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# Studying Factors Affecting Environmental Accounting Implementation in Mining Enterprises in Vietnam

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## Abstract

The study investigates the impact of factors on environmental accounting implementation in mining enterprises in Binh Dinh province, Vietnam. The survey was carried out in three phases: 1) a draft survey form; 2) in-depth interviews with experts; 3) design questionnaire. The survey respondents were people who had knowledge of environmental information in mining enterprises in Binh Dinh province, including: accountant, chief accountant, financial deputy director or director. The questionnaire was sent directly or through Google Form tool. The author received 162 responses from the survey respondent, out of which 13 were unusable due to missing data. Thus, 149 valid responses were used. This study employs Cronbach's alpha analysis, exploratory factor analysis and multivariate regression analysis. The results showed the influence of five different factors on environmental accounting implementation in mining enterprises in Binh Dinh province: stakeholders pressure, corporate characteristics, coercive pressure of government agencies, environmental awareness of senior managers and accountant qualifications of environmental accounting. While the pressure of stakeholders has a negligible influence, the remaining four factors (coercive pressure of government agencies, environmental awareness of senior executives, business characteristics, accountant qualifications of environmental accounting) have significant effect on environmental accounting implementation in mining enterprises in Binh Dinh province, Vietnam.

**Keywords :** Environmental Accounting, Environmental Information, Mining Enterprises, Vietnam.

**JEL Classification Code:** G30, M41, O13, Q01, Q56.

## 1. Introduction

After environmental disasters, green barriers (environmental regulations, environmental technique standards, environmental taxes and fees) have been increasing. Enterprises need to ensure balance between economic, environmental and social aspects. Governments, financial institutions, customers, investors, local communities, and others have growing interest in corporate environmental responsibility and use environmental information for

decision making. According to Schaltegger and Burritt (2017), environmental accounting (EA) was created from stakeholder pressures and changing cost relations.

At the enterprise level, EA is a part of the accounting system, use the new theoretical framework and accounting methods to record, measure and disclose environmental information that is useful for stakeholder decisions. Based on environmental information users, EA is divided into two sections such as environmental financial accounting (EFA) and environmental management accounting (EMA). Studies around the world have proved that EA brings great benefits to businesses. For example, support firms to comply with environmental laws, environmental policies, ensure long-term strategic position (IFAC, 2005), reduce environmental impact and save costs (IFAC, 2005), reduce government's environmental concerns (Liu & Anbumozhi, 2009), establish better relationship with stakeholders and improve decisions making of enterprises (Kokubu & Kitada, 2015), enhance the image, reputation and trade name of enterprises (Zeng, Xu, Dong, & Tam, 2010), have better financial performance (Amacha & Dastane, 2017).

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EA helps firms achieve environmental efficiency and economic efficiency. Therefore, EA is an accounting tool, which is suitable for businesses in the context of global sustainable development, especially for environmentally sensitive businesses like mining enterprises. This study aims to identify and evaluate the impact of factors on EA practice in mining enterprises in Binh Dinh province, Vietnam. Based on survey data from 73 mining enterprises, with support of SPSS software, research results will add to the body of research on EA practice in Vietnam. This study is needed when EA research in developing countries is still limited, especially in Southeast Asia (Herzig, Viere, Schaltegger, & Burritt, 2012).

This article consists of six sections. The remainder of this paper is organized as follows. The second section presents the literature review, followed by the research method. Then, the author presents and discusses research results. Finally, the conclusion offers implications as well as limitations and future research directions.

## 2. Literature Review

Studying factors affecting EA implementation have attracted many researchers around the world and Vietnam. Overview of research on factors affecting EA implementation is presented in two perspectives, including: background theory and practical research. The background theories explaining the factors affecting EA implementation provided insight into the EA development. So, the author presents a literature review with a combination of background theory and practical studies.

Research around the world has identified factors affecting EA implementation, such as stakeholders pressure (government, community, customer, shareholder, etc.), business characteristics (size, industry, profitability, etc.), environmental awareness of manager, and accountant qualifications. Government is one of the stakeholder that has an active role in EA implementation through legal documents and coercive mechanism. Liu and Anbumozhi (2009) showed that the government was a factor that has a significantly influence on environmental information disclosure, in particular, and EA implementation, in general, when analyzing 175 listed companies on the Chinese stock exchange, based on stakeholder theory. In contrast, using institutional theory, Qian and Burritt (2008) showed that regulatory pressure had the lowest impact on the EMA development, in particular, and EA, in general, because EMA has internal environmental functions.

In addition, Wilmshurst and Frost (2000) showed that shareholders were the most significant factors affecting on environmental information disclosure through legitimacy theory because shareholders were the main readers of annual reporting to reduce environmental uncertainty. Meanwhile,

Deegan and Gordon (1996) showed positive relationship between environmental organizations and environmental information disclosure of 197 Australian businesses in the period 1980-1991. Patten (1992) showed a considerable increase in environmental information disclosure between 1988 and 1989, when society increased pressure on the oil and gas industry after the Exxon Valdez oil spill.

Relationship between enterprise characteristics and EA implementation has been found in Pahuja (2009), Christ and Burritt (2013). Industry has been identified as a significant factor influencing the level of environmental information disclosure (Deegan & Gordon, 1996; Bewley & Li, 2000; Liu & Anbumozhi, 2009; Pahuja, 2009; Malarvizhi & Matta, 2016). Malarvizhi and Matta (2016) showed the highest level of environmental information disclosure was the energy sector (63%), followed by the metal industry (52%) and chemicals (40%) when conducting empirical of 85 listed companies on the Bombay Stock Exchange, India. The level of environmental information disclosure depends on the sector of activity sector and the nature of the industry to which a company belongs (Pahuja, 2009). Environmentally sensitive industries participated in EMA activities more than less sensitive industries (Christ & Burritt, 2013).

Besides, firm size is also an important factor influencing on EA implementation (Deegan & Gordon, 1996; Bewley & Li, 2000; Pahuja, 2009; Christ & Burritt, 2013). Large firms participated in EMA activities more than small firms (Christ & Burritt, 2013). Based on the annual report of 91 manufacturing enterprises in India, Pahuja (2009) pointed out that large enterprises provide more environmental information than small companies. Moreover, Pahuja (2009) also proved that profit was a significant explain variable in environmental reporting practices of the sample enterprises. Firms that disclosed environmental information was more profitable than undisclosed enterprises (Saha & Akter, 2012). Amacha and Dastane (2017) concluded that sustainability practices in general environmental practices in particular had a strong relationship with financial performance.

However, Bewley and Li (2000) showed that profitability did not affect environmental information disclosure when studying the 1993 annual report of 188 Canadian manufacturing enterprises.

Managers play an important role in promoting EA implementation. Top management support was very important for companies to implement EMA. Business with a high support of top management had good chance to implement EMA (Wang, Wang, & Wang, 2019). Understanding of concept and benefits of EA was an important condition to promote EMA in Japan (Kokubu & Nashioka, 2005). In response to institutional pressures, enterprise managers could choose environmental strategy that focuses on compliance with regulations or exceeding regulations (Delmas & Toffel, 2004). Parker (1997), the

first researcher using the contingency theory, showed a relationship between EMA and environmental strategy. Pondeville, Swaen, and De Rongé (2013) demonstrated a positive relationship between proactive environmental strategies and environmental management control systems. Awareness of proactive environmental strategies helps senior executives to support environmental initiatives, environmental reporting, and training of environmental staff.

Accountant qualifications also are an important factor in environmental management. There is a great relationship between professionally trained employees and EMA development (Qian & Burritt, 2008). Environmental awareness and skills of accountants play an important role in setting up EMA in Chinese enterprises (Qian, Burritt, & Chen, 2015).

In Vietnam, Nguyen, Tran, Nguyen, and Le (2017) studied the factors affecting the level of environmental information disclosure of listed construction companies on the Vietnamese stock exchange from 2013 to 2016. Results showed that the level of environmental information disclosure was influenced by factors such as: size, profitability, financial leverage, number of years, and independent audit.

Le (2017) empirically researched factors affecting environmental costs management accounting in brick manufacturing enterprises in Vietnam. The results of the multivariate regression model showed four factors, the strongest factor being is government pressure, followed by normative pressure, environmental strategy, and the lowest factor is community pressure. Nguyen (2017) has pointed out the factors affecting environmental costs management accounting in steel enterprises in Vietnam, including: managerial awareness, coercive pressure, internal communication and the role of management accounting department.

Using Structural Equation Model (SEM), Nguyen (2017) measured factors affecting EMA implementation in manufacturing enterprises in Vietnam's southern provinces, from strong to weak, including: environmental strategy, followed by fluctuation of business environment, normative pressure, task complexity, mimetic pressure and finally coercive pressure. Except for task complexity that had an opposite effect, five factors had positively impact on the EMA implementation.

Using a mixed research method, Nguyen and Nguyen (2018) identified factors affecting the environmental information disclosure of listed companies on Vietnam's stock market. The results showed that factors had a positive impact (coercive pressure, awareness of senior managers, firm size, industry, normative pressure, proactive environmental strategy, community pressure), and two factors had negative impact (profitability and financial leverage). However, Lam (2019) has identified six factors impacting on environmental information disclosure in Vietnamese aquaculture

enterprises, including: supervision of environmental management agencies; accountant qualifications of EA; attitude managers to environmental protection; EA guide; government, importer, investor, financial institution and community pressure; and EA benefit.

Nguyen, Nguyen, Nguyen, Le, and Nguyen (2020) identified factors that impact on the environmental information disclosure such as government pressure, stakeholders pressure, view of company managers, firm size, community pressure, business sector, profit and financial leverage. Two independent variables (profit, financial leverage) have the negative effect.

The Research overview showed the impact of stakeholder pressures, business characteristics, awareness of managers and accountant qualifications on EA implementation. However, the results of previous studies are still different. For example, Qian and Burritt (2009) argued that legal regulation has the lowest impact on internal waste management in Australia, but Jamil, Mohamed, Muhammad, and Ali (2015) showed that coercive pressure has a significant effect on EMA implementation in small and medium enterprises in Malaysia. So, EA research in developing country like Vietnam, especially environmentally sensitive industry like mining is suitable.

### 3. Methodology

#### 3.1. Research Hypothesis

##### 3.1.1. Stakeholder Pressures (SP)

Coercive pressure from environmental regulations of the National Assembly, Government, Ministries and local authorities affect EA implementation in mining enterprises in Binh Dinh province, Vietnam. Mining is an environmentally sensitive industry as stipulated in Circular 04 of Ministry of Natural Resources and Environment of Vietnam. Therefore, mining enterprises in Binh Dinh province are strongly influenced by the environmental regulations of Government, Ministries and local authorities, such as: (1) Law No. 45/2009/QH12 on natural resource tax, (2) Law No. 60/2010/QH12 on mineral, (3) Circular 38/2015/TT-BTNMT on environmental remediation and recovery in mining activities, (4) Decision 4046/2013/QĐ-UBND on approving, adjusting and supplementing planning that is mineral exploration, exploitation and use in Binh Dinh province, etc.

Green credit regulations of financial institutions affect EA implementation in mining enterprises in Binh Dinh province. According to Directive 03 /2015/NHNN green credit that supply credit for environmentally friendly projects also affect EA implementation in mining enterprises in Binh Dinh province because these enterprises need to publish more environmental reports.

Shareholders, customers, and environmental organizations pressure affect EA implementation in mining enterprises in Binh Dinh province. Environmental information is essential for decision making of shareholders so shareholders can request businesses to publish environmental reports. Wilmshurst and Frost (2000) have shown that shareholders' information right was the most significant factor to environmental information disclosure. Especially, green consumption awareness of customers can create pressure on enterprises to implement environmental responsibilities through EA.

Environmental awareness of the local community affects EA implementation in mining enterprises in Binh Dinh province. In order to meet growing environmental awareness and expectations of the local community, businesses need to examine, and supervise the environment. Liu and Anbumozhi (2009) have shown that environmental information had a positive relationship with the position when listed companies operating in eastern coastal regions in China were more likely to disclose emission data. This might raise the level of environmental awareness of the local community in those regions.

Mimetic pressure of same industry or competitors affect EA implementation in mining enterprises in Binh Dinh province. Environmental reporting is increasing both in quantity and quality because EA implementation is more and more spillover by imitating behavior among enterprises to achieve sustainable development. Using institutional theory, Lin and Sheu (2012) showed that mimetic pressure has a significant positive impact on green supply chain management practices. Companies were motivated to apply green certification when their competitors do so.

On the basis of this discussion, the first hypothesis predicts that stakeholders pressure affect EA implementation in mining enterprises in Binh Dinh province, Vietnam. Therefore, the authors set up the first hypothesis as flows:

**Hypothesis 1:** Stakeholders pressure has a positive relationship with EA implementation in mining enterprises in Binh Dinh province, Vietnam.

### 3.1.2. Awareness of Senior Executives (ASE)

Proactive environmental strategies awareness of senior executives affects EA implementation in mining enterprises in Binh Dinh province. Environmental strategy is divided into two types: such as passive environmental strategy (reluctantly meeting environmental regulations) and proactive environmental strategy (technology innovation, green product development, accounting system change, etc.). Kokubu and Nashioka (2005) have demonstrated that senior managers' awareness is an important element in EMA practices in Japan. Manager awareness will affect the

selection of environmental policy and strategy in business activities. When managers know EA benefits, they will implement proactive environmental strategies to provide more environmental information, minimize operating costs, exploit new market and attract consumers through green products.

Awareness of environmental uncertainty of senior executives affects EA in mining enterprises in Binh Dinh province. Environmental uncertainty is new uncertainties that related to the natural environment (such as resource scarcity, climate change or natural disasters) or changes in ecological environment awareness (such as environmental behavior of stakeholders, government's environmental policies change, environmental technologies change, etc.), businesses need to meet in the present and future (Lewis & Harvey, 2001). Environmental uncertainty affects the environmental strategy and EA practice (Lewis & Harvey, 2001). Chang and Deegan (2010) found that environmental uncertainty is factor that encourage EMA implementation. Environmental uncertainty and environmental strategy were important factors in the contingency theory that affect EA development (Parker, 1997; Bouma & Van der Veen, 2002).

Awareness of EA benefits and costs of senior executives affect EA implementation in mining enterprises in Binh Dinh province. EA brings many great benefits for businesses. However, EA implementation requires businesses to spend significant financial resources to restructure the accounting information system, train environmental knowledge for staff. At the same time, lack of EA guide is also a barrier, which is expensive to integrate environmental issues into accounting system (Setthasakko, 2010)

On the basis of the above analysis, the second hypothesis predict that awareness of senior executives affect EA implementation in mining enterprises in Binh Dinh province:

**Hypothesis 2:** Awareness of senior executives has a positive relationship with EA implementation in mining enterprises in Binh Dinh province, Vietnam.

### 3.1.3. Accountant Qualifications of EA (AQEA)

Environmental accountant capacity affect EA implementation in mining enterprises in Binh Dinh province. EA function provides financial and non-financial environmental information to stakeholders. So, accountants must have knowledge and skills related to recording, measurement, presentation and disclosure of environmental information. Accountants need to accurately measure, allocate environmental cost to overcome traditional accounting weaknesses. However, this is not an easy job. Setthasakko (2010) has shown that lack of environmental knowledge and skills could limit integration

of environmental issues into practical accounting systems in Thai businesses.

Training environmental staff affects EA implementation in mining enterprises in Binh Dinh province. Accountancy is related to theoretical frameworks that provide social legitimacy for profession (Hines, 1991). When businesses join the association network, businesses will access to theoretical frameworks, participate in discussions. Therefore, businesses will learn to develop and lead to behavioral change. Currently, Vietnam has no formal training programs in EA at universities and institutes. So, accountants take part in EA training courses offered by professional organizations such as: the Vietnam Association of Accountants and Auditors (VAA), the Association of Chartered Certified Accountants (ACCA), and others. This will promote EA implementation. Zhu, Sarkis, Cordeiro, and Lai (2008) showed a positive relationship between learning mechanism and green supply chain management practices in enterprises.

On the basis of this analysis, the third hypothesis to predict that accountant qualifications of EA affect EA implementation in mining enterprises in Binh Dinh province:

**Hypothesis 3:** Accountant qualifications of EA has a positive relationship with EA implementation in mining enterprises in Binh Dinh province, Vietnam.

### 3.1.4. Business Characteristics (BC)

Connection between accounting department and relevant departments affects EA implementation in mining enterprises in Binh Dinh province. The more professional network is expanded, the more EA is adopted (Qian & Burritt, 2008). Kokubu and Nashioka (2005) have shown that successful environmental management derived from the cooperation between different function individuals in the enterprise.

Firm size affects EA implementation in mining enterprises in Binh Dinh province. Many studies around the world have demonstrated that firm size had significant influence on environmental reporting (Patten, 1992; Roberts, 1992; Deegan & Gordon 1996; Pahuja, 2009) as well as EMA practices in the present or future (Christ & Burritt, 2013). Large enterprises are subjected to more public pressure and more political supervision. Therefore, they need to implement EA to create good social images, meet community, investor and government pressure. Moreover, large enterprises had higher resources and adopt more sophisticated management accounting techniques (Chenhall, 2003).

Profitability affects EA implementation in mining enterprises in Binh Dinh province. Businesses disclose environmental information make a difference to other

businesses as well as assert their position with stakeholder. Many studies around the world have shown a positive relationship between profitability and environmental reporting (Roberts, 1992; Pahuja, 2009; Saha & Akter, 2012; Nor, Bahari, Adnan, Kamal, & Ali, 2016). Firms which have significant profitability have more environmental information in their annual report to emphasis on future growth to investor and community.

Industry affects EA implementation in mining enterprises in Binh Dinh province. Many empirical studies have demonstrated that industry is a factor affecting EA implementation. For example, Deegan and Gordon (1996), Wilmshurst and Frost (2000), Cormier and Gordon (2001), Pahuja (2009), Christ and Burritt (2013). According to Cormier and Gordon (2001), environmental reporting tends to be more expanding in environmentally sensitive industries such as gas, chemicals, pulp, etc. These disclose environmental reports to alleviate environmental concerns form government. There was positive relationship between industry and EMA (Christ & Burritt, 2013)

On the basis of the above analysis, the fourth hypothesis to predict that business characteristics affect EA implementation in mining enterprises in Binh Dinh province:

**Hypothesis 4:** Business characteristics has a positive relationship with EA implementation in mining enterprises in Binh Dinh province, Vietnam.

### 3.2. Research Model

Based on previous studies, with expert advice in accordance with the research context, the author has formulated four 4 research hypotheses shown in Table 1. Since then, the author uses multivariate regression model, in which dependent variable is EA implementation and independent variables are stakeholders pressure (SP), awareness of senior executives (ASE), accountant qualifications of EA (AQEA) and business characteristics (BC). The multivariate regression equation used in this study is:

$$EAI = \alpha_0 + \alpha_1 x SP + \alpha_2 x ASE + \alpha_3 x AQEA + \alpha_4 x BC + \varepsilon$$

where:  $\alpha_0$ ,  $\alpha_1$ ,  $\alpha_2$ ,  $\alpha_3$  and  $\alpha_4$  are coefficients;  $\varepsilon$  is error.

### 3.3. Description of Observed Variables

The author has designed eight 8 observed variables in the scale of EA implementation with Likert 5-point scale (with 1 “very few” and 5 “great many”) (see Table 2) and 19 observed variables in four 4 scales of factors affecting EA implementation with Likert 5-point scale (with 1 “completely disagree” and 5 “fully agree”) (see Table 3).

**Table 1:** Research hypotheses

| Hypotheses | Hypothetical content  | Expected sign |
|------------|---|---------------|
| H1         | Stakeholders pressure has a positive relationship with EA implementation in mining enterprises in Binh Dinh province, Vietnam.            | +             |
| H2         | Awareness of senior executives has a positive relationship with EA implementation in mining enterprises in Binh Dinh province, Vietnam.   | +             |
| H3         | Accountant qualifications of EA have a positive relationship with EA implementation in mining enterprises in Binh Dinh province, Vietnam. | +             |
| H4         | Business characteristics has a positive relationship with EA implementation in mining enterprises in Binh Dinh province, Vietnam.         | +             |

**Table 2:** Observed variables measuring EA implementation

| Observed variables   | Code | Source  |
|--|------|---|
| 1. Recording environmental non-financial information (volume of consumption resources; environmental policies, objectives, strategies; environmental violation, environmental management system) | EAI1 | UNSD (2001), UNCTAD (2002), IFAC (2005), Circular 155/2015/ Ministry of Finance, GRI (G4-2016).   |
| 2. Recording environmental financial information (environmental assets, environmental liabilities, environmental costs, environmental income)  | EAI2 | USEPA (1995), UNSD (2001), UNCTAD (2002), IFAC (2005), JMOE (2005), Chang (2007), Circular 155/ 2015 / Ministry of Finance, GRI (G4-2016), IFRS 6, IAS 16, IAS 37, IAS 38, IAS 20, Law on Forest Protection and Development (2004), Law on Natural Resource Tax (2009), Mineral Law (2010). |
| 3. Allocating environmental cost by advanced method (ABC method, MFCA method, LCC method)  | EAI3 | USEPA (1995), UNSD (2001), IFAC (2005), Chang (2007).   |
| 4. Using detailed account tracking environmental information   | EAI4 | Pham (2016).  |
| 5. Using detailed ledger tracking environmental information  | EAI5 | Pham (2016).  |
| 6. Analyzing environmental performance   | EAI6 | IFAC (2005), JMOE (2005), Chang (2007).   |
| 7. Making external environmental reports   | EAI7 | UNCTAD (2002), Circular 155/2015/ Ministry of Finance, GRI (G4-2016).   |
| 8. Making internal environmental reports   | EAI8 | JMOE (2005); Chang (2007).  |

### 3.3. Data Collection

The author used a questionnaire survey method to get data from mining enterprises in Binh Dinh province, Vietnam. The survey was carried out in three phases. Phase 1 was the preparation of a draft survey form. Based on the research overview, the author produced an initial survey form. Phase 2 was to consult with experts to ensure questions in the survey were adequate and relevant to the context of the mining industry in Binh Dinh province. The author conducted in-depth interviews with senior lecturers at universities as well as chief accountants and directors of mining. The results show that the questionnaire needed to be adjusted, including: (1) add

items on coercive pressure of ministries, (2) add items on coercive pressure of local authorities, (3) eliminating items on religious organizations because they are not suitable in the Vietnamese context, (4) add items on work experience in operation fields, so that the survey objects can be clearly identified. Stage 3 was to finalize the official questionnaire. The questionnaire is designed in two parts. Part 1 asks general information about respondents; part 2 presented the survey questions. Survey respondents were persons who had knowledge of environmental information in mining enterprises in Binh Dinh province. It includes: accountants, chief accountants, financial deputy directors or directors. The official questionnaire was sent directly or via Google Form tool.

The author used probability sampling method with stratified sampling technique. Research sample is divided into five business sectors in mining industry in Binh Dinh province, Vietnam, including: quarrying, sand exploitation, titanium exploitation, leveling soil exploitation and natural hot water exploitation. The survey is conducted in 73/79

mining enterprises in Binh Dinh province. The author received 162 responses giving a 91.5% response rate, 13 responses were unusable due to missing data. Thus, 149 valid completed questionnaires were used. Tables 4 and Table 5 describe the research sample.

**Table 3:** Observed variables measuring the factors affecting implementation of EA

| Observed variables  | Code  | Source   |
|---|-------|--|
| 1. Coercive pressure of Parliament and Government laws.                                   | SP1   | Hoffman (2001), Law on Forest Protection and Development (2004), Law on Natural Resource Tax (2009), Mineral Law (2010), Decree 38/2015/ Government, Decree 19/2015/ Government, etc                     |
| 2. Coercive pressure of legal documents of ministries                                     | SP2   | Decision No. 38/2005/ QĐ-BNN, Circular No. 36/2015/ Ministry of Natural Resources and Environment, Circular No. 38/2015/ TT-BTNMT, QCVN 05: 2013/ BTNMT, QCVN 09: 2015/ BTNMT, QCVN 08: 2015/ BTNMT, etc |
| 3. Coercive pressure of legal documents of local authorities                              | SP3   | Decision No. 39/2010/ QĐ-UBND, Decision No. 4046/2013/ QĐ-UBND, etc  |
| 4. Local community 's environmental awareness   | SP4   | Hoffman (2001).  |
| 5. Customer 's environmental requirements   | SP5   | Hoffman (2001).  |
| 6. Shareholders 's environmental information requirements                                 | SP6   | Hoffman (2001).  |
| 7. Green credit regulations of credit institutions  | SP7   | Hoffman (2001), Directive 03 /2015/ CT-NHNN.   |
| 8. Commitment to non-governmental environmental organizations                             | SP8   | Hoffman (2001).  |
| 9. Pressure of the same industry or competitors   | SP9   | Hoffman (2001).  |
| 10. Awareness of senior executives about proactive environmental strategy                 | ASE1  | Chang (2007).  |
| 11. Awareness of senior executives about environmental uncertainty                        | ASE2  | Chang (2007).  |
| 12. Awareness of senior executives about EA benefits and costs                            | ASE3  | Chang (2007), Hoang (2017).  |
| 13. Environmental accountant capacity   | AQEA1 | Qian and Burritt (2008).   |
| 14. Staff training on EA  | AQEA2 | Qian and Burritt (2008).   |
| 15. Work experience in operation fields   | AQEA3 | Experts opinion  |
| 16. Connection between accounting department and environment department in the enterprise | BC1   | Kobuku and Nashioka (2005), Christ and Burritt (2013).   |
| 17. Enterprise size has a great impact on practice of EA                                  | BC2   | Pahuja (2009), Christ and Burritt (2013).  |
| 18. Profitability has a great impact on practice of EA                                    | BC3   | Pahuja (2009).   |
| 19. Industry has a great impact on practice of EA   | BC4   | Pahuja (2009), Christ and Burritt (2013).  |

**Table 4:** Statistics of surveyed enterprises

| Characteristics               | Classification                         | Frequency | Percentage (%) |
|-------------------------------|--|-----------|----------------|
| <b>1. Size</b>                | Less than 20 VND billion               | 25        | 34,2           |
|                               | From 20 VND billion to 100 VND billion | 36        | 49,3           |
|                               | More than 100 VND billion              | 12        | 16,4           |
| <b>2. Number of employees</b> | Less than 100 people                   | 67        | 91,8           |
|                               | From 100 to 200 people                 | 3         | 4,1            |
|                               | More than 1 200 people                 | 3         | 4,1            |
| <b>3. Business sector</b>     | Quarrying                              | 23        | 31,5           |
|                               | Sand exploitation                      | 41        | 56,2           |
|                               | Titanium exploitation                  | 4         | 5,5            |
|                               | Leveling soil exploitation             | 4         | 5,5            |
|                               | Natural hot water exploitation         | 1         | 1,3            |
|                               | <b>Total</b>                           | <b>73</b> | <b>100</b>     |

**Table 5:** Statistics of survey respondents

| Characteristics           | Classification                       | Frequency  | Percentage (%) |
|---------------------------|--------------------------------------|------------|----------------|
| <b>1. Gender</b>          | Male                                 | 59         | 39.6           |
|                           | Female                               | 90         | 60.4           |
| <b>2. Age</b>             | Less than 27 years old               | 28         | 18.8           |
|                           | From 28 to 35 years old              | 57         | 38.3           |
|                           | From 36 to 45 years old              | 38         | 25.5           |
|                           | More than 46 years old               | 26         | 17.4           |
| <b>3. Job positions</b>   | Director (Financial Deputy Director) | 24         | 16.1           |
|                           | Chief accountant                     | 52         | 34.9           |
|                           | Accountant                           | 73         | 49.0           |
| <b>4. Work experience</b> | Less than 5 years                    | 32         | 21.5           |
|                           | From 6 to 10 years                   | 70         | 47.0           |
|                           | From 11 to 20 years                  | 45         | 30.2           |
|                           | More than 20 years                   | 2          | 1.3            |
| <b>5. Qualifications</b>  | College level                        | 12         | 8.1            |
|                           | University level                     | 137        | 91.9           |
|                           | Postgraduate level                   | 0          | 0.0            |
|                           | <b>Total</b>                         | <b>149</b> | <b>100</b>     |

### 3.4. Methods of Data Analysis

To test the research hypotheses and ensure the reliability of the research model, I used SPSS 22.0 software to analyze data through techniques, including: analysis of scales reliability, analysis of exploratory factors and variables multivariate regression analysis.

## 4. Research Results

### 4.1. Scale Reliability

Using Cronbach's Alpha coefficient and total correlation coefficient in SPSS 22.0, I test scales reliability of the research model. The greater the Cronbach's Alpha coefficient, the



higher the internal consistency reliability. However, in new research and new research concept, Cronbach's Alpha coefficient of 0.6 or above is acceptable. In this paper, observed variables of independent and dependent variables are selected when Cronbach's Alpha coefficient is 0.6 or over and total correlation coefficient is greater than 0.3.

The results show that EA implementation scale meet requirements when the Cronbach's Alpha coefficient is 0.929 (greater than 0.6) and the total correlation coefficient of the total observed variables is greater than 0.3. Factors affecting EA implementation in this study have four scales with nineteen observed variables. The results of these meet requirements except for observed variables (SP8 and BC3) because total correlation coefficients are less than 0.3. Thus, seventeen observable variables for the four scales are used for exploratory factor analysis.

#### 4.2. Exploration Factor Analysis (EFA)

Exploration factor analysis of EA implementation scale shows that KMO = 0.855; Sig = 0,000; loading factor of all variables are greater than 0,5; Eigenvalues = 5,583 with extracted variance = 69,791% > 50%. So, it is concluded that exploratory factor analysis for dependent variables is appropriate. The EA implementation scale explains 69,791% of data variable through eight observed variables.

Exploration factor analysis of factors scales affecting EA implementation shows that KMO = 0.701; Sig = 0,000; loading factor of all variables is greater than 0,55, Eigenvalues = 1,652 with five extracted factors and the extracted variance = 72,296% > 50%. Thus, exploratory factor analysis for independent variables is appropriate and the EFA results discover a new factor in addition to the four original factors. New factor names coercive pressure of the government

agencies, including observed variables SP1, SP2, SP3. Five factors explain 72,296% of data variable through seventeen observed variables. At the same time, the fifth new hypothesis (H5) is proposed "coercive pressure of government agencies (CPGA) has a positive relationship to EA implementation in mining enterprises in Binh Dinh province, Vietnam.

#### 4.3. Multivariate Regression Analysis

The results of multivariate regression analysis in Table 6 show that Sig of the F test is  $0,000 < 0,05$ . This prove multivariate regression model in accordance with the actual data. Adjusted R Square coefficient is 0,746, which means that independent variables in the model explain 74,6% change in EA implementation. It is concluded that the research model is high suitability. Sig value of independent variables of t-test are all less than 0,1. So, no independent variables is excluded from research model. Standardized Beta Coefficients are positive, which means variables are positively related. In other words, the hypotheses are accepted. Sig value of SP is 0,086. It means that SP has a positive effect on EA implementation with 10% statistical significance or hypothesis H1 is accepted at 10% statistical significance. Sig value of CPGA, BC, ASE and AQEA are 0,000. This shows that these variables have positive effect on EA implementation with 1% statistical significance or hypothesis H2, H3, H4 and H5 are accepted at 1% significance level (see Table 7)

The standardized Beta coefficients analysis shows impact level of independent variables on the dependent variable (EAI). In five independent variables, CPGA (coercive pressure of government agencies) has the strongest influence (Beta = 0.638); followed by ASE (awareness of senior executives) (Beta = 0.467), BC (business characteristics)

**Table 6:** Regression model test

| Model | R                  | R Square | Adjusted R Square | F      | Sig.              |
|-------|--------------------|----------|-------------------|--------|-------------------|
| 1     | 0.869 <sup>a</sup> | 0.755    | 0.746             | 88.082 | .000 <sup>b</sup> |

**Table 7:** Results of testing hypotheses

| Hypothesis | Relationship                                 | Standardized beta coefficients | Sig   | Results         |
|------------|--|--------------------------------|-------|-----------------|
| H1         | SP positively impacts on EA implementation   | 0,074                          | 0,086 | Accept H1 (10%) |
| H2         | ASE positively impacts on EA implementation  | 0,467                          | 0,000 | Accept H2 (1%)  |
| H3         | AQEA positively impacts on EA implementation | 0,265                          | 0,000 | Accept H3 (1%)  |
| H4         | BC positively impacts on EA implementation   | 0,299                          | 0,000 | Accept H4 (1%)  |
| H5         | CPGA positively impacts on EA implementation | 0,638                          | 0,000 | Accept H5 (1%)  |

(Beta = 0.299); AQEA (accountant qualifications of EA) (Beta = 0.265) and the lowest impact is SP (stakeholders pressure) (Beta = 0.074). In addition, the VIF coefficient is less than 2, which means that multicollinearity don't appear between independent variables in the research model (see Table 8). Therefore, official multivariate regression equation is:

$$EAI = -3,479 + 0,592 \times CPGA + 0,089 \times SP + 0,310 \times BC + 0,481 \times ASE + 0,266 \times AQEA$$

## 5. Discussion

From the above research results, coercive pressure of government agencies has the strongest impact on EA implementation in mining enterprises in Binh Dinh province, Vietnam. This is an environmental sensitive industry under Decision 04/2012 of Ministry of Natural Resources and Environment of Vietnam. Thus, government, ministries and local authorities have many legal documents to control environmental pollution. These lead to the EA implementation in mining enterprises in compliance aspect. This finding supports the study by Liu and Anbumozhi (2009) suggesting that government pressure has a significant influence on EA implementation. Government policy has a direct impact on public environment awareness (Saifullah, Kari, & Ali, 2017).

Environmental awareness of senior managers has positive relationship with EA implementation. When fully environmental benefits awareness, senior executives will be motivated to implement EA with green initiatives and proactively environmental information management. This is completely consistent with Kokubu and Nashioka (2005) in emphasizing the importance of senior managers in the development of EA.

This research confirm that business characteristics remain a factor affecting EA implementation. Similar results were found in Deegan and Gordon (1996), Kokubu and Nashioka (2005), Pahuja (2009), Christ and Burritt (2013). When an enterprise is large-size or belong to an environmentally-sensitive industry, the enterprise will easily implement EA. At the same time, a cross-functional group from the cooperation of departments also plays a very important role in solving environmental issues and promoting EA implementation. In addition, accountant staff is also an important factor affecting implementation of green accounting. This result agrees with Setthasakko (2010) that the accountants' low environmental knowledge and skills limit the integration of environmental issues into accounting system.

## 6. Conclusion

This study measures the impact level of factors on EA implementation in mining enterprises in Binh Dinh province, Vietnam. Based on a study of 73 mining enterprises in Binh Dinh province through 149 questionnaires, the result shows macro factors, micro factors, internal and external factors affecting EA implementation through Cronbach's alpha analysis, EFA analysis, multivariate regression analysis. There are four factors that significantly influence at 1% statistical significance, including: coercive pressure by government agencies, awareness of senior managers, business characteristics, and accountant qualifications of EA. Stakeholders pressure has the lowest impact at 10% statistical significance. Therefore, government and authorities need to promulgate environmental accounting standards, circulars as well as regulate EA in accounting law, etc., to promote EA implementation.

Moreover, human resources training on EA is also very important. Experts at universities, colleges, and institutes should publish textbooks on EA and integrate EA into

**Table 8:** Regression coefficients

| Model | Unstandardized Coefficients |            | Standardized Coefficients | T     | Sig.    | Collinearity Statistics |       |       |
|-------|-----------------------------|------------|---------------------------|-------|---------|-------------------------|-------|-------|
|       | B                           | Std. Error | Beta                      |       |         | Tolerance               | VIF   |       |
| 1     | (Constant)                  | -3.479     | 0.301                     |       | -11.545 | 0.000                   |       |       |
|       | CPGA                        | 0.592      | 0.039                     | 0.638 | 15.207  | 0.000                   | 0.975 | 1.025 |
|       | SP                          | 0.089      | 0.052                     | 0.074 | 1.731   | 0.086                   | 0.939 | 1.065 |
|       | BC                          | 0.310      | 0.044                     | 0.299 | 7.100   | 0.000                   | 0.968 | 1.033 |
|       | ASE                         | 0.481      | 0.045                     | 0.467 | 10.795  | 0.000                   | 0.916 | 1.091 |
|       | AQEA                        | 0.266      | 0.042                     | 0.265 | 6.346   | 0.000                   | 0.980 | 1.021 |

the curriculum. This is closer to international practices. Professional associations such as VAA, VACPA, and CAC need to organize seminars, and conference to help managers and accountants raise awareness, and establish a learning mechanism about EA practice. In addition, managers also need to change their views on environmental protection activities, environmental policies, and proactive environmental strategies to overcome expanding green barriers.

This study uses a small sample of the mining industry actors in Binh Dinh province, Vietnam. However, research results provide a new perspective on EA implementation in an environmentally-sensitive industry in Vietnam. This study can be considered as a starting point for other future studies when examining regional characteristics, industry characteristics, and corporate governance to implement EA in Vietnam.

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