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Determinants and consequences of environmental investment: an empirical study of Indonesian firms

Anis Chariri, Mohammad Nasir, Indira Januarti and Daljono Daljono

Abstract

Purpose – *This study aims to examine the effect of institutional ownership, audit committee and types of industry on environmental investment. Furthermore, this research investigates the consequences of environmental investments on firm financial performance.*

Design/methodology/approach – *The sample consisted of 145 companies listed on the Indonesia Stock Exchanges and receiving PROPER awards issued by the Ministry of Environment, Republic of Indonesia in the year 2009-2015. The data were then analyzed using ordinal logistic regression and multiple regression.*

Findings – *The findings showed that environmental investment was significantly affected by types of industry. However, institutional ownership and audit committee did not influence environmental investment. Finally, the finding indicated that environmental investments positively affected firm financial performance.*

Research limitations/implications – *This research only covered companies listed on the Indonesia Stock Exchanges and receiving PROPER awards. Thus, the findings cannot be generalized for all companies in Indonesia and other markets.*

Originality/value – *This study is the first effort intended to investigate the determinants and consequences of environmental investment which have been ignored by previous studies, especially in the Asian emerging markets. This study at least provides us with two main contributions. First, the findings on determinants of environmental investment can be used by governments in Asian countries, especially Indonesia as a reference in making policies concerning the obligations of companies to the environmental problems. Second, the finding on the relationship of environmental investment and financial performance can be used by companies as strategies to generate profits without destroying the environment.*

Keywords *Institutional ownership, Audit committee, Environmental investment, PROPER, Types of industry, Company size, Firm performance, Ownership*

Paper type *Research paper*

Anis Chariri, Mohammad Nasir, Indira Januarti and Daljono Daljono are all based at the Faculty of Economics and Business, Universitas Diponegoro, Semarang, Indonesia.

1. Introduction

In the past decade, organizations have changed their business paradigm. In fact, companies no longer see profit as their main orientation of doing business, but they have shifted their focus on profit, people and planet (3P). Public awareness on environmental issues has also forced companies to consider problems of pollution, resources, waste, and other environmental and social issues as parts pf their business (Gray *et al.*, 2001; Gray *et al.*, 1995). As a consequence, companies have focuses their strategic decisions on environmental investments.

Environmental investment can be seen as company efforts in environmental management to reduce the negative impacts of firm activities on the environment (Berliner and Prakash, 2013; Minatti Ferreira, *et al.*, 2014; Testa *et al.*, 2015). Indeed, companies have considered

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a special fund for doing green management so as the companies can minimize the use of energy and carbon emissions. Environmental investment is believed as an appropriate strategy to improve company reputation in the eyes of stakeholders, and ultimately can increase competitive advantages and firm values (Bagur-Femenías *et al.*, 2015; Bonifant *et al.*, 1995). The awareness of companies in dealing with environmental issues can be related to the environmental condition, which tends to decrease gradually. In fact, a number of countries suffer from environmental problems, including Asian countries.

In the Indonesia arena, for example, the public have witnessed a number of environmental problems such as deforestation, peat lands degradation, and slash-and-burn agriculture, which together accounts for 80 per cent of Indonesia's carbon dioxide emissions (reported by Time July 12, 2007). This makes Indonesia the world's 16th largest greenhouse gas emitter (reported by The Guardian, January 11, 2011). Unfortunately, manufacturing companies are growing at over 10 per cent annually, and the Indonesian Government recognizes the mounting risk of severe pollution damage (Makarim *et al.*, 1995). The environmental problems have led to environmental movement. In fact, environmental issues have also attracted groups, including religious and spiritual groups in Indonesia to get actively involved in the global environmental movement's campaign for environmental sustainability (Reuter, 2015).

Under the conditions, thus, the Ministry of Environment Republic of Indonesia has decided to release a number of environmental policies, including a large-scale public disclosure program, which may induce significant pollution abatement. In June 1995, the Ministry of Environment launched an innovative program for public disclosure of polluters' environmental performance. This initiative—well known as the Program for Pollution Control, Evaluation and Rating (PROPER)—is expected to serve two main objectives: to promote compliance with existing regulations and to reward firms whose performance exceeds regulatory standards (Makarim *et al.*, 1995). This program has forced companies, especially those which are sensitive to environmental issues to implement PROPER as part of their responsibility for solving the issues. Consequently, a number of companies that are committed to environmental investment tend to increase yearly. As reported by the Ministry of Environment Republic of Indonesia, the number of companies implementing PROPER increased from 85 in 2002/2003 to 1,317 in 2011/2012 (Ministry of Environment, 2012).

However, the involvement of companies in PROPER awards is still voluntary. Hence, only companies with environmental investment will be eager to apply for the PROPER awards. In other words, the achievement of a company to win PROPER awards can be seen as how serious is the company in investing their money on environmental issues. In fact, the indicators used in PROPER award are consistent with the concept of environmental investment, in which the implementation of PROPER requires companies to invest money in environmental programs for the purpose of getting rewards. Moreover, the voluntary implementation of PROPER implies that environmental investment can be influenced by unique characteristics of the companies (Hrovatin *et al.*, 2016).

The awareness of companies on the environment issues has also attracted business scholars to conduct empirical research with different perspectives. In fact, a number of studies on environmental issues have been conducted in some developed countries. However, such studies are more concerned with environmental disclosures (Banasik *et al.*, 2010; Barbu *et al.*, 2014; Iatridis, 2013; Cho *et al.*, 2012; Hackston and Milne, 1996) and environmental performance (Sun *et al.*, 2012; Wahba, 2010; Rokhmawati *et al.*, 2015). In regard to environmental investment, Nakamura's (2014) study showed that every company had different environmental performance due to differences in the characteristics of organization and industry. Other studies on environmental investment have also been conducted by several scholars (Jansson and Biel, 2011; Power *et al.*, 2015; Krishnamoorthy *et al.*, 2008; Sueyoshi and Goto, 2009; Banasik *et al.*, 2010; Testa *et al.*, 2015). Unfortunately, such studies are concentrated on the impact of environmental investment on

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firm performance and have ignored factors affecting companies in the implementation of environmental investment (Minatti Ferreira *et al.*, 2014).

Furthermore, in line with firm performance, most research studies in Asian countries have been focused on the determinants of firm performance, which are not concerned with environmental investment. For example, in China, leadership style and environmental uncertainty significantly influenced firm performance (Jung *et al.*, 2013). Meanwhile, in Pakistan, firm performance is affected by a single largest shareholder (Yasser and Mamun, 2015) and the board size, minority representation in board, and family director's in-board (Yasser *et al.*, 2017). Furthermore, in Taiwan, independent outside directors and ownership characteristics have a significant and positive impact on both financial performance and corporate social performance (Huang, 2010). Unfortunately, study by Chen *et al.* (2015) using samples of companies in Sweden, China and India found that environmental management practices did not influence company performance. Similarly, Teng *et al.* (2014) conducted a study in Taiwan and found that the relationship between economic performance and ISO certification is neither strictly negative nor strictly positive. Inconclusive findings of the previous studies are also found in Indonesia.

Studies on environment issues in the Indonesia context are more concerned with the effectiveness of forest management certification programs to improve environmental, social, and economic performance over existing management practices (Miteva *et al.*, 2015) and the effectiveness of environmental impact assessment regarding the protection of the marine environment from industrial pollution (Syafiq, 2015). Moreover, Rock and Aden (1999) investigated the influence of plant characteristics, regulatory actions, community and market pressures, and government incentives on plant investment in pollution control. In regard to environmental issues and firm performance, Rokhmawati *et al.* (2015) found that CO2e intensity and social reporting scores have a positive and significant effect on firm performance (ROA). It is important to note that such studies have contributed the importance of studying environmental issues and firm performance. However, they ignored the determinants and consequences of environmental investments. Indeed, firm characteristics and corporate governance may influence the implementation of environmental investment.

Borrowing findings from other studies related to social and environmental issues, the characteristics may include ownership structure (Calza *et al.*, 2014; Nulla, 2015; Chang and Zhang, 2015), audit committee (Trotman and Trotman, 2015; Samaha *et al.*, 2015), types of industry (Dzikuć and Tomaszewski, 2016; Lodhia and Hess, 2014; Chen and Wu, 2015; Hackston and Milne, 1996) and firm size (Yu *et al.*, 2016; Nawaiseh, 2015; Lee, 2015; Iatridis, 2013; Hart and Ahuja, 1996; Barbu *et al.*, 2014; Hrovatin *et al.*, 2016). Moreover, other studies found that environmental performance increased firm value (Jackson and Singh, 2015; Rokhmawati *et al.*, 2015; Teng *et al.*, 2014; Nakamura, 2014; Hart and Ahuja,1996; Chariri *et al.*, 2018). Unfortunately, although the previous studies have provided scholars with interesting contributions on environmental issues, it is not easy to find any studies examining the determinants of environmental investment, especially those in the Asian emerging markets.

Therefore, this study aims to find empirical evidence on the determinants and consequences of environmental investment. More specifically, this study is intended to investigate the effect of company characteristics (ownership structure, audit committee, types of industry and firm size) on environmental investment. Second, this study examines how environmental investment may increase firm financial performance. This research is expected to provide us with two main contributions. First, findings on the relationship between ownership structure, audit committee, types of industry, firm size and environmental investment can be used by governments in Asian countries as a reference in making rules concerning the obligations of companies in implementing environmental management. Second, the relationship between environmental investment and firm financial

performance can be used by companies as a strategy to generate profits without destroying the environment.

2. Literature review

Environmental investments can be considered as a part of company responsibilities to its stakeholders and reflect the fact of how companies deal with social contract. Hence, legitimacy theory and stakeholder theory are useful in explaining the determinants and consequences of environmental investment. Dowling and Pfeffer (1975) insisted that the organization continuously seeks legitimacy by aligning social values and norms into company values and keep maintaining the both values in harmony. As long as company values or norms are in congruence with social values, then the company will gain legitimacy and supports from stakeholders (Ashforth and Gibbs, 1990; O'Donovan, 2002; Dowling and Pfeffer, 1975). Environmental investment can be considered as a medium used by companies to gain such legitimacy and supports.

Stakeholder theory states that companies operate their business not only for their own interests but also for the benefits of all stakeholders because company survival depends on stakeholders' supports (Ullmann, 1985; Gray *et al.*, 1995). When companies adopt appropriate strategies of environmental investment, their performances are expected to increase, and they eventually will get stakeholders' supports (Claver *et al.*, 2007; Clarkson *et al.*, 2011; Epstein and Roy, 1998). Thus, the more powerful the stakeholders, the greater the company's efforts to adapt to the stakeholders' pressures. Environmental investment can be seen as a medium for the companies to fulfill stakeholders' claims and to gain legitimacy. Environmental performance awards (for example, the PROPER award) reflect how well the companies deal with their environmental investment in response to their stakeholders' pressures.

PROPER plays an important role in motivating companies in Indonesia to deal with environmental issues. PROPER can be seen as a reputational incentive system, which is proposed with two main goals (Makarim *et al.*, 1995): to encourage general compliance with the regulations, and to create incentives for pollution reduction in excess of regulatory requirements through adoption of additional end-of-pipe treatment, clean technology, and methods for waste minimization. Based on the policy objectives, PROPER is expressed in the five-color rating system as described in Table I.

It is believed that PROPER is actually intended to signify some of the most recent thinking in environmental economics about appropriate incentives for pollution control (Makarim *et al.*, 1995). Thus, PROPER can be seen as an incentive regulation system, which is created on both carrots and sticks mechanism to improve environmental condition. The color-coded ratings are employed to reward companies that have good environmental performance and

Table I Proper (five-color rating systems)

Compliance status	*Color rating*	*Performance criteria*
Not in compliance	Black (Very Poor)	Polluter makes no effort to control pollution, or causes serious environmental damage
	Red (Poor)	Polluter makes some effort to control pollution, but not sufficiently to achieve compliance
In Compliance	Blue (Adequate)	Polluter only applies effort sufficient to meet the standard
	Green (Good)	Pollution level is lower than the discharge standards by at least 50 per cent. Polluter also ensures proper disposal of sludge; good housekeeping; accurate pollution records; and reasonable maintenance of the wastewater treatment system
	Gold (Excellence)	All requirements of Green, plus similar levels of pollution control for air and hazardous waste. Polluter reaches high international standards by making extensive use of clean technology, waste minimization pollution prevention, recycling, etc.

Source: (Makarim *et al.*, 1995)

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to penalize non-compliant polluters (Makarim *et al.*, 1995). As the implementation of PROPER is voluntary, the mechanism of assessing the way the companies deal with environmental issues is based on self-assessment and reporting (Makarim *et al.*, 1995). This implies that the compliance status of the companies is first assessed on the basis of self-reported data. If a violation of the discharge standards is found, the companies are then judged as non-compliant (Makarim *et al.*, 1995). Furthermore, if they show no violation, independent inspection and monitoring reports are consulted for verification. Makarim *et al.* (1995) continue to explain that if none are available, the companies are then reviewed by *BAPEDAL* (Indonesia's National Pollution Control Agency). Figure 1 describes the mechanism of the PROPER assessment.

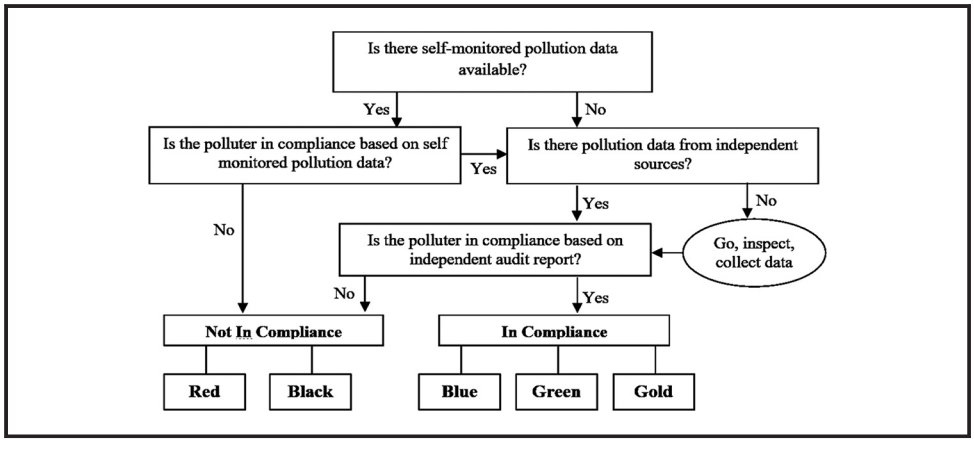
As PROPER is a voluntary program, for some publicly listed companies, pursuing Green or Gold status may be very expensive. Therefore, companies will not undertake PROPER unless the expected benefits outweigh the costs (Makarim *et al.*, 1995). This implies that PROPER ratings represent the level of environmental investment. In fact, companies with Gold rating have higher environmental investment than those with lower ratings. Furthermore, the voluntary implementation of PROPER indicates that a number of firm characteristics may determine the level of environmental investment, including company size, industry types, corporate governance and ownership structure.

2.1 Institutional ownership and environmental investment

Stakeholder theory points out that shareholders as part of stakeholders may influence the implementation of environmental investment policies. Such influence depends on how powerful the shareholders compared to other stakeholders. Institutional investors are one of the powerful stakeholders who may put pressures on environmental issues. Chakroun and Matoussi (2012) stated that companies with large institutional ownership (IO) are seen as powerful in monitoring management. The greater the IO, the greater the pressure on the company in regard to environmental issues (Hsiung *et al.*, 2012; Ortiz-de-Mandojana *et al.*, 2011; Lahouel *et al.*, 2014; Hadani, 2012; Wahba, 2010; Calza *et al.*, 2014; Nulla, 2015). This may encourage companies to invest more in environmental issues to show their responsibility to the shareholders. Some studies also indicated the relationship of institutional investors and carbon emission policies (Marsden and Groer, 2016; Nulla, 2015). Based on the arguments, this study proposes the following hypothesis:

H1. IO positively affects environmental investment.

Figure 1 Proper assessment



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2.2 Audit committee and environmental investment

In the context of corporate governance, audit committees play an important role in overseeing the implementation of financial and accounting policies (Spira, 1998; Spira, 1999; Hayes, 2014; Ghafran and O'Sullivan, 2013; Dezoort, 1998). Stakeholder theory and legitimacy theory pointed out that as companies are bounded by social contracts, companies strive to meet stakeholders' demands and seek to gain legitimacy from society. Audit committees are responsible for ensuring that financial and accounting policies (including environmental investment policies) are in congruence with stakeholders' interests and social contracts. In the Indonesia setting, audit committee activities are reflected by how frequent audit committee members hold regular meeting yearly. The Financial Service Authority (OJK) Regulation No. 55/POJK.04/2015 insists that audit committee should hold meetings at least four times a year. Frequency of meeting is considered as important since oversight by the audit committee is one of the crucial activities for the implementation of good corporate governance. The Regulation also points out the audit committee members are responsible for monitoring risk management policies, including company's risk caused by the negative impacts of company's activities on the environment. This implies that environmental investment policies cannot be separated from the role of audit committees.

Based on the previous studies on the role of audit committees in various corporate policies and strategies such as the prevention of earnings management (Garven, 2015; Miko and Kamardin, 2015), compliance with regulations (Bepari and Mollik, 2015; Bryce *et al.*, 2014), financial reporting and disclosure (Ahmed Haji, 2015; Abernathy *et al.*, 2015; Tanyi and Smith, 2015; Akhtaruddin and Haron, 2010), and firm financial performance (Kallamu and Saat, 2015), it is believed that the effectiveness of the audit committee determines the reason why companies implement environmental investment. The relationship of audit committees and environmental issues can also be traced to Trotman and Trotman (2015) study. Thus, as audit committees play important roles in overseeing company policies, it is argued that the more effective the audit committees in monitoring company's policies, the higher the environmental investment of the company. Based on the argument, this study proposes the following hypothesis:

H2. Audit committees effectiveness positively affects environmental investment.

2.3 Types of industry and environmental investment

Industry types are seen as important factors that may influence environmental investment depending on how sensitive is the company in regard to environmental issues. Based on its sensitivity to the environment, the types of industry can be divided into two main groups: high-profile and low-profile industry. Hackston and Milne (1996) define a high-profile industry as an industry with high consumer visibilities, political risks, and competitions. Companies included in the high-profile industries are petroleum, chemical, forest and paper, automobiles, aircraft, extractive, agricultural, liquor and tobacco and media and communications (Hackston and Milne, 1996). In the Indonesian environment, the type of industry most commonly monitored by the Government in the PROPER assessment is the palm oil industry, oil and gas industry and textile industry (Ministry of Environment, 2011; Chariri *et al.*, 2017). This type of industry is in line with high-profile industry proposed Hackston and Milne (1996) and consequently, it is claimed that this type of industry may affect environmental investment as described by the legitimacy theory.

Legitimacy theory claimed that the company seeks to gain legitimacy from all stakeholders, including the community (Dowling and Pfeffer, 1975) by implementing policies (including environmental investment) that are consistent with their interests and values. When company interest and values are different from those of stakeholders, there will be a legitimacy gap that may threaten the company position (Lindblom, 1994; Dowling and Pfeffer, 1975). Therefore, to avoid legitimacy gap, companies must be able to identify their

activities or policies, which are considered as consistent with stakeholders' expectations (Neu *et al.*, 1998). Environmental investment can be viewed as a medium used by companies to gain legitimacy. The more sensitive the types of industry on environmental issues, the more serious the companies in managing environmental issues (Fuisz-Kehrbach, 2015; Xie *et al.*, 2016; Sariannidis *et al.*, 2015; Giannarakis *et al.*, 2014; Chen and Wu, 2015; Cho *et al.*, 2012). In line with environmental investment, the above arguments imply that types of industry probably affect environmental investment. Therefore, the hypothesis is proposed as a follow:

H3. Companies in high-profile industry positively influence environmental investment.

2.4 Environmental investment and firm performance

Legitimacy theory argues that companies actively search for and maintain their legitimacy (Dowling and Pfeffer, 1975) by aligning company values, policies and strategies to the community values. Such alignment is seen by companies as a potential source of legitimacy for their survival (Ashforth and Gibbs, 1990; Dowling and Pfeffer, 1975; O'Donovan, 2002). Environmental investment can be seen as a company's strategy to gain legitimacy and supports from stakeholders. The reason is that environmental investment enables companies to manage the environment by minimizing the use of energy and decreasing carbon emissions and other negative impacts (Berliner and Prakash, 2013; Minatti Ferreira *et al.*, 2014; Testa *et al.*, 2015). It is also believed that environmental investment can increase company reputation, and ultimately enhance competitive advantages of companies (Bagur-Femenías *et al.*, 2015; Bonifant *et al.*, 1995). Success in managing environmental issues can eventually increase firm values (Rokhmawati *et al.*, 2015; Orellano and Quiota, 2011; Judge and Douglas, 1998; Jackson and Singh, 2015; Teng *et al.*, 2014; Nakamura, 2014; Hart and Ahuja, 1996; Xie *et al.*, 2016; Claver *et al.*, 2007). Therefore, the proposed hypothesis is as a follow:

H4. Environmental investment positively affects firm financial performance.

3. Research methodology

This study used five variables: environmental investment, firm financial performance, IO, types of industry and firm size. Environmental investment is defined as the total investment incurred by the company for managing environmental issues and decreasing the negative impact of company activities (Nakamura, 2014). As it is difficult to find monetary expenditure of environmental investment from annual reports, environmental investment is then measured by PROPER awards released by the Ministry of Environment, Republic Indonesia. The reason is that companies awarded higher ranks of PROPER certainly reflect a fact that the companies have better environmental investment than those with lower ranks of PROPER. In fact, since the search of PROPER awards is voluntary, for some publicly listed companies, pursuing Gold rating can be seen as very costly (Makarim *et al.*, 1995). Following this argument, environmental investment (EI) is measured by the rank of PROPER Award received by companies with ordinal scales as follows: five for Gold (excellent), four for Green, three for Blue, two for Red and one for Black (very poor).

IO is measured by proportion of shares owned by institutions (non-individual ownership) to total outstanding shares. Audit committee effectiveness (AC) is defined as the active involvement of audit committee members in monitoring environmental investment policies. This variable is measured by the number of audit committee meetings within one year. Firm Size (FZ) shows total numbers of assets, which is measured by Ln total assets of the company (L. A. Chang *et al.*, 2015; Cho *et al.*, 2012; Nakamura, 2014). Industry types refer to the level of company sensitivity to environmental issues. Types of Industry (IT) are considered as a dummy variable which refers to low profile or high profile industry. Companies in high profile industry will be scored one (1), otherwise zero (0). Firm financial

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performance is measured by ROA (Earnings After Tax divided by Total Assets). Leverage (LV) is measured by Debt Equity Ratio.

The population of this study consists of all companies listed on the Indonesia Stock Exchanges in the year 2009-2015. Samples are chosen based on purposive sampling method with the following criteria: they published annual reports in the year 2009-2015 and received PROPER awards in the observation year. Data were then analyzed using ordinal logistic regression (1) and linear regression (2) based on the following models.

$$EI = \alpha + ß_1 IO + ß_2 AC + ß_3 IT + ß_4 FS + e \quad (1)$$

$$FP = \alpha + ß_1 EI + ß_2 LV + e \quad (2)$$

where EI is Environmental Investments (PROPER); IO shows Institutional Ownership; AC represents Audit Committee effectiveness; IT shows Industry Types (high profile VS low profile); FS indicates Firm size (Ln total assets, as a control variable); FP is Firm Financial Performance (EAT ratio to total assets); LV shows leverage (control variable), α is Intercept; ß indicates Regression coefficients and e represents Error.

4. Findings and discussion

To confirm the proposed determinants and consequences of environmental investment, this study involved 172 companies that have received PROPER Awards from 2009 to 2015. However, only 145 companies meet all criteria of the required sample because the remaining 27 companies receiving the PROPER Award were not those listed on the Indonesia Stock Exchanges. The descriptive statistics of empirical data can be seen in Table II.

As indicated in Table II, the majority of companies (56 per cent) received Blue category of PROPER award. This means that the companies managed their environmental investment at the minimum level as required by the environmental rules or regulations. The findings reveal that there is a tendency that the companies invested their money in environmental issues just to meet the minimum requirements specified by regulators. Thus, the initiatives of companies to undertake voluntarily environmental investment exceeding the minimum requirements (especially Gold rating of PROPER award) were not found in the sample companies. In fact, the number of companies receiving Gold and Green rating of PROPER awards are only 9 per cent and 26 per cent of the total sample respectively.

In terms of the industry types, the majority of samples (65 per cent) consisted of high profile companies with high sensitivity to environmental issues. Furthermore, the audit

Table II Descriptive statistics

Variables	*PROPER rating*	*No.*	*(%)*
EI	Gold	13	9.00
	Green	39	26.90
	Blue	82	56.60
	Red	10	6.90
	Black	1	0.70
IT	low profile	51	35.20
	high profile	94	64.80
	Valid	145	100.00
	Min	*Max*	*Mean (SD)*
AC	1.00	59.00	10.489 (11.63)
FS (Ln)	21.79	32.08	28.99 (1.64)
IO	20.00	100.00	79.20 (17.36)

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committees held formal meetings on average of 10 times a year. This figure is quite high for publicly listed companies in Indonesia. In line with the description of firm size, it can be seen that the average of firm size (Ln Assets) was 28.99 or equivalent to nine trillion Rupiah. The description of IO also reveals that share ownership was dominated by institutional shareholders (79.20 per cent). It is also interesting to note that there is a sample company by which 100 per cent of its shares are owned by institutional shareholders.

Tables III and IV provide us with information regarding the correlations between variables.

It can be seen from Table III that the correlation between industry types and environmental investment is significant and positive. The significant result was also found in the correlation between firm size and environmental investment, but no significant correlation was found between IO, audit committee meeting and environmental investment. Further, Table IV shows that environmental investment is significantly correlated with financial performance.

To further analyze the relationship of environmental investment and its determinants, the data were then tested using ordered logistic regression (Model 1) as can be seen from Table V.

Table V indicated that the Chi-Square value is equal to 18.29 (Sig. = 0.0011), which means that the model can be used to explain the determinants of environmental investment. Table V also showed that the predicted variables that significantly influenced the investment environment were types of industry (IT) and firm size (FS as a control variable). However, audit committees (AC) and IO did not significantly affect environmental investment. Pseudo

Table III Correlation matrix (environmental investment as dependent)

Variables	*IT*	*ACE*	*FS*	*IO*	*EI*
IT	1.0000				
AC	0.1212 (0.1466)	1.0000			
FS	0.0283 (0.7354)	0.2791* (0.0007)	1.0000		
IO	0.2091* (0.0116)	0.0254 (0.7621)	−0.0604 0.4706	1.0000	
EI	0.2000* (0.0159)	0.1523 0.0674	0.2972* (0.0003)	0.0437 0.6016	1.0000

Table IV Correlation matrix (financial performance as dependent)

Variables	*FP*	*EI*	*LV*
FP	1.0000		
EI	0.2492* (0.0025)	1.0000	
LV	−0.1561 (0.0607)	0.0138 (0.8689)	1.0000

Table V Ordered logistic regression: Model 1 (dependent = env. Investment)

Variables	*Coef.*	*Std. Err.*	p > ltl
IT	0.7247	0.3624	0.046*
IO	0.0034	0.0096	0.724
AC	0.0063	0.0149	0.672
FS	0.3965	0.2245	0.003*

Notes: *N* = 145; Wald Chi2 (4) = 18.29; Prob > Chi2 = 0.0011; Pseudo *R2* = 0.0568; *Significant at 5%; FS = control variable

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*R*2 has a value of 0.057, which indicated that the degree to which industry types and firm size influenced environmental investments was only 5.7 per cent.

The second model was used to examine the consequences of environmental investments (EI) on firm financial performance. The results of statistical tests can be seen in Table VI. It can be seen that the empirical data supported the hypothesis (Sig. 0.002). This means that environmental investment significantly and positively affected firm financial performance. Hence, the higher the environmental investment, the higher the firm performance (profitability). This reveals that environmental investment plays a significant role in increasing firm financial performance.

Robustness check

We also undertook robustness checks to ensure the consistency of our statistical results. For Model 1, as dependent variable is ordered-logistic regression, robustness check is based on random effect as a default robustness check (Table VII). It can be seen that the results remain unchanged.

For Model 2, we run Hausman test to identify whether we should use either random effect or fixed effect for robustness test. Based on Table VIII, it can be seen that chi2(2) = (b − B)'[(V_b − V_B)^(−1)](b − B) = 6.48 Prob > chi2 = 0.0391 (significant at 5 per cent),

Table VI Linear regression: Model 1 (dependent = env. Investment)

Variables	*Coef.*	*Std. Err.*	p > ltl
EI	4.4382	1.4155	0.002*
LV	−0.2466	0.1239	0.048*
cons	−0.7016	4.8915	0.886

Notes: *N* = 145; F(4, 140) = 3.88; Prob > *F* = 0.0051; *R*2 = 0.0998, Adj *R*2 = 0.0740; Root MSE = 13.102; *significant at 5%; LV = control variables

Table VII Robustness check: ordered logistic regression (dependent = environmental investment)

Variables	*Coef.*	*Robust Std. Err.*	p > ltl
IT	0.7247	0.3569	0.042*
IO	0.0034	0.0089	0.702
AC	0.0063	0.0172	0.714
FS	0.3965	0.2245	0.077**

Notes: *N* = 145; Wald Chi2(4) = 14.78; Prob > Chi2 = 0.0052; Pseudo *R*2 = 0.0568; *significant at 5%; **significant at 10%

Table VIII Hausman test: Random vs Fixed effect

	Coefficients			
Variables	*(b) Fixed*	*(B) Random*	*(b-B) Difference*	*sqrt(diag(V_b − V_B)) S.E.*
EI	1.4056	2.1887	−0.7831	1.3870
LV	0.1871	0.0378	0.1492	0.0605

Notes: Test: Ho: difference in coefficients not systematic. Result: chi2(2) = (b − B)'[(V_b − V_B)^(−1)](b-B) = 6.48; Prob > chi2 = 0.0391 \ (significant at 5%); Decision: reject random effect and prefer to use fixed effect for robustness test

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which mean that we rejected random effect and prefer to use fixed effect for robustness test. Table IX showed the result of robustness check (fixed effect).

Table IX indicated that in line with our variables of interests, our results remained unchanged. Indeed, environmental investment positively influenced firm financial performance.

Endogeneity issue. It is possible that environmental investment would lead to better financial performance, however, on the other side profitable firms would have more resources to conduct environmental investment. To solve this issue we conducted endogeneity test and the result can be seen in Table X. It can be seen that there is no an endogeneity issue of the model. This implies that environmental investment is a predictor of financial performance and not vice versa.

Based on the results of hypotheses testing, this study provides us with some interesting findings. The first findings of this study indicated that IO did not affect environmental investment. Descriptive statistics showed that even though the average percentage of IO was 79 per cent, but the average investment environment was only 56 per cent (PROPER at the Blue level). This implies that companies implemented environmental investment simply to comply with the provisions of the laws issued by the regulator. The companies had no special incentives to carry out the environmental investment policies exceeding legislative provisions. These findings also revealed the fact that although the percentage of institutional shareholders is high enough, the shareholders did not have power to influence management in the implementation of environmental investment policies as claimed by stakeholder theory. The finding did not support findings by previous studies claiming that the greater the IO, the greater the pressure on the company to manage all policies relating to the environment issues (Wahba, 2010; Calza *et al.*, 2014; Nulla, 2015; Hsiung *et al.*, 2012; Ortiz-de-Mandojana *et al.*, 2011; Lahouel *et al.*, 2014; Hadani, 2012) and carbon emission policies (Marsden and Groer, 2016; Nulla, 2015).

The second hypothesis states that the effectiveness of the audit committee positively influences the environmental investment. However, the empirical results showed that the hypothesis was not supported. This finding means audit committees did not play an important role in monitoring the environmental investment policy of the sample companies. Although the average meeting held each year reached 10 times, these meetings might not discuss any policies related to environmental investment. Indeed, previous studies claimed

Table IX Linear regression: Fixed-effects (within) regression

Variables	*Coef.*	*Std. Err.*	p > |t|
EI	3.6885	1.5031	0.015*
LV	−0.2012	0.1192	0.094
cons	−33.1697	18.0074	0.068

Notes: *N* = 145; F(2, 141) = 6.78; Prob > F = 0.01789; Adj *R*2 = 0.0278; Root MSE = 13.097; *significant at 5%; LV = control variables

Table X Endogeneity test

FP	*Coef.*	*Robust Std. Err.*	p > t	*[95% Conf. Interval]*	
EI	0.738028	1.512672	0.628	−2.29737	3.773427
LV	0.187943	0.103617	0.075	−0.01998	0.395866
res_fe	16.75268	10.20512	0.107	−3.72538	37.23075

Notes: Predict res_fe = predicted residual value of EI = f(IP,AC,FS,IO); Res_fe has insignificant value (0.107), which mean that there is no endogeneity issues on the model

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that audit committees are more concerned with accounting and financial reporting regulations (Spira, 1998; Spira, 1999; Hayes, 2014; Ghafran and O'Sullivan, 2013; Dezoort, 1998; Ahmed Haji, 2015; Abernathy *et al.*, 2015; Tanyi and Smith, 2015; Akhtaruddin and Haron, 2010; Bepari and Mollik, 2015; Bryce *et al.*, 2014), prevention of earnings management (Miko and Kamardin, 2015; Garven, 2015), and firm performance (Kallamu and Saat, 2015). Consequently, the focus of supervision is not much directed at environmental investment policies. This finding is also inconsistent with claims by Trotman and Trotman (2015) which states that audit committees play important roles in monitoring company policies on environmental issues.

The third hypothesis proposed argument that types of industry positively influence environmental investment. The finding showed that this hypothesis was supported by empirical data. This means that the more environmentally sensitive the company (high profile industry), the greater the environmental investment incurred by the companies. It is therefore, not surprising that types of industry in Indonesia, which are mostly monitored by the Ministry of Environment, are palm oil industry, oil and gas industry, and textile industry (Ministry of Environment, 2011). This finding also supported legitimacy theory claiming that to gain legitimacyand public supports, companies must be able to identify any activities, which are consistent with stakeholders or public expectations (Neu *et al.*, 1998; Dowling and Pfeffer, 1975), including activities related to environmental investments. Moreover, the finding is consistent with the findings from previous studies insisting that the company policies on environmental issues will increase when their business activities are more sensitive to the environmental issues (Chen and Wu, 2015; Fuisz-Kehrbach, 2015; Cho *et al.*, 2012; Xie *et al.*, 2016; Sariannidis *et al.*, 2015; Giannarakis *et al.*, 2014).

The last hypothesis is that environmental investment positively affects firm financial performance. The empirical data of this study supported the hypothesis. The greater the environmental investment incurred by companies, the better the financial performance of the companies (ROA). This finding is consistent with legitimacy theory (Dowling and Pfeffer, 1975) arguing that environmental investments can help companies manage their legitimacy by reducing carbon emissions and other environmental impacts (Berliner and Prakash, 2013; Minatti Ferreira *et al.*, 2014; Testa *et al.*, 2015) and can enhance company reputation and competitive advantages (Bagur-Femenías *et al.*, 2015; Bonifant *et al.*, 1995). This study is also in line with other studies indicating that firm value or financial performance will improve when the company implements an adequate environmental investment policy (Rokhmawati *et al.*, 2015; Jackson and Singh, 2015; Teng *et al.*, 2014; Nakamura, 2014; Hart and Ahuja, 1996; Xie *et al.*, 2016; Claver *et al.*, 2007; Orellano and Quiota, 2011; Judge and Douglas, 1998).

5. Concluding remarks

This study examined the determinants and consequences of environmental investments of companies listed on the Indonesia Stock Exchanges and receiving PROPER awards. The findings indicated that the level of corporate environmental investment is still low despite the fact the companies implement environmental policies only to meet the provisions required by the regulation. This can be seen from the PROPER award received by the companies which are on the Blue category. Moreover, this study found that industry type and firm size are the determinants of environmental investment. The more sensitive the type of industry and the bigger the size of the company, the higher the environmental investment incurred by the company. However, this study was unable to prove the effect of IO and effectiveness of audit committees on environmental investments. In line with the consequences of environmental investment, the findings indicated that environmental investment empirically has a positive effect on firm financial performance. This means that companies can actually create profit by sustaining the environment through proper environmental investment.

Findings of this study provide us with fruitful contributions. First, industry types and firm size are important determinants affecting environmental investment. Thus, this study enhances previous studies claiming that types of industry and firm size only influenced social and environmental disclosures and tend to ignore the impact of such variables on environmental investments. Second, the findings can be used by governments in Asian countries as reference in making policies related to the company's obligation in the implementation of environmental management, especially for large-scale companies and those which are sensitive to the environmental issues. Third, the positive relationship of environmental investment and firm financial performance can be used by companies as a corporate strategy to create profits without sacrificing the environment. Finally, the results of this study can be utilized by accounting academicians to include environmental issues as part of learning and research in the field of accounting.

Despite its contributions to current studies on environmental investment, this study suffers from some weaknesses. First, this research focused only on companies that received PROPER awards in Indonesia. Thus, the findings cannot be generalized to other companies listed on the Indonesia Stock Exchanges and other markets. The future studies should consider more companies listed in Asian emerging markets. Second, difficulties in finding the monetary amount of environmental investment led this study to use PROPER awards as a proxy of environmental investment. Consequently, this proxy did not indicate the actual environmental investment. We suggest that future studies should consider other methods of data collection, such as using questionnaires or interviews. Third, this study only uncovered two main variables that affect the environmental investment. The next research should include other variables such as the activity of an independent board of directors, audit committee expertise/ skills, ISO certification and foreign ownership as predictors of environmental investment.

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