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## Article

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# Impact of Environmental Commitment, Environmental Management Accounting and Green Innovation on Firm Performance: An Empirical Investigation

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## ABSTRACT

The present study aims to analyze the influence of environmental uncertainty (ENU) on a firm's environmental management accounting (EMA). Moreover, the current examination is also motivated to empirically investigate the relationship of environmental commitment (ENC), EMA and green innovation (GRI) on firm performance (FPR). The current study is first in studying the joint impact of the studied variables in analyzing small and medium enterprises performance appraisals. In doing so, we applied partial least squares structural equation modeling (PLS-SEM) and the results of this methodology confirm that all selected variables have a positive and significant impact on environmental performance in except ENU. Moreover, the outcomes of the PLS-SEM confirm that ENC has a positive and significant impact on FPR of multinational firms of Indonesia. Moreover, the results further suggested that ENU have a negative and significant impact on FPR. The results of PLS-SEM also confirm that GRI and EMA have significantly and positively impact on FPR. Technical speaking, the results confirm that GRI and ENC are the key contributors to enhance the FPR of Indonesian multinational firms.

**Keywords:** Environmental Commitment, Green Innovation, Firm Performance, Indonesia

**JEL Classifications:** Q56, L25

## 1. INTRODUCTION

Environmental Analysis has taken an eminent role in the firm's strategic management and performance appraisals. In current deteriorating environments, the threat of sustainability has enhanced firms concern for identifying their impact on existing environments (Ardito and Dangelico, 2018). In addition, given the rising focus on environmental legislation and customer preference for sustainable goods and services, firms are circumscribed to follow eco-friendly organizational practices to ensure competitive functioning in the globalized market (He et al., 2019).

In this regard, the role of environmental accounting is considered crucial in identifying the firm's influence on the environment through numerous channels. It helps the organization to measure

environmental costs and supplements the process of environmental disclosures (De Beer and Friend, 2006). In addition, environmental account also enables the firm's internal management by reporting organizational practices that have the potentials for supporting or disrupting the organization's motives for sustainable development (Schaltegger and Burritt, 2010). However, the role of environmental uncertainty (ENU) is vital for environmental accounting management. In cases of higher uncertainty in external environments, the reliability of accounting data, trends and value assessments may not be sufficient to strengthen firm's desire for improved environmental performance and competency, thereby, fall short for organization's sustainable and economic objectives.

In a similar context, the firm's adoption of technologies, in process, product and management underlie greater potentials for improving organizational performance (Haseeb et al., 2019b;

Haseeb et al., 2019a). For environmental management, innovation performance plays a significant part in driving the firm's energy efficiencies, reducing operational costs and thus lends support to the organization's financial and social objectives (Jermisittiparsert et al., 2019a). In particular, ecologically driven technological advancements in firms ensure development in material and goods design, industrial procedures to reduce energy dependence, decline pollution, lessen waste and reduce organization's adverse influence on nature (Woo et al., 2014; Chen et al., 2006).

However, the success of the firm's strategies and objectives largely depend on organizational commitment. For the organization's ecologically driven business operations, environmental commitment (ENC) is crucial in performance appraisals and market orientations. There is an agreement that small and medium enterprises (SMEs) are significant to spread environmental degradation. The adherence to ecological commitment is crucial in SMEs to aid the notion of sustainability in order to reduce ecological burdens and improve the environmental condition (Jermisittiparsert et al., 2019b). The idea of ecological commitment alludes to the manner by which firms connect with arrangements, practices, and procedures to improve their influence on natural environment (Sarkis et al., 2010) and has progressively picked up considerably in the recent studies for having significant importance (Carrillo-Higueras et al., 2018). This commitment is made by the administration of the firm, and it regularly comprises of a composed record or plan used to impart the usefulness of ecologically driven organizational practices to all stakeholders (Henriques and Sadorsky, 1999). ENC requires organizations to look over a wide continuum of ecological alternatives, reflecting various dimensions of exertion and enthusiasm for specific natural territories that not only support their motive of sustainability but also fulfills financial and non-financial performance criteria.

Thus, the motivation of the current examination is to investigate the potential association between accounting, environment, management, and performance. In doing so, the present study aims to analyze the influence of ENU on a firm's environmental management accounting (EMA). Moreover, the current examination is also motivated to empirically investigate the relationship of ENC, EMA and green innovation (GRI) on firm performance (FPR). The current study is first in studying the joint impact of the studied variables in analyzing SMEs performance appraisals. The outcomes derived from this study would be useful in formulating environmentally motivated firms strategies and would add greater value in environmental literature.

The remaining article is outlined below. Section-two will present a literature review that has helped in building hypotheses. Section-three will provide details related to the sampling method and variables adoption. Section-Four will provide results and their statistical explanation. Section-five will conclude the existing study and provide future commendation.

## 2. LITERATURE REVIEW AND HYPOTHESES

The current investigation based the empirical testing on the theoretical foundations of natural resource-based theory. The

theory was developed by Hart (1995) that suggested that a firm's competitiveness can be enhanced through generating profits utilizing resources that are difficult to duplicate by competitive organizations. The theory emphasis on three core ecologically driven organizational practices. They included (a) pollution restriction, (b) goods ethical stewardship (c) sustainability. All of these ecological objectives require a set of strategies that necessitate persistent commitment, advanced methods to drive efficiencies (Latan et al., 2018). Thus the theory stresses that competitive advantages are fostered by resource utilization. Such resources can be in the form of physical goods, advanced technologies, expertise, knowledge, and innovation. The proper utilization of organizational resources in eco-driven strategies can result in improved competence that ultimately improves organizational performance.

In the existing literature, many studies discussed the significance of environmental management in boosting firm processing and performance. Emphasizing on organizational commitment for improved environments, Nath and Ramanathan (2016) studied the association between a firm's ecological practices, commitment, and technology portfolios. Analyzing the sample of seventy-six companies in the United Kingdom, the findings of the investigation supported the significance of operational (OPP) and tactical practices (TAP) in improving technology portfolios. Moreover, the results also found that ecological commitment significantly moderates the relationship between OPP and TPP on environmental performance through pollution reduction. In another study, Hirunyawipada and Xiong (2018) analyzed the association of ecological commitment with an organization's financial performance. Analyzing the sample of 376 companies having 1197 company-year observations, the findings of the investigation supported the significance of ENC in improving firms' financial performance. In specific, the results found that ecological commitment significantly influenced the company's short term financial performance, measured by returns on assets, as well as the long-run financial performance, measured by Tobin's Q.

Similarly, For Australian Firms, Carrillo-Higueras et al. (2018) also analyzed the role of ecological commitment in improving FPR. Using the responses of 184 managers, the results established the significance of ecological commitment in altering FPR. Particularly, the findings suggested that the firm's ecologically driven attitudes and perceptions positively influenced the organization's ENC that further carried a positive impact on a firm's performance. Likewise, measuring the effect of sustainability on organizational performance, Luzzini et al. (2015) studied the association between firm's ecological commitment, cooperative capabilities (CCP) and performance. Analyzing the sample of ten European and North-American nations, the findings of the investigation supported the significance of ecological commitment in improving the firm's CCP. Moreover, the results also found that inter-firm CCP significantly carries a positive impact on an organization's environmental and social performance.

Signifying the importance of commitment, ENU and environmental accounting in altering FPR, Latan et al. (2018) examined the role of EMA in protecting environmental performance. The results of

the investigation found the significant role of top management's commitment to enhancing the firm's ecological performance. Moreover, the study also found the positive significant impact of ecological uncertainty in influencing EMA performance. Finally, the outcomes of the study reported the positive significant influence of EMA in boosting the firm's environmental performance. In another study, De Beer and Friend (2006) also studied the association of environmental accounting and firms performance. Analyzing the data of South African firms, the findings of the investigation supported the significance of environmental accounting in improving an organization's environmental and economic performances. Specifically, by checking the applicability of EEGECOST model, the results found that ecological accounting supports organizational objectives of improving and expressing ecological impact in terms of environmental costs.

In another study, Gul (1991) also analyzed the relationship between accounting systems in influencing managers' performance under low and high ENU. The findings of the study reported that in low external uncertainty, accounting systems management carried a negative impact on performance. On the other hand, accounting systems under high uncertainty enhanced managers' performance. Similar findings were reported in the study of Gul and Chia (1994). Focusing on Indonesian SMEs, Susanto, and Meiryani (2019) analyzed the role of environmental accounting systems (EAS) in affecting the firm's ecological and financial performance. Analyzing the responses of 345 SMEs, the findings of the investigation supported the significance of EAS in improving firms' performance. In specific, the results found that EAS significantly brought a positive impact on not only firms' financial but also their environmental performance. Furthermore, focusing on product quality, Dunk (2002) also found the significance of environmental accounting in improving an organization's quality performance.

Analyzing the nexus of uncertainty, accounting and performance, Chong and Chong (1997) analyzed the role of ecological uncertainty, accounting systems and performance of strategic business units (SBU). Using the responses of 62 managers, the results established the significance of ENU and accounting systems in altering SBU performance. Particularly, the findings suggested that ENU positively influenced accounting systems management that further carried a positive impact on SBU performance. The results of the study, however, failed to find the significance of ENU in predicting SPBU performance.

Linking innovation with FPR, several studies analyzed the empirical testing of firms varied form of innovation with financial, environmental and overall performance (Thornhill, 2006; Soto-Acosta et al., 2016). Among them, Tang et al. (2018) examined the effects of GRI on FPR. Utilizing the sample of 188 companies in China, the outcomes of the study concluded the significance of GRI in predicting the firm's performance. In particular, the findings stated that GRI, in the form of product and process innovation carries significant positive influence on a firm's performance.

In another study on China, Wang and Wang (2012) investigated the nexus between knowledge sharing, innovation, and performance.

Studying the responses from 89 managers, the study analyzed innovation in two forms, i.e., innovation quality and innovation speed. Similarly, performance is measured in terms of operational and financial performance. The overall results established the positive effect of innovation on performance. Specifically, the suggested that innovation speed carried a positive significant impact on firms' operational and financial performance. As for innovation quality, the outcomes found that innovation quality only carried a positive impact on firms' financial performance. In another study, Darroch (2005) also examined the role of knowledge management, innovation, and performance for firms in New Zealand. The results of the study found a positive significant role of knowledge responsiveness in enhancing firms' innovation potential and performance. However, the study failed to find a significant contribution to innovation in boosting FPR.

Focusing on the manufacturing sector, Soto-Acosta et al. (2016) examined the role of electronic business, innovation, and performance. The outcomes of the study found the positive significant impact of e-business on innovation but not on FPR. On the other hand, the results indicated the positive significant impact of organizational innovation on FPR. Examining the innovation-performance nexus, Ar (2012) explored the impact of green product innovation on FPR and competency. The findings of the study confirmed the positive significant effects of ecologically driven product innovation on FPR and competence. Similarly, Lee and Min (2015) also analyzed the contribution of innovation in boosting FPR. Analyzing the data of Japanese companies, the findings of the study established the significant impact of eco-innovation on FPR.

Therefore, based on the above literature, the current study proposes that;

Hypothesis-1: Environmental Commitment has a significant impact on Firm Performance.

Hypothesis-2: Environmental Uncertainty has a significant impact on Environmental Management Accounting.

Hypothesis-3: Environmental Management Accounting has a significant impact on Firm Performance.

Hypothesis-4: Green Innovation has a significant impact on Firm Performance.

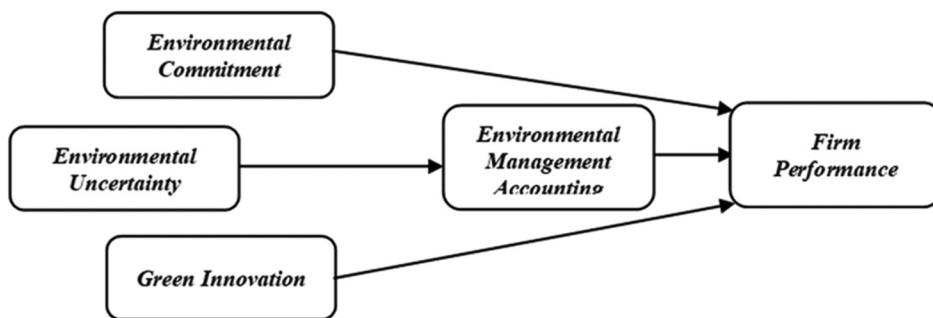
The conceptual framework of the current analysis is shown below.

### 3. DATA AND METHODOLOGY

#### 3.1. Measures

The present examination explores the effect of ENC, EMA and GRI on FPR in different multinational companies in Indonesia. In order to accomplish this objective, the present research focuses on the research framework based on previous studies, and the framework is represented in Figure 1. The basic properties of the factors are clarified by using the Likert scale procedure from 1 (strongly disagree) to 5 (strongly agree). Generally, the present examination utilizes five different factors. The factors utilized in this examination are the ENC, ENU, GRI, EMA and FPR. The four items of (ENC) are adopted from the previous study of Darnall et al. (2010). Moreover, the four questions of (ENU) are adopted from the prior study of Pondeville et al. (2013). Also,

Figure 1: Research model



the four items of (GIN) are adopted from the earlier contribution of Chen (2008). Furthermore, the four final items of (EMA) are taken from the previous research of Latan et al. (2018). Finally, the four items of (FPR) employed in this study are adopted from the past examination of Delaney and Huselid (1996).

3.2. Sample Collection Procedure

In this current research, the method for data collection is done by collecting the information from the different multinational firms of Indonesia. Moreover, we select 17 various multinational firms in Indonesia for the sample gathering process. In order to get quick and speedy sample collection process, we translate our survey questionnaire into the English language and refer to the selected different multinational firms of Indonesia. Furthermore, we sent a sum of total 339 research questionnaire to employing both printed and soft copy of the survey questionnaire. The method for data collection took a period of the total 107 days and collected 316 survey questionnaires with the reaction rate of 93.25%.

4. DATA EXAMINATION AND EXPLANATION

In the current examination, the information investigation is done by using two novel programmings, which is the SmartPLS V-3.2.9 (Ringle et al., 2015) and Statistical Package for Social Sciences (SPSS) (Version-23). The final data employed for the current analysis is 303 resulting in taking out univariate and multivariate outliers. The method for the seeing of univariate and multivariate outliers are Z-test score and Mahalanobis Distance (D2) by using SPSS (V-23), and further data examination is finished by applying SmartPLS. Table 1 is the structure and synthesis of the final total data utilized in this analysis. Furthermore, Table 2 definite the mean and Pearson’s correlation of the data utilized in the present examination. In like manner, to deal with the issue of multicollinearity, we look for after the study of Hair et al. (2013) begin that by a vast range in Pearson’s Correlation examination 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 descriptives of all the sub-classes.

Table 1: Descriptive statistics

Items	Frequency	Percentage
Gender - Valid		
Female	126	42
Male	177	58
Total	303	100
Age - Valid		
20-30 years	91	30
31-40 years	156	51
41-50 years	37	12
51 and above	19	6
Total	303	100
Working experience - Valid		
1-5 years	74	24
6-10 years	180	59
11-15 years	17	6
More than 15 years	32	11
Total	303	100
Education - Valid		
Undergraduate	51	17
Graduate	187	62
Postgraduate	39	13
Others	26	9
Total	303	100

Source: Authors estimation

Table 2: Means and Pearson correlations

Variables	Mean	ENC	ENU	GRI	EMA	FPR
ENC	3.893	-				
ENU	3.556	0.189**	-			
GRI	4.113	0.285**	0.422**	-		
EMA	4.320	0.436**	0.409**	0.401**	-	
FPR	3.778	0.338**	0.335**	0.344**	0.374**	-

N=303. \*\*Correlation is significant at the 0.01 level (2-tailed). ENC: Environmental commitment, ENU: Environmental uncertainty, GRI: Green innovation, EMA: Environmental management accounting, FPR: Firm performance

Besides, content validness is created if the correlation value of the questions using in the information investigation load with high values in their specific factor in relationship with the items appeared in the model, while internal consistency is perceived whether the estimation of Cronbach’s alpha and composite reliability discovered more perceptible than 0.7 (Hair et al., 2013; Waseem et al., 2013). Factor loadings and composite reliability value show up in Table 3, which demonstrate that a smooth estimation of the build factor loadings more clear than 0.7. Moreover, these loadings appear in their individual parts, which ensuring the internal consistency of the chose items.

**Table 3: Measurement model results**

Variables	Items	Factor loadings	Cronbach's alpha	Composite reliability	AVE
ENC	ENC1	0.905	0.892	0.901	0.552
	ENC2	0.082			
	ENC3	0.087			
	ENC4	0.089			
ENU	ENU1	0.083	0.875	0.892	0.601
	ENU2	0.080			
	ENU3	0.081			
	ENU4	0.080			
GRI	GRI1	0.080	0.841	0.885	0.582
	GRI2	0.078			
	GRI3	0.084			
	GRI4	0.076			
EMA	EMA1	0.081	0.811	0.845	0.593
	EMA2	0.077			
	EMA3	0.073			
	EMA4	0.077			
FPR	FPR1	0.079	0.874	0.912	0.612
	FPR2	0.078			
	FPR3	0.076			
	FPR4	0.074			

Source: Authors estimation. ENC: Environmental commitment, ENU: Environmental uncertainty, GRI: Green innovation, EMA: Environmental management accounting, FPR: Firm performance, AVE: Average variance extracted

**Table 4: Discriminant validity Fornell-Larcker criterion**

	ENC	ENU	GRI	EMA	FPR
ENC	<b><i>0.743</i></b>				
ENU	0.452	<b><i>0.775</i></b>			
GRI	0.332	0.360	<b><i>0.763</i></b>		
EMA	0.294	0.449	0.285	<b><i>0.770</i></b>	
FPR	0.200	0.502	0.385	0.440	<b><i>0.782</i></b>

Source: Authors estimation. ENC: Environmental commitment, ENU: Environmental uncertainty, GRI: Green innovation, EMA: Environmental management accounting, FPR: Firm performance

Furthermore, convergent legitimacy reveals to what degree a construct regarding a specific factor loaded to various components where they expected to be loaded (Afshan and Sharif, 2016; Mehmood and Najmi, 2017; Afshan et al., 2018; 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 dominant than and uncovered contrastingly in association with 0.5 for affirming the convergent legitimacy. The results of AVE in Table 3 is affirming the fundamental parameters.

In the subsequent stage, discriminant validity is revealed as how much an item of a factor is discriminant and novel from various components used in a model (Frooghi et al., 2015). As appeared by Fornell and Larcker (1981), the discriminant validity is said to be developed if the AVE square root value is more than the pair-wise relationship of the unidentified factor (latent variable). The results appeared in Table 4, bold, and italic values are the square base of AVE, which is more than the cutoff value, which is the pair-wise relationship of each factor. Additionally, Table 5 exhibits the factor loadings of other and individual factor, in like way, articulating the cut-off benchmark. In this way, the discriminant validity is likewise affirmed if the Hetro Trait and Mono Trait parameter are lower

**Table 5: Results of loadings and cross loadings**

Variable	ENC	ENU	GRI	EMA	FPR
ENC	<b>0.905</b>	0.194	0.270	0.131	0.274
	<b>0.082</b>	0.317	0.206	0.192	0.232
	<b>0.087</b>	0.080	0.151	0.174	0.260
	<b>0.089</b>	0.268	0.260	0.208	0.283
ENU	0.108	<b>0.083</b>	0.351	0.161	0.213
	0.103	<b>0.080</b>	0.213	0.329	0.181
	0.104	<b>0.081</b>	0.156	0.288	0.202
	0.104	<b>0.080</b>	0.177	0.215	0.261
GRI	0.214	0.104	<b>0.080</b>	0.166	0.229
	0.137	0.101	<b>0.078</b>	0.181	0.294
	0.137	0.108	<b>0.084</b>	0.167	0.258
	0.326	0.098	<b>0.076</b>	0.115	0.225
EMA	0.229	0.216	0.105	<b>0.081</b>	0.234
	0.291	0.437	0.100	<b>0.077</b>	0.331
	0.355	0.407	0.094	<b>0.073</b>	0.234
	0.265	0.338	0.100	<b>0.077</b>	0.202
FPR	0.269	0.228	0.312	0.103	<b>0.079</b>
	0.219	0.332	0.388	0.101	<b>0.078</b>
	0.322	0.498	0.360	0.098	<b>0.076</b>
	0.506	0.236	0.411	0.095	<b>0.074</b>

Source: Authors estimation. ENC: Environmental commitment, ENU: Environmental uncertainty, GRI: Green innovation, EMA: Environmental management accounting, FPR: Firm performance, AVE: Average variance extracted

**Table 6: Results of HTMT ratio of correlations**

	ENC	ENU	GRI	EMA	FPR
ENC					
ENU	0.583				
GRI	0.331	0.603			
EMA	0.369	0.447	0.694		
FPR	0.438	0.339	0.444	0.567	

Source: Authors estimation. HTMT: Hetro Trait and Mono Trait. ENC: Environmental commitment, ENU: Environmental uncertainty, GRI: Green innovation, EMA: Environmental management accounting, FPR: Firm performance, AVE: Average variance extracted

**Table 7: Results of path coefficients**

Hypothesized path	Path coefficient	CR	P-value	Remarks
FPR←ENC	0.284	4.385	0.000	Supported
EMA←ENU	0.372	3.996	0.000	Supported
FPR←GRI	0.227	4.658	0.000	Supported
FPR←EMA	0.425	8.584	0.000	Supported

Level of significance (5% i.e., 0.050). Source: Authors' estimation. ENC: Environmental commitment, ENU: Environmental uncertainty, GRI: Green innovation, EMA: Environmental management accounting, FPR: Firm performance

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 step, we related a partial least square (PLS) framework to examine the model structure 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 affirming the quantifiable key evaluations of the extensive number of values. Table 7 reveals beta coefficients, t-stats, and their significant motivating force with the comments about the theory testing.

The outcomes of the PLS-structural equation modeling (SEM) 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 environmental performance except ENU. Moreover, the outcomes of the PLS-SEM confirm that ENC ( $\beta = 0.284$ ,  $P < 0.000$ ) have a positive and significant impact on FPR of multinational firms of Indonesia, hence confirming H1. Moreover, the results further suggested that ENU ( $\beta = 0.372$ ,  $P < 0.000$ ) have a negative and significant impact on FPR therefore, confirming H2. The results of PLS-SEM also confirm that GRI ( $\beta = 0.227$ ,  $P < 0.000$ ) and EMA ( $\beta = 0.227$ ,  $P < 0.000$ ) have significantly and positively impact on FPR hence affirming H3 and H4. Technical speaking, the results confirm that GRI and ENC are the key contributors to enhance the FPR of Indonesian multinational firms.

## 5. CONCLUSION AND DISCUSSION

In current deteriorating environments, the threat of sustainability has enhanced firms concern for identifying their impact on existing environments. In addition, given the rising focus on environmental legislation and customer preference for sustainable goods and services, firms are circumscribed to follow eco-friendly organizational practices to ensure competitive functioning in the globalized market. In this regard, the role of environmental accounting is considered crucial in identifying the firm's influence on the environment through numerous channels. It helps the organization to measure environmental costs and supplements the process of environmental disclosures. Thus, the motivation of the current examination is to investigate the potential association between accounting, environment, management, and performance. In doing so, the present study aims to analyze the influence of ENU on a firm's EMA. Moreover, the current examination is also motivated to empirically investigate the relationship of ENC, EMA and GRI on FPR. The current study is first in studying the joint impact of the studied variables in analyzing SMEs performance appraisals.

In doing so, we applied PLS-SEM and the results of this methodology confirm that all selected variables have a positive and significant impact on environmental performance in except ENU. Moreover, the outcomes of the PLS-SEM confirm that ENC has a positive and significant impact on FPR of multinational firms of Indonesia. Moreover, the results further suggested that ENU have a negative and significant impact on FPR. The results of PLS-SEM also confirm that GRI and EMA have significantly and positively impact on FPR. Technical speaking, the results confirm that GRI and ENC are the key contributors to enhance the FPR of Indonesian multinational firms. The results of this study guide the policymakers to strengthen their innovation process following a green methodology like introduce green purchasing and green payment concepts. Also, the management needs to motivate its employee towards a sustainable and green environment and also enhance their commitment towards the environment.

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