Effects of Green Transformational and Ethical Leadership on Green Creativity, Eco-innovation and Energy Efficiency in Higher Education Sector of Indonesia

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ABSTRACT

The role of energy efficiency (ENE) is regarded as the prime goal for reducing environmental pressures; co-existing in the form of the organization's extensive energy dependence and resource depletion. Therefore, the current examination proposed to test the empirical association of ETL and TRL in influencing green creativity (GRC) and eco-innovation (ECI) in higher educational institutes of Indonesia. Moreover, given the significance of ENE in curtailing negative effects of power consumption in environmental degradation, the present study also examined the impact of GRC and ECI on ENE by particularly focusing higher educational institutes. The study applied partial least squares structural equation modeling (PLS-SEM), and the results recommended that eco-innovation and have a positive and significantly influenced by green transformational leadership. Moreover, the results further suggested that eco-innovation and green capacity have significantly and positively impacted by ethical leadership. Finally, the results of PLS-SEM confirm that eco-innovation and green capacity have significantly and positively impact on ENE on international schools in Indonesia. In summary, the results confirmed that green transformational leadership, eco-innovation and GRC are very important and significant contributor in enhancing ENE in higher education sector of Indonesia. The study recommended that government need to pay more attention on environmental friendly innovations to reduce environmental issues and enhance ENE in Indonesia.

Keywords: Green Transformational Leadership, Ethical Leadership, Energy Efficiency, Indonesia
JEL Classifications: L8, O3

1. INTRODUCTION

In the existing environmental uncertainties and deteriorations, the organizational emphasis for green management is considered crucial for the prospect of sustainable development (Lee, 2009). In this regard, the role of energy efficiency (ENE) is regarded as the prime goal for reducing environmental pressures; co-existing in the form of the organization's extensive energy dependence and resource depletion. Thus, in order to fulfill eco-friendly business objectives, every industry in the economy should play their due part in minimizing its adverse impact on the environment.

The role of educational institutions is prime for structuring country economic and social foundation. In this regard, educational institutions should adopt ecological safeguard as their societal obligation. Many studies have argued the significance of ENE in instructive environments and stressed on the implementation of energy conservation strategies in higher educational institutes (Moon et al., 2018; Trubaev and Tarasyuk, 2014; Reed et al., 2010). Moreover, eco-friendly practices in institutions can also offer green opportunities that inspire them to accept ecological administration for augmenting green reputation and market competitiveness (Chen, 2008; Porter and van der Linde, 1995).

In order to endure competitiveness and sustainability in existing rapid changing environments, businesses are required to invest in creativity and innovation (Khalili, 2016). There exist certain drivers of the firm's creativity and innovation. In this context, the firm's management skills and expertise are regarded as critical for the prospect of sustainable management. The motives of environmental management largely depend on effective leadership that helps institutions to articulate competitive environmental strategies that can benefit both firm and environment. In this regard, several characteristics of leaders are discussed to ensure optimum environmental management. Among them, ethical leadership (ETL) is regarded as a vital leadership quality that supports organization to blend organizational objectives with societal and environmental goals (Jordan et al., 2013).

The ETL qualities in higher management persist in terms of care, reliability, genuineness, and decency. That is, conduct that expressly shows ethical lead, just as reasonable and principled choices, in this manner imparting the significance of morals values by compensating positive ethical conduct and teaching the individuals who display unethical conduct (Jordan et al., 2013). It is principally through their activities that ethical pioneers look to impact the conduct of their supporters. In this regard, Brown et al. (2005) defines ETL as the conducts of ethical values and integrity that are transferred into subordinates through correspondence and consolation. It is characterized as the show of normatively fitting behavior through sympathetic activities and relational connections, and the advancement of such direct to adherents through two-way correspondence, support, and basic leadership (Brown et al., 2005) to spread integrity in organizational practices and behaviors. With such objectives, ethical pioneers try to change the ethical conduct of their subordinates by imparting ethical norms, building up ethical social models and controlling the ethical conduct of subordinates (Brown and Treviño, 2006; Treviño et al., 2003) to inspire integrity such as instigating creativity (Feng et al., 2018; Javed et al., 2017) and green innovation (Liu and Zhao, 2019; Chen and Hou, 2016). Hence, such form of leadership preserves higher appreciation for individuals, society, and environment and thus play a critical role in driving eco-driven practices to ensure the minimum adverse impact of organizations on the environment.

Similarly, transformational leadership (TRL) is also regarded as eminent to reassure green organizational behaviors and practices in terms of green creativity (GRC) and innovation (Khalili, 2016). Bass (1985) regarded transformational leaders as managers who encourage subordinates to display higher than expected performance. Such leaders are considered self-motivated and practical, having the capability of leading their subordinates to embrace changes (Ahangar, 2009). Similarly, Khalili (2016) discussed the importance of TRL in encouraging the environment of creativity and innovation in businesses. The presence of inspiration and novelty in a firm's practices can expand institutional ways of accomplishing tasks and help to recognize effective methods of environmental management through efficiency avails in the form of GRC and innovation.

Therefore, keeping in mind the contribution of leadership in driving institutional creativity and innovation, the current examination proposed to test the empirical association of ETL and TRL in influencing GRC and eco-innovation (ECI) in higher educational institutes of Indonesia. Moreover, given the significance of ENE in curtailing negative effects of power consumption in environmental degradation, the present study also examined the impact of GRC and ECI on ENE by particularly focusing higher educational institutes as recommended by Desha and Hargroves (2010). The understanding resulted from the current study can foster higher insights into the nexus of leadership, innovation, creativity, and ENE and thus strengthen knowledge creation in institutional and environmental policymaking.

2. LITERATURE REVIEW AND HYPOTHESES

The base of resource-based theory relies on the attainment of unique competitiveness through proper utilization of the firm's resources and capabilities. This also includes the efficient usage of business tangible and intangible abilities such as innovation, wisdom, knowledge, and expertise. In a similar vein, a leader with effective characteristics is considered the eminent resource of organizational expertise that supplement firm's creativity (Halbesleben et al., 2003) and innovation (Borins, 2002), thereby, play a critical role in firm sustainability.

In the existing literature, several studies examined the impact of various leadership characteristics on firms' strategies and sustainable organizational practices (Horlings and Padt, 2013). More recently, the emphasis of literature has shifted towards identifying solutions for the decline in environmental degradation. In this regard, Crichton et al. (2018) discussed the role of responsible leadership in diminishing ecological deteriorations. Likewise, investigating the empirical significance of leadership in higher education, Elrehail et al. (2018) examined the impact of transformational and authentic leadership on product and process innovation. In doing so, the authors utilized the data from four Jordanian universities and applied empirical testing on173 valid responses. The outcomes of the study established that TRL is significant to carry positive influence on institutes innovation capabilities. On the other hand, the findings of the investigation failed to report the significant impact of authentic leadership on product and process innovation.

Similarly, Khalili (2016) also analyzed the association between TRL, firm's creativity, and innovation. In doing so, the authors utilized the data from 1, 172 employees of Iranian organizations. The outcomes of the study established that TRL is significant to influence the firm's creativity and innovation prospects. In specific, the results reported the positive impact of TRL on employee's creativity and the firm's innovation. Similar findings are reported in the study of Hu et al. (2013) that also confirmed the presence of positive direct and indirect link of TRL with innovation and creativity.

Studying eco-driven business expertise and capabilities, Chen and Chang (2013) pursued to recognize the empirical connection of green TRL and capabilities on the firm's creativity and product development performance. In doing so, the authors used the data of Taiwanese firms and analyzed 254 valid responses. The results

of the study established that green TRL along with green dynamic capabilities is significant to cause positive influence on firm's creativity and subsequently product development performance. In another study, Mittal and Dhar (2016) also examined the association of green TRL on GRC. The results of the study, similar to Chen and Chang (2013) confirmed the presence of a significant positive association between green TRL and GRC in the hospitality industry in India.

Focusing on ethics in leadership, Javed et al. (2017) examined the association of ETL on employees' creativity. In doing so, the authors have collected the data from 183 hotels in Pakistan. The empirical results of the study reported the significant impact of ETL on employee's creativity. Specifically, the results suggested that a unit increase in ETL can enhance employee's creativity by 0.138%. Similarly, Feng et al. (2018) also investigated the connection of ETL on employees' creativity. In doing so, the authors have collected the data from 326 employees and their leaders in China. The empirical results of the study, similar to Javed et al. (2017), reported the significant positive impact of ETL on employee's creativity in China.

In another study, Chen and Hou (2016) studied the relationship between ETL, ecological innovation, and creativity within public institutions in Taiwan. In doing so, the authors collected data from research and development institutions by collecting responses from 349 employees and workgroups. The results of the analysis suggested that ETL is significant to enhance employee's voice behavior that further augmented the creativity levels. Moreover, the results also established the positive moderation of ECI in influencing the relationship of voice behavior on employee's creativity. Similarly, Liu and Zhao (2019) also analyzed the role of ETL in influencing firm's green innovation. For this, the authors have examined the conceptual framework using the theoretical base of organizational identity and social learning theories. The study proposed the positive impact of ETL on the firm's green innovation.

Stressing on the need for environmentally driven technological advancements, Machiba (2010) studied the contribution of ECI in enhancing resource efficiency. Reviewing the existing environmental needs and adverse ecological impacts of organizations on natural atmosphere, the author proposed the ecological innovation in both systematics and incremental form is eminent in resource optimization and green growth perspective. In another study, Costantini et al. (2017) studied the effects of ECIs in developing energy-efficient technologies. Analyzing the data of twenty-three OECD economies between 1990 and 2010, the results established the positive significance of ECI on ENE. Similarly, discussing the role of capital, labor, creativity and energy, Kümmel et al. (2002) enumerated the economic impact of energy and creativity utilizing five case studies for the United States, Germany, and Japan. The study concluded the significant contribution of creativity in diffusing innovation during the period of energy crises.

In another study, Gerstlberger et al. (2014) also studied the association between innovation and ENE. Utilizing the data of 335 organizations, the results of the investigation reported the importance of green innovation in achieving ENE in manufacturing firms of Europe. Similarly, for OECD economies, also analyzed the association between green innovation and energy intensity. In doing so, the authors have collected the data from seventeen OECD nations from the period of 1975 to 2005. The outcomes of the empirical investigation suggested that green innovation is significant to decrease the intensity of energy in major industrial sectors.

Thus, based on the above literature, the current study hypothesized the following;

H_1: Transformational leadership is significant to influence eco-innovation

H_2: Transformational leadership is significant to influence employee's creativity

H_3: ETL is significant to influence eco-innovation

H_4: ETL is significant to influence employee's creativity

H_5: Eco-innovation is significant to influence the institution's ENE

H_6: Employee's creativity is significant to influence the Institution's ENE.

The hypothesized framework of the current study is displayed in Figure 1.

3. DATA AND METHODOLOGY

In this current study, the procedure for data collection is finished by amassing the information from the different International schools in Indonesia. Moreover, we select 297 different international schools in Indonesia for the information gathering process. In order to get brisk and smooth information collection process, we make an understanding of our examination survey into the English language and insinuate the selected international schools of Indonesia. Furthermore, we appropriate a total of complete 383 research survey to using a hard copy of the survey instrument. The system for data collection took a period of the total seven and accumulated 349 research surveys with the reaction rate of 91.12%. The target population for the current study is the principal and vice principal of different international schools in Indonesia.

Moreover, the current study examines the effect of green transformational leadership, ETL, eco-innovation, and GRC on ENE in different international schools in Indonesia. In order to accomplish this objective, the present study research framework revolves around the past studies, and the structure is exhibited in Figure 1. The main properties of the factors are clarified by using the Likert scale framework from 1 (strongly disagree) to 5 (strongly agree). In simple, the present examination utilizes five

Figure 1: Conceptual framework
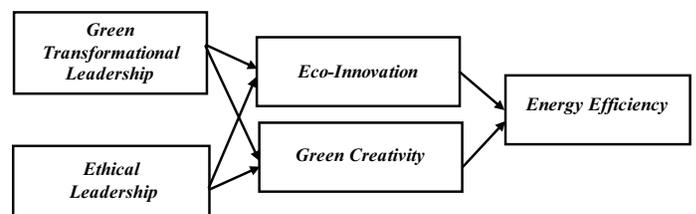
distinct factors. The variables utilized in this examination are the green transformational leadership (GTL), ETL, eco-innovation (EIN), GRC, and ENE. After that, the items of the factors used in this current study are adopted from different research studies. The four things of (GTL) are taken from the past examination of

Table 1: Descriptive statistics

Valid	Frequency	Percent
Gender		
Female	143	43
Male	192	57
Total	335	100
Age (years)		
20-30	105	31
31-40	144	43
41-50	56	17
51 and above	30	9
Total	335	100
Working experience (year)		
1-5	89	27
6-10	205	61
11-15	15	4
More than 15	26	8
Total	335	100
Education		
Undergraduate	62	19
Graduate	189	56
Postgraduate	39	12
Others	45	13
Total	335	100

Source: Authors estimation

Table 2: Means and Pearson correlations

Variables	MEAN	GTL	ETL	EIN	GRC	ENE
GTL	3.985	-				
ETL	4.013	0.402**	-			
EIN	4.128	0.372**	0.411**	-		
GRC	3.783	0.302**	0.327**	0.302**	-	
ENE	4.113	0.334**	0.299**	0.344**	0.311**	-

N=335. **Correlation is significant at the 0.01 level (2-tailed)

Chen and Chang (2013). In addition, the four items of (ETL) are adopted from the earlier study of Brown et al. (2005). The four different constructs of (EIN) are taken from Chen et al. (2006). The final four items of (GRC) are adopted from the past research of Chen and Chang (2013). Finally, the four items of (ENE) used in this examination are embraced from the past examination of Ninlawan et al. (2010).

4. ANALYSIS AND INTERPRETATION

In the present investigation, the information analysis is done by using two novel statistical programmings, which is the statistical package for social sciences (Version-23) and SmartPLS V-3.2.9 (Ringle et al., 2015). The final data used for the present examination is 335 resulting in excluding univariate and multivariate abnormalities. The methodology for the identifying of univariate and multivariate abnormalities are Z-test score and mahalanobis distance (D2) by using SPSS (V-23), and further data examination is finished by applying SmartPLS. Shown Table 1 is the structure and alignment of the data utilized in this examination. In addition, Table 2 clarify the mean and Pearson's correlation of the data utilized in the current study. In like manner, to deal with the problem of multicollinearity, we scan for the examination of Hair et al. (2011) begin that by an enormous range in Pearson's correlation relationship should underneath 0.90. Therefore, to confirm the absence of multicollinearity among the factors (Frooghi et al., 2015; Hair et al., 2013).

The results of descriptive insights are reported in Table 1 with complete structure and composition of the gathered information. The descriptive measurements are additionally isolated into four diverse sub-classes, which are gender, age, work experience, and education. Table 1 clarifies the descriptive of all the sub-classes.

In addition, content authenticity is made if the connection of the items using in the information examination load with high value

Table 3: Measurement model results

Variables	Items	Factor loadings	Cronbach's alpha	Composite reliability	AVE
Green transformational leadership	GTL1	0.935	0.924	0.893	0.603
	GTL2	0.849			
	GTL3	0.895			
	GTL4	0.915			
Ethical leadership	ETL1	0.859	0.905	0.885	0.624
	ETL2	0.824			
	ETL3	0.835			
	ETL4	0.829			
Eco-innovation	EIN1	0.831	0.934	0.894	0.594
	EIN2	0.810			
	EIN3	0.863			
	EIN4	0.781			
Green creativity	GRC1	0.842	0.896	0.844	0.584
	GRC2	0.801			
	GRC3	0.828			
	GRC4	0.801			
Energy efficiency	ENE1	0.819	0.885	0.835	0.618
	ENE2	0.810			
	ENE3	0.782			
	ENE4	0.763			

Source: Authors estimation

in their specific factor in relationship with the items appeared in the model, while inner consistency is seen if the estimation of Cronbach's alpha and unwavering composite quality discovered more conspicuous than 0.7 (Hair et al., 2013; Waseem et al., 2013). Factor loadings and composite reliability show up in Table 3, which display that a smooth estimation of the gathers factor loadings more than 0.7. Additionally, these loadings appear in their individual parts, which ensuring the inner authenticity of the selected items.

Also, the convergent legitimacy reveals to what degree an item regarding a specific factor loaded to various segments where they expected to be loaded (Mehmood and Najmi, 2017; Khan et al., 2019). In this examination, convergent legitimacy is appeared by using an average variance extracted (AVE) for each factor (Fornell and Larcker, 1981; Mehmood and Najmi, 2017). They gave the benchmark of more overwhelming than and revealed contrastingly in association with 0.5 for demanding the convergent legitimacy. The outcomes of AVE in Table 3 is affirming the significant parameters.

In the following stage, discriminant authenticity is revealed as how much an item of a factor is discriminant and unique from various variables used in a framework (Frooghi et al., 2015). As appeared by Fornell and Larcker (1981), the discriminant authenticity is said to be made whether the AVE square root parameter is more than the pair-wise relationship of the unidentified factor (latent variable). The results appeared in Table 4, italic, and bold parameter are the square root of AVE, which is more than the cutoff limit, which is the pair-wise relationship of each factor. Moreover, Table 5 demonstrates the factor loadings of other and individual factor, in like way, articulating the cut-off benchmark. Therefore, the discriminant authenticity is also authenticated if the hetro trait and mono trait parameter are lower than 0.85, as proposed by Henseler et al. (2015). The outcomes in Table 6 uncovered that all parts have discriminant authenticity.

In the last phase, we associate a partial least square framework with examining the model and hypothesis testing, which demonstrating beta coefficients, t-stats, and P-value. As appeared by Chin (1998) recommendation, a bootstrapping framework using 1000 sub-test was identified with demanding the quantifiable key evaluations of the wide number of values. Table 7 reveals beta coefficients, t-stats, and their critical significance value with the comments about the hypothesis testing.

The outcomes of the partial least square structural equation modelling are shown in Table 7. The table presented the beta coefficient, t-stats value, P-value, and the status of hypothesis testing against each hypothesis. Generally, the outcome confirms that all selected variables have a positive and significant impact on ENE in international schools in Indonesia. Moreover, the outcomes of the partial least squares structural equation modeling (PLS-SEM) confirm that eco-innovation ($\beta = 0.302$, P < 0.000) and green capacity ($\beta = 0.295$, P < 0.000) have a positive and significantly influenced by a green transformational leadership, hence confirming H_1 and H_2. Moreover, the results further suggested that eco-innovation ($\beta = 0.375$, P < 0.000) and green capacity ($\beta = 0.278$, P < 0.000) have significantly and positively

impacted by ETL, therefore affirming H_3 and H_4. Finally, the results of PLS-SEM confirm that eco-innovation ($\beta = 0.331$, P < 0.000) and green capacity ($\beta = 0.275$, P < 0.000) have significantly and positively impact on ENE on international schools in Indonesia, hence confirming H_5 and H_6. Technical speaking, the results confirm that the green transformational leadership, eco-innovation, and green capacity are the key contributors to enhance the ENE in international schools in Indonesia.

Table 4: Discriminant validity Fornell-Larcker criterion

	GTL	ETL	EIN	GRC	ENE
GTL	*0.777*				
ETL	0.302	*0.790*			
EIN	0.338	0.336	*0.771*		
GRC	0.295	0.411	0.285	*0.764*	
ENE	0.402	0.492	0.246	0.443	*0.786*

Source: Authors estimation

Table 5: Results of loadings and cross loadings

Variable	GTL	ETL	EIN	GRC	ENE
Green transformational leadership	**0.935**	0.347	0.483	0.235	0.491
	0.849	0.567	0.369	0.344	0.416
	0.895	0.144	0.270	0.312	0.466
	0.915	0.480	0.465	0.372	0.507
Ethical leadership	0.305	**0.859**	0.493	0.289	0.381
	0.295	**0.824**	0.382	0.589	0.324
	0.402	**0.835**	0.279	0.517	0.362
	0.385	**0.829**	0.317	0.385	0.468
Eco-innovation	0.144	0.435	**0.831**	0.297	0.410
	0.140	0.478	**0.810**	0.324	0.527
	0.150	0.264	**0.863**	0.299	0.463
	0.135	0.246	**0.781**	0.207	0.403
Green creativity	0.189	0.380	0.264	**0.842**	0.419
	0.180	0.668	0.322	**0.801**	0.592
	0.169	0.393	0.425	**0.828**	0.419
	0.180	0.668	0.502	**0.801**	0.361
Energy efficiency	0.437	0.184	0.407	0.532	**0.819**
	0.471	0.182	0.459	0.421	**0.810**
	0.395	0.175	0.558	0.342	**0.782**
	0.432	0.171	0.515	0.503	**0.763**

Source: Authors estimation

Table 6: Results of hetro trait and mono trait ratio of correlations

	GTL	ETL	EIN	GRC	ENE
GTL					
ETL	0.694				
EIN	0.402	0.643			
GRC	0.245	0.457	0.595		
ENE	0.493	0.296	0.411	0.604	

Source: Authors estimation

Table 7: Results of path coefficients

Hypothesized path	Path coefficient	C.R	P-value	Remarks
EIN←GTL	0.302	3.984	0.000	Supported
GRC←GTL	0.295	4.583	0.000	Supported
EIN←ETL	0.375	4.003	0.000	Supported
GRC←ETL	0.278	4.447	0.000	Supported
ENE←EIN	0.331	5.549	0.000	Supported
ENE←GRC	0.275	8.436	0.000	Supported

Source: Authors' estimation. Level of significance (5% i.e., 0.050)

5. CONCLUSION AND DISCUSSION

The role of ENE is regarded as the prime goal for reducing environmental pressures; co-existing in the form of the organization's extensive energy dependence and resource depletion. Thus, in order to fulfill eco-friendly business objectives, every industry in the economy should play their due part in minimizing its adverse impact on the environment. Moreover, the role of educational institutions is prime for structuring country economic and social foundation. In this regard, educational institutions should adopt ecological safeguard as their societal obligation. Many studies have argued the significance of ENE in instructive environments and stressed on the implementation of energy conservation strategies in higher educational institutes. Similarly, transformational leadership (TRL) is also regarded as eminent to reassure green organizational behaviors and practices in terms of GRC and innovation. Moreover, transformational leaders as managers who encourage subordinates to display higher than expected performance. Such leaders are considered self-motivated and practical, having the capability of leading their subordinates to embrace changes.

Keeping in mind the contribution of leadership in driving institutional creativity and innovation, the current examination proposed to test the empirical association of ETL and TRL in influencing GRC and eco-innovation (ECI) in higher educational institutes of Indonesia. Moreover, given the significance of ENE in curtailing negative effects of power consumption in environmental degradation, the present study also examined the impact of GRC and ECI on ENE by particularly focusing higher educational institutes. The study applied PLS-SEM, and the results recommended that eco-innovation and have a positive and significantly influenced by green transformational leadership. Moreover, the results further suggested that eco-innovation and green capacity have significantly and positively impacted by ETL. Finally, the results of PLS-SEM confirm that eco-innovation and green capacity have significantly and positively impact on ENE on international schools in Indonesia.

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