practices and accomplish their goals, usually less experience creation of substances polluting the work environment and damaging the health of workers. Hence, green technology adoption improves sustainable environment. Bradu et al. (2022), examines how green technology innovation, environmental regulation, and industrial structure upgrading influences environment sustainability. The research was conducted in 105 Chinese cities engaged in environmental monitoring and the partially linear functional-coefficient panel model was used. The study proclaims that the firms applying green technologies, improves operational and production procedures reducing pollution. As a result, the environment where firms operate, get sustainable. The study of Shan et al. (2021), explains that the adoption of green technologies like solar panel, led lightening, carbon capture, electric vehicles, recycling, wastes management, green transportation, and energy efficiency etc. reduces the total amount of pollution from firms. The reduction in pollution maintains the environmental balance and adds to sustainable environment. Hence,

H_1: Green technology has a positive influence on sustainable environment.

Business organizations require energy to prepare work environment, undertake business practices at different departments, and produce goods or services. Energy causes the emissions of different contaminating gases polluting the environment. Under energy efficiency, less amount of energy is used while same outcomes can be achieved. Thus, firms can mitigate environmental issues and achieve sustainable environment. Paramati et al. (2022), investigates the relationship of energy efficiency, energy demand, environmental-related technologies, and sustainable environment. The research sample consists of 28 OECD economies and annual data were collected for years between 1990 and 2014. Panel estimation techniques for cross-sectional dependence, endogeneity, and fixed effect were applied. The study posits that when firms include energy efficiency in their policies, they adopt technologies which require less amount of energy even not disturbing the outputs, they may control environmental issues. Hence, environment is free from pollution and sustainable. A research was done by Pan et al. (2019), for the evaluation of impacts of energy efficiency, environmental regulations, technological innovation, and environmental sustainability. Large dimensional panel data of China from 30 provinces for 2006-2015 was used. For research, authors used structure vector auto regression (SVAR) and the directed acyclic graph (DAG). The study highlights that the firms following energy efficiency allow changes in business infrastructure, technologies, manufacturing machinery, and transportation. Green innovation with less energy consumption, reduces business emissions and provides public sustainable healthy environment. Rasoulinezhad and Taghizadeh-Hesary (2022), also examines the relationship of energy efficiency with environmental quality. The study implies that the decrease in total energy consumption applying energy efficient techniques and technologies result in less greenhouse gas emissions. It assures sustainability in natural environment. Thus,

H_2: Energy efficiency has a positive influence on sustainable environment.

Firms for the use of different technologies, resources, chemicals, and instant materials in operating business practices becomes a major cause of imbalance in nature and destroys environment for stakeholders. The firms concern about the environmental quality motivate them to bring changes in technologies, resources, and materials, they apply for production and operational purposes keeping under consideration the impacts on environment and quality of natural resources including human health. The resultant ecological-friendly innovation business operations absorbs pollution and assures a sustainable environment (Usman and Balsalobre-Lorente, 2022). Saudi et al. (2019), examines the association of managerial environmental concern, green innovation, and sustainable environment. Data for the research were collected from manufacturing enterprises operating business practices in Malaysia. Here PLS-SEM was sued for analysis of acquired data. The study proclaims that the managerial personnel are influential authority in an organization. If they have environmental concern, they attention turn to do something environmentally-friendly while forming business policies. The resultant environmentally-friendly programs help overcome environmental problems and creates environmental sustainability. The literary article of Song et al. (2020), debate on association of managerial environmental concern, green human resource management, green innovation, and sustainable environment. Data were arranged from 143 enterprises in China. Bootstrapping test and the regression analysis were used to evaluate the hypotheses. The study results convey that when the organizational management has environmental concern, they like to introduce green resources as well as prepare the human resources as to tackle with the

environmental issues and employ green resources efficiently. In these circumstances, environmental issued are controlled and sustainable environment is sure for public. Yue et al. (2020), also indicates that environmental concern gives rise to social-friendly consciousness in employees and motivate them to preserve environment for future generation. The managerial struggles in this regard, improves sustainable environmental performance of the firm. That's why,

H_3: Environmental concern has a positive influence on sustainable environment.

Organizational awareness is the knowledge or information with organizational personnel either in managing department or operational departments. If the organizational personnel have wide scope of awareness about market trends and scientific development, know the significance of green technology and have ability to apply them. Apart from this, it motivates them to take actions for improving environmental performance. Thus, organizational awareness improves the contribution of green technology to sustainable environment (Fernando et al., 2019). A research conducted by Lv et al. (2021), examines the relationship organizational awareness, green technology innovation, innovation output, environmental regulations, and sustainable environment. The research applies both the GML (Global Malmquist-Luenberger) index and the DEA-SBM (Data Envelopment Analysis, Super Slack-Based Measure) model to measure the factors in China's 30 provinces for the time of 2003-2017. The study depicts that organizational awareness, green technology, and sustainable environment are interlinked as organizational awareness encourages the usage of green technology and improves its role in achieving sustainable environment. Hossain et al. (2020), identifies the association among organizational environmental awareness, green technology usage, sustainable green practices, and sustainable environment. For acquiring data, structured questionnaires were sent to 220 manufacturing SMEs in Bangladesh. Smart PLS 3.0 was used for analysis. The study posits that the firms where employees are trained and assured to have high technical and environmental awareness, green technologies are introduced and firms succeeds in achieving sustainable environment. The study of Lv et al. (2021), reveals that green technologies are the innovative technologies specially designed or formed as to overcome environmental problems related to the functions of casual technologies. Organizational awareness enables them to make a right choice about green technologies and implement them efficiently. Moreover, organizational awareness create environmental consciousness. In this situation, green technology can be more useful to control environmental pollution and assure sustainable environment. So,

H_4: Organizational awareness plays a significant moderating role between green technology and sustainable environment.

Energy efficiency is the reduction in total energy required for the tasks or change in the nature of energy being use used. For implementing energy efficiency, different innovative technologies, resources, and change in processes are required. Organizational awareness enables the organizational personnel to recognize ecological-friendly technologies, resources, and procedures as well as create ability to implement them. So, when organizational awareness is high, energy efficiency can better be implemented and it can better overcome pollution leading to sustainable environment (da Cunha and de Aguiar, 2020). Sun et al. (2021), checks the association among organizational awareness (Knowledge), technological innovation, energy efficiency, and sustainable environment. Authors employed data from the OECD Triadic Patent Families database for 24 developing countries during the time of 1994-2013. Study used descriptive statistics for analyzing the factors' relationships. The study explains that organizational awareness about the increasing shocks regarding environmental quality, requirement of eco-friendly changes from public, and green technologies getting popularity in market. With such knowledge, energy efficiency can be implemented within organization, effectively and firms can be saved from environmental pollution. In this situation, firms assure sustainable environment. Shahzad (2020), identifies the association of organizational awareness (Knowledge), environmental taxes, energy efficiency, and sustainable environment. By examining the literature up to 2020, this article offers a thorough overview of the prior research on developed, developing, and rising nations. The study findings reveal that organizational awareness fosters energy efficiency and improves its influence to improve sustainable environment. The study of da Cunha and de Aguiar (2020), claims that organizational awareness enables organizational personnel to understand how adversely excessive energy use and environmental pollution would affect the operational and financial future of the firm. Also, it provides knowledge how to overcome energy use and mitigate environmental pollution. Hence, it encourages energy efficiency and making the energy efficiency effectively implemented giving a sustainable environment. Hence,

H_5: Organizational awareness plays a significant moderating role between energy efficiency and sustainable environment.

Organizational awareness means knowledge of managers and other employees to work for business operations. Their knowledge affect their intention, mental capabilities, and actions. The organizational personnel who have the awareness of customers' environmental requirements, have concern for environmental needs and necessity of environmental preservation for their own future. They evaluate the environmental issues they have to face in routine business life and impose environmental regulations effectively. So, the firm sustains environmental quality. Li et al. (2019), integrates the relationship between organizational awareness, environmental concern, energy efficiency, and environmental sustainability. Research data were related to Shanxi province of China. Smart PLS 3.0 and SPSS with micro Indirect and the Bootsrap methods, were used for analyzing data and presenting view about the authenticity of research hypotheses. The study implies that the organizations where employees have high environmental awareness and technical knowledge, have environmental concern and inclination for energy efficiency. Less energy use cause less pollution and gives environmental sustainability. Fu et al. (2020), investigates the association among organizational awareness, environmental concern, and sustainable environment in road freight transportation industry in China. Authors checked hypotheses taking a sample

of 243 truck drivers applying hierarchical regression analysis and structural equation modeling. The study reveals that organizational awareness enhances the contribution of environmental concern in sustainable environment. The study of Serra-Majem et al. (2020), claims that when organizations are aware of the impacts of energy usage on environment and its adverse consequences on people social and economic future, they have environmental concern. Having environmental concern, they prefer energy efficiency, and adopt the appropriate technologies doing same work with less amount of energy. The decrease in the energy usage, results in decrease in greenhouse gas emissions and environmental degradation. It improves sustainable environment. Thus, organizational awareness improves the relationship among organizational awareness, environmental concern, and sustainable environment. Therefore,

H_6: Organizational awareness plays a significant moderating role between environmental concern and sustainable environment.

3. RESEARCH METHODS

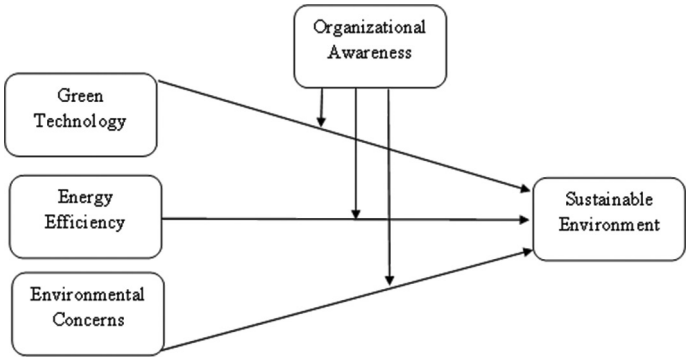
The study investigates the impact of green technology, energy efficiency and environmental concerns on sustainable environment and also investigate the organizational awareness as moderator among predictors and predictive variables. The study gathered the primary data with the help of survey questionnaires form the employees of the oil industry in Indonesia. The items were used to measure the constructs used in the study. For example green technology is measured six questions (Alam et al., 2024), energy efficiency is measured with five items (Sosiadi et al., 2023), environmental concerns is measured with six items (Chao et al., 2023), organizational awareness is measured with four questions (Pescaroli et al., 2020) and sustainable environment is measured with five questions (Gershberg et al., 2022).

In addition, the employees are the respondents of the study who are working for the clean environment in the organization. The employees were chosen on random sampling basis. The surveys were distributed by personal visits to the organizations. The researchers have distributed 539 surveys but 290 valid surveys were received after 1 month. These responses have 53.80 percent response rate. Moreover, the study also used the smart-PLS to examine the association between the constructs. It is an effective tool for the analysis of primary data and gives best results even though the researchers used complex frameworks (Hair Jr et al., 2020). Finally, the study was used three predictors named green technology (GT), energy efficiency (EE) and environmental concerns (EC), while the stud also used organizational awareness (OA) as the moderating variable and sustainable environment (SE) as dependent variable in the study. These are given in Figure 1.

4. RESEARCH FINDINGS AND DISCUSSION

The study checks the items correlation called convergent validity using Alpha, composite reliability (CR), average variance extracted (AVE) and factor loadings. The outcomes show that the Alpha and CR values are high than 0.70 and AVE and factor loading values are bigger than 0.50. These values show a high correlation between items and shows convergent validity is valid. These figures are given in Table 1 and Figure 2.

Figure 1: Theoretical model



The study also checks the variables correlation called discriminant validity using Fornell Larcker and cross-loadings. The outcomes show that the values that show the correlation between variable itself are bigger than the values that show the correlation with other variables. These values show a low correlation between variables and shows discriminant validity is valid. These figures are given in Tables 2 and 3.

The study also checks the variables correlation called discriminant validity using Heterotrait Monotrait (HTMT) ratio. The outcomes show that the values are <0.85. These values show a low correlation between variables and shows discriminant validity is valid. These figures are given in Table 4.

The path analysis outcomes indicated that the green technology, environmental concerns and energy efficiency has a positive and significant association with sustainable environment and accept H1, H2 and H3. The results also revealed that the organizational awareness also moderate the association among green technology, energy efficiency and sustainable environment at 5 percent level of significance while moderating among environmental concerns, and sustainable environment at ten percent level of significance. These results are given in Table 5 and Figure 3.

5. DISCUSSION

The study results showed that green technology has a positive influence on sustainable environment. These results are supported by Madaleno et al. (2022), which examines the role of green technology in achieving sustainable environment. The study posits that the organizations which are inclined to apply green technology for performing different business practices, they succeed in reducing environmental pollution caused by these activities. These organizations add to sustainable environment. These results are also in line with Wang et al. (2019), which highlights that the use of green technology within an organization, results in less energy use and organization achieve sustainable environment.

The study results showed that energy efficiency has a positive influence on sustainable environment. These results are supported by Iris and Lam (2019), which posits that the use of energy efficient

Table 1: Convergent validity

Constructs	Items	Loadings	Alpha	CR	AVE
Environmental Concern	EC1	0.870	0.904	0.926	0.675
	EC2	0.824			
	EC3	0.789			
	EC4	0.778			
	EC5	0.827			
	EC6	0.839			
Energy Efficiency	EE1	0.524	0.842	0.878	0.605
	EE2	0.892			
	EE3	0.918			
	EE4	0.914			
	EE5	0.527			
Green Technology	GT1	0.762	0.882	0.910	0.628
	GT2	0.750			
	GT3	0.711			
	GT4	0.872			
	GT5	0.784			
	GT6	0.861			
Organizational Awareness	OA1	0.866	0.899	0.929	0.766
	OA2	0.875			
	OA3	0.879			
	OA4	0.881			
Sustainable Environment	SE1	0.862	0.893	0.921	0.700
	SE2	0.820			
	SE3	0.856			
	SE4	0.790			
	SE5	0.854			

Table 2: Fornell Larcker

Variables	EC	EE	GT	OA	SE
EC	0.822				
EE	0.498	0.778			
GT	−0.075	−0.144	0.792		
OA	0.421	0.521	−0.103	0.875	
SE	0.522	0.431	−0.171	0.390	0.837

Table 3: Cross-loadings

Variables	EC	EE	GT	OA	SE
EC1	**0.870**	0.417	−0.115	0.347	0.487
EC2	**0.824**	0.453	−0.020	0.351	0.438
EC3	**0.789**	0.401	−0.034	0.348	0.393
EC4	**0.778**	0.388	−0.109	0.332	0.399
EC5	**0.827**	0.351	−0.031	0.367	0.398
EC6	**0.839**	0.438	−0.054	0.337	0.449
EE1	0.241	**0.524**	−0.090	0.660	0.152
EE2	0.460	**0.892**	−0.154	0.376	0.392
EE3	0.458	**0.918**	−0.125	0.396	0.406
EE4	0.453	**0.914**	−0.106	0.354	0.428
EE5	0.242	**0.527**	−0.084	0.662	0.159
GT1	−0.039	−0.105	**0.762**	−0.079	−0.093
GT2	−0.061	−0.161	**0.750**	−0.131	−0.139
GT3	0.005	−0.048	**0.711**	−0.044	−0.089
GT4	−0.078	−0.120	**0.872**	−0.048	−0.147
GT5	−0.063	−0.117	**0.784**	−0.123	−0.166
GT6	−0.089	−0.111	**0.861**	−0.051	−0.146
OA1	0.321	0.443	−0.095	**0.866**	0.337
OA2	0.385	0.469	−0.081	**0.875**	0.334
OA3	0.360	0.436	−0.099	**0.879**	0.306
OA4	0.404	0.473	−0.087	**0.881**	0.381
SE1	0.448	0.348	−0.125	0.344	**0.862**
SE2	0.450	0.408	−0.143	0.319	**0.820**
SE3	0.386	0.296	−0.141	0.300	**0.856**
SE4	0.480	0.433	−0.174	0.359	**0.790**
SE5	0.399	0.284	−0.124	0.293	**0.854**

Table 4: Heterotrait Monotrait ratio

	EC	EE	GT	OA	SE
EC					
EE	0.542				
GT	0.089	0.160			
OA	0.467	0.717	0.113		
SE	0.573	0.443	0.183	0.428	

technologies or other resources used in business operations, help overcome the amount of total energy used and reduces the harmful gas emissions. It assures sustainable environment for organizational personnel. These results are also in line with Murshed (2020), which reveals that higher the organization's tendency to move towards energy efficiency, lower is the harmful gas emissions, and better is the sustainable environment.

The study results showed that environmental concern has a positive influence on sustainable environment. The article of Saxena et al. (2020), supports these results. This previous study states that the organizations whose policies show higher environmental concern, are engaged in environmentally-friendly programs and attain sustainable environment. These results also agree with Khan et al.(2022), which claims that firms concern about environmental quality, motivate them to bring ecological-friendly changes and thereby, improve sustainable environment.

The study results showed that organizational awareness plays a significant moderating role between green technology and sustainable environment. These results are supported by Yacob et al. (2019), which implies that the environmental awareness of organizational personnel, bring them close to green technologies and in this way improve sustainable environment. These

Table 5: Path analysis

Relationships	Beta	Standard deviation	T statistics	P-values
EC -> SE	0.399	0.059	6.804	0.000
EE -> SE	0.149	0.067	2.223	0.028
GT -> SE	0.104	0.041	2.517	0.013
OA -> SE	0.210	0.064	3.296	0.001
OA×EE -> SE	0.142	0.063	2.251	0.027
OA×GT -> SE	0.098	0.046	2.131	0.036
OA×EC -> SE	0.097	0.055	1.764	0.081

Figure 2: Measurement model assessment

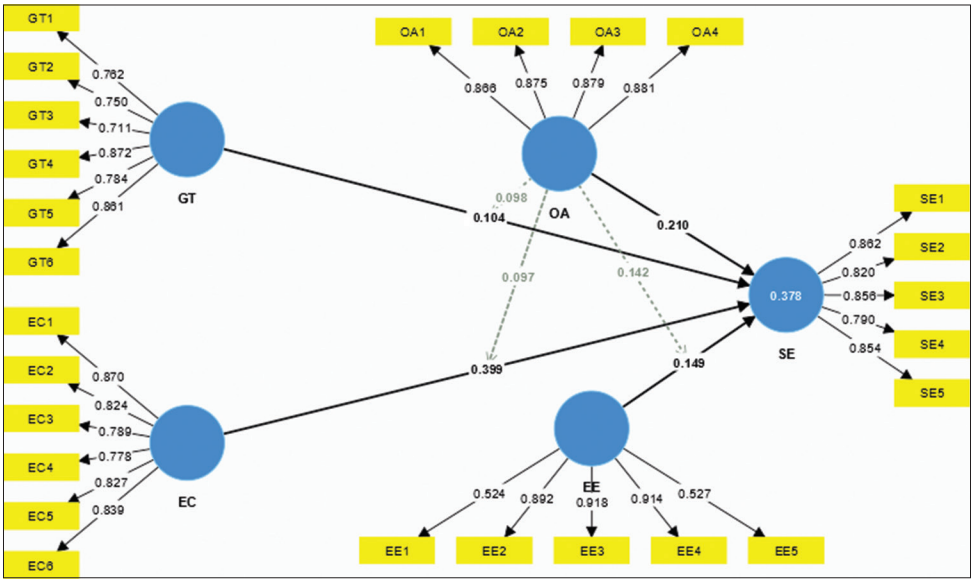
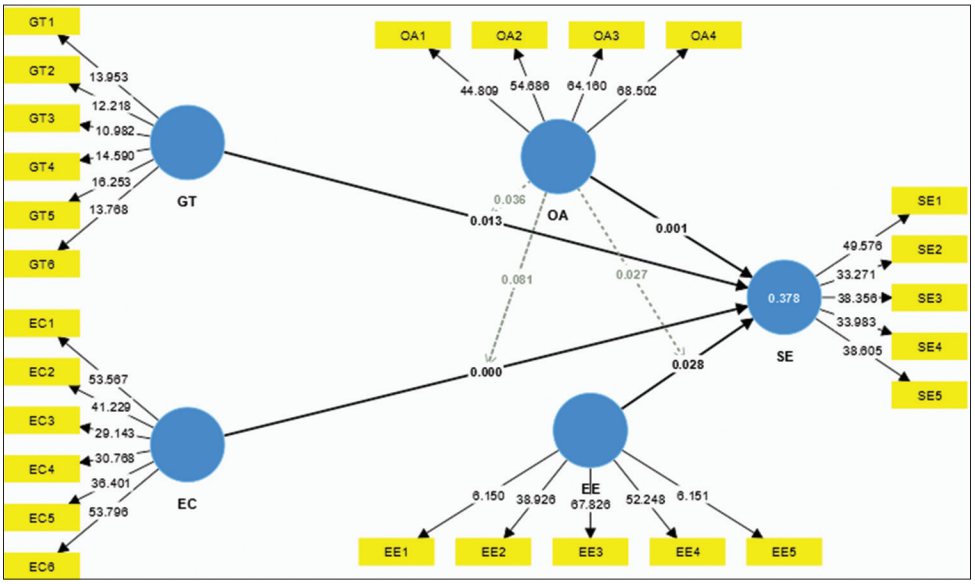


Figure 3: Structural model assessment



results also match with Ulucak (2020), which states that when organizational awareness is high, green technology becomes frequent and organizations contributes to sustainable environment.

The study results showed that organizational awareness plays a significant moderating role between energy efficiency and sustainable environment. These results agree with Elahi et al. (2022), which posits that organizational awareness encourages energy efficiency and improves sustainable environment. Thus, organizational awareness improves relationship between energy efficiency and sustainable environment. These results are also in line with García-Quevedo and Jové-Llopis (2021), where authors have the view that increase in organizational awareness, enables organizational personnel to implement energy efficiency. Thus, it improves the contribution of energy efficiency in sustainable environment.

The study results showed that organizational awareness plays a significant moderating role between environmental concern and sustainable environment. These results are also in line with Heo and Muralidharan (2019), which states that organizational awareness strengthens the relationship between environmental concern and sustainable environment. These results are supported by Rasheed et al. (2019), which conveys that organizations having wide awareness of stakeholders' requirements, show environmental concern and develop ability to achieve sustainable environment.

6. CONCLUSION

The study objective was to examine the influences of green technology, energy efficiency, and environmental concern on sustainable environment. The study objective was also to analyze role of organizational awareness between green technology, energy efficiency, environmental concern, and sustainable environment. Applying structured questionnaires, quantitative data were arranged from firms operating in China. The study findings showed a positive influence of green technology, energy efficiency, and environmental concern on sustainable environment. The study claims that the use of green technologies to provide infrastructure, facilitate business operations like production, communication, and transportation, reduces the discharge of contaminating substances. Hence, sustainable environment can be assured. The study results also depicted that if the organizational management focuses on implementing energy efficiency, it brings a change in technologies and procedures applied for the business as they produce little amount of greenhouse gas emissions. It leads to sustainability in environmental quality. The results also revealed that when organizational management has environmental concern, they try to remove the environmental issues linked to the business. It creates sustainable environment. The study also concluded that organizational awareness plays a moderating role between green technology, energy efficiency, environmental concern, and sustainable environment. In case, organizational awareness is high, green technology, energy efficiency, and environmental concern make better contribute to sustainable environment.

6.1. Implications

The present research can be useful in countries like China, where economic activities cause a large amount of pollution and spoil environmental quality as the present study shows concern for environmental quality. This article provides guidelines to organizational management on how to improve sustainable environment. The study guides that organizational management must encourage green technology adoption for operational and production practices as well as organizational personnel must be proficient in using green technology so that environmental sustainability can be achieved. The study also posits that organizations must apply energy efficiency for its resources and operations. In this way, they may improve sustainable environment. The current article suggests that environmental concern must be developed in employees so that sustainable environment can be achieved. There is also a suggestion that organizational personnel must broaden the scope of awareness. It would help in applying green technology and sustainable environment can be attained in better way. The study also has a guideline that organizations must have large awareness about modern business trends. It would lead them to implement energy efficiency effectively and attain sustainable environment. Moreover, the study conveys that organizational awareness must be increased by organizational management with policies like research and development. It would create environmental concern and assure sustainable environment.

6.2. Limitations

The present study faces some limitations in its implication. The current article has limited scope of research framework as it includes just three factors like green technology, energy efficiency, and environmental concern to evaluate sustainable environment in an economy. Authors paid no attention to factors like human resource talents, green finance, and green innovation although these ones carry significance for sustainable environment evaluation. Second, authors distributed questionnaires to firms in Indonesia only for attaining data. The analysis of the data from a single country can't be enough to give valid results for all countries. In future, authors must expand the context and collect more valid data.

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