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UNIVERSITÉ GRENOBLE-ALPES

MASTER THESIS

**Environmental provision under IAS 37: A
Review of the Research Literature**

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Introduction

In 2018, World Bank documents that: “Gas flaring causes more than 350 million tons of CO₂ emissions every year, with serious harmful impacts from un-combusted methane and black carbon emissions. Gas flaring is also a substantial waste of energy resources the world can ill afford”¹. Due to the operation’s requirement of using dangerous chemicals, degradation and gas flaring, the extractive industries play a major role in the environmental and social issues. Furthermore, gas flaring also has a significant impact on the local and global environment (i.e in the form of water, air and land pollution). Therefore, we could argue that the more extractive firms account for carbon emission, the more they should account for environmental provision. In addition, prior research suggested that environmental provision has a moderating role in the relationship between environmental performance and firm value (Baboukardos 2018). On the other hand, environmental disclosure and environmental performance are valuable to investors and stakeholders for assessing environmental provision of companies.

Environmental provision is a liability of uncertain timing or amount, which was used to capture the risks regard to environmental cost such as clean up cost, dismantling cost, rehabilitation that companies will expose in the future. Furthermore, Fogleman (2013) document that there were 352 industrial accidents (i.e 4 accidents from Toxic spills from mining activities, 339 Non-mining accidents and 9 Oil spill industrial accidents) in European countries for periods of 11 years from 1998 to 2009. The cost of recover human and animal’s life after these industrial accidents and environmental disaster can rise up to million of unit currency. For instance, the Aznacóllar mining disaster happened on 25 April 1998 in Spain, it released from four to five million cubic meters of toxic mud into nearby River Agrio and River Guadimar which is the main water source for the Doñana National Park. Therefore, it also threatened thousand of animal’s life in the national park. In addition, this industrial accident cost 136.7 million euro for clean-up costs and restoration of surface water from the national government. Nevertheless, Boliden company (the mine owner) only paid more than 52 million euro which approximately equal to 20% of the clean-up cost for this industrial disaster. It is clear that environmental liabilities do not have the same features as financial liabilities. Because in the case companies go into bankruptcy or companies do not prepare enough environmental provision for the clean-up cost in some industrial accident such as the Aznacollar accident, their environmental liabilities still exist. Hence, other stakeholders such as taxpayer, and the government have to recover polluting firm’s environmental liabilities. Therefore, we could argue that it is important for environmentally sensitive industries to recognize accurately the environmental liabilities and environmental provisions in their financial statement.

¹From the journal of World Bank website: New Satellite Data Reveals Progress: Global Gas Flaring Declined in 2017. Available online at: <https://www.worldbank.org/en/news/press-release/2018/07/17/new-satellite-data-reveals-progress-global-gas-flaring-declined-in-2017>.

Under the International Financial Reporting Standards (IFRS) accounting framework and after the effective date of IAS 37 standard which is 1 July 1999, the company needs to follow IAS 37 *Provisions, Contingent Liabilities, and Contingent Assets* requirements when it comes to accounting for environmental provision. Nevertheless, the application of IAS 37 can lead to several issues such as the unclear of measurement objective and the diversity in applying discount rate for environmental provisions (Schneider et al. 2017; IFRS staff research paper 2016). Furthermore, these issues relate to IAS 37 can increase the risk that companies need to expose in the future. Therefore, the first objective of this study is to understand the mechanism related to recognition and measurement of environmental provision under IAS 37 *Provisions, Contingent Liabilities, and Contingent Assets*. It also explores possible issues for companies when applying IAS 37 and the divergence in environmental regulations, the discount rate setting for provisions and environmental governance of different European countries.

For a long period of time, environmental accounting research intensely debated the role of voluntary environmental disclosure (Clarkson et al., 2008; Cho et al., 2012). Furthermore, in a recent research, Baboukardos (2018) document that stakeholders assess a higher value and positive on the environmental performance of firms that reported environmental provisions. This may indicate a change in a trend as findings from prior research on the value relevance of environmental disclosure and environmental provision rather provided mixed results (Li and McConomy, 1999; Bewley, 2005; Plumlle et al., 2015; Clarkson et al., 2013). Therefore, the second objective of this study is to explore the association between firm's value and environmental disclosure, the relationship between environmental disclosure and environmental performance and the factors which can possibly affect to the value relevance of environmental provision.

Furthermore, according to the report from the commission to the council and the European Parliament in Brussels (2017) over a third of the European Union's reactors will be shut down by 2025. In the decommissioning phase of these reactors, companies need to manage several activities such as decontaminating facilities, dismantling buildings, restoring damaged land, and manage for radioactive waste. Similar to environmental provision, accounting for decommissioning provisions can be very complexity and uncertainty about timing and amount. Therefore, this research also investigates recent research on decommissioning provision and explore the annual reports of different companies in European countries to understand how these provisions are actually accounted for in the financial statement.

The remainder of the paper is organized as follow. Chapter 1 presents a brief description of the mechanism in accounting for environmental provision. Chapter 2 provides the discussion and the finding on IAS 37 *Provisions, Contingent Liabilities, and Contingent Assets*. Chapter 3 presents the findings from prior studies on environmental accounting research. Chapter 4 provides a description of the empirical works and the methodology from prior research on environmental provision and environmental disclosure. Chapter 5 presents extra-financial information and decommissioning cost. Chapter 6 explores the annual reports on the provisions of different companies. Chapter 7 presents the research questions which we aim to investigate in the future. Chapter 8 and Chapter 9 explain the sample selection and the methodology that we will employ in future research.

Chapter 1

Theoretical framework of environmental provisions

The first chapter presents the theoretical framework of environmental provisions. It explores how environmental provisions were recognized and estimated under IAS 37 *Provisions, Contingent Liabilities, and Contingent Assets*. Furthermore, the second section presents the different regulations on environmental provisions in European countries. Finally, the third section investigates the diversity in applying the discount rate that was used to estimate environmental provision in divergent European countries.

1.1 Recognition and measurement of environmental provisions under IAS 37

In the past, provisions were used to manipulation of profit figure by making and releasing various provisions back and forth (Wretman et al. 2012). Before the IAS 37 *Provisions, Contingent Liabilities, and Contingent Assets* was applied, there were several potential ways to address environmental liability. The approach to estimate environmental liability was divergent due to the divergence in the environmental regulations, environmental governance and accounting framework. Irrek et al. (2006) document in Italy's country report that ENEL (an Italian multinational energy firm) had accumulated decommissioning cost to nearly 800 million euro until 1999. Nevertheless, they had not arranged any provisions regard to their decommissioning cost. Furthermore, their liabilities were transferred 100% to the Italian Ministry of Treasury through the company SOGIN (a state-ownership company) between 2000 and 2005. They also indicated that about 80% of the total decommissioning costs have not been paid by the former generations, instead of they will be paid by future generations. Therefore, we could argue accounting for provision is a better way to address the risk that regards to environmental liabilities and decommissioning cost. In order to address the risk of "big bath provisioning" which was used by many companies, the International Accounting Standards Committee issued IAS 37 in September 1998, with its effective date from 1 July 1999. The "big bath" is an accounting term that refers to an earning management technique. The aim of this technique is to lower future expenses, through a big charge is made against income to reduce assets. IAS 37 *Provisions, Contingent Liabilities, and Contingent Assets* required a provision should be recognised when and only when: "(a) an entity has a present obligation (legal or constructive) as a result of a past event; (b) it is probable (i.e more likely than not) that an outflow of resources embodying economic benefits will be required to

settle the obligation; (c) a reliable estimate can be made of the amount of the obligation”¹.

Environmental provision is a liability of uncertain timing or amount. The company used environmental provision to capture the risks regard to environmental cost such as clean – up cost, dismantling cost, rehabilitation that they will expose in the future. Nevertheless, the way that environmental provision was accounted may increase the risks of companies. According to IAS 37, the measurement of a provision not only take risks and uncertainties into account but also take future events (i.e changes in the technological and law) into account. However, these provisions do not take gains from the expected distribution of assets into account. In addition, a pre-tax discount rate was used to estimate the present value of environmental provisions. IAS 37 document that: “discount the provisions, where the effect of the time value of money is material, using a pre-tax discount rate (or rates) that reflect(s) current market assessments of the time value of money and those risks specific to the liability. The increase in the provision due to the passage of time is recognised as an interest expense”². For instance, company A estimate that their future decommissioning cost over a period of 20 years is 1 billion euro. In order to calculate the present value of their future decommissioning cost, they discounted the estimated cash outflow at 2% risk-free rate, which was based on government bond rate. The present value of the decommissioning cost will be 673 million euro.

Furthermore, Schneider et al. (2017) demonstrated that there is diversity in accounting practice under IFRS and their research papers contributed to the debate about what the appropriate discount rate for environmental provisions should be. For instance, company A in the previous example can estimate their 1 billion euro future decommissioning cost at another discount rate which was adjusted for their non – performance risk (own credit risk). Therefore, they discounted the estimated cash outflow at 4% real discount rate. The present value of the decommissioning cost will be 456 million euro. It is a decrease of 217 million euro compared to the present value of decommissioning cost which was discounted by the risk-free rate. Indeed, the variation of the discount rate can have a major impact on the financial statement.

In the financial statement, environmental provisions should be recognized as the best estimate of the future expenditure required to satisfying the present obligation. The “best estimate” has been used in the case where environmental provisions have a range of possible outcomes or measuring the provision for a large number of items. In these situations, the “expected value” method which means using a weighted – average of all possible outcomes, was used to calculated provisions. For instance, company B has five possible outcomes for future environmental provisions. There are 1 billion euro, 1.5 billion euro, 2 billion euro, 2.5 billion euro, 3 billion euro with the probabilities respectively 15%, 20%, 30%, 15%, 20%. The expected value will be 2.025 billion euro. In the case of a single obligation, the estimated cost is the outcome with the highest probability of happening.

¹IAS 37 *Provisions, Contingent Liabilities, and Contingent Assets*, page. A1248, IN2. IFRS Foundation

²IAS 37 *Provisions, Contingent Liabilities, and Contingent Assets*, page. A1249, IN6(b). IFRS Foundation

1.2 The regulations on environmental provisions

For a long history, environmental law and environmental regulations were strictly established with the aim which includes management of specific natural resources, for instance forests, fisheries or minerals. Especially in the European countries, there are a lot of directive and environmental regulations which can enhance the quality of environmental performance in the environmentally sensitive industries and reduce the risk of environmental disasters. For instance, the Companies Act of 1985 and the Environmental Protection Act 1990 in the United Kingdom (UK) or the New Economic Regulations (NER) law voted in France in 2001. In order to establish a common environmental regulation in European countries, the European Union issued the *Non – Financial Reporting Directive 2014/95/EU* which aim to encourage companies to report more information about their environmental performance.

Sidney J. Gray et al. (2019) document that environmental liabilities can be classified into decommissioning, remediation liabilities, and legal liabilities due to non-compliance with relevant environmental regulations. Furthermore, the environmental disclosure quality has a positive association with the increased in the Financial Accounting Standards Board (FASB) regulations or the Securities and Exchange Commission (SEC) regulations and the pressure of the public after the Exxon Valdez Oil Spill in 1989 (Gamble et al. 1995). In addition, preventing dangerous climate change is a key priority for the European Union (EU). Because of the limitation in voluntary approach on disclosure of non-financial reporting, less than 10% of the EU large companies disclosed environmental and social information regularly in 2014. Therefore, the European Union issued the *Non – Financial Reporting Directive 2014/95/EU*.

The new directive required companies to include non-financial statements in their annual reports from 2018 onwards. In order to avoid the undue administrative burden, only large public-interest companies with more than 500 employees must comply with the directive. Under the directive 2014/95/EU, large companies have to issue reports on the policies they perform in relation to “*environmental protection, social responsibility, and treatment of employees, respect for human rights, anti-corruption and bribery, diversity on company boards (in terms of age, gender, educational and professional background)*”³. The aims of this directive include the benefits for companies, investors, and society. The main benefits for companies are not only better performance, lower funding costs, fewer and less significant business disruptions, but also better relations with consumers and stakeholders, disclosing transparent information on social and environmental. Investors will benefit from more information and efficient investment decision. In general, society benefits from the more effective managing environmental and social challenges of these companies. According to the new directive, companies will disclose more transparent information regard to environmental issues such as the current impacts of their operations on the environment (i.e green-house gas emissions, air pollution, and water use). Therefore, investors and stakeholders could explore a more appropriate environmental performance and environmental provisions of these companies, based on their disclosure about environmental issues.

³Non-financial reporting. Available online at: https://ec.europa.eu/info/business-economy-euro/company-reporting-and-auditing/company-reporting/non-financial-reporting_en

“ France is now a global leader in mandatory climate change related reporting and provides a model for other countries...” (Asset Owners Disclosure Project – AODP, 2017). In 2001, the New Economic Regulations (NER) law voted in France. According to the new legislation, nearly 60 indicators related to corporate social responsibility (CSR) of all listed companies need to be engaged in their annual report. Half of these CSR indicators are related to environmental commitment to reduce pollution (Albertini, 2014). The purpose of the new legislation was to oblige publicly listed French companies to issue information about the social and the environmental consequences to their stakeholders. Albertini (2014) also document the increased of environmental disclosure in annual reports and the improvement in the environmental performance of listed companies after the new legislation was applied by firms.

In the UK, the first regulation that required disclosure about the environmental performance of listed companies was the Companies Act of 1985. In the next decade, there were more regulations related to environmental disclosure, including the Environmental Protection Act (1990) and Environment Act (1995). The Companies Act of 2006 were extended these disclosure requirements to large non-listed companies. Barbu et al. (2012) document that when selecting information to be included in the annual reports, British managers have large discretion. Additionally, it is interesting to note that there is no obligation for audits of environmental disclosure in both France and the UK.

In the Canadian context, where the Canadian extractive industries play a major role in the international market, there are strict regulations that aim to protect the environment from the polluted activities of these firms. Since 1990, the Canadian Institute for Chartered Accountants (CICA) standards persuaded the listed firm to inform the stakeholders about environmental liabilities. In 2004, CICA handbook section 3110 required firms to capitalize on the fair value of the full estimated restoration cost. In 2011, Canada adopted IAS 37, the framework of the International Accounting Standards Board (IASB). Under IAS 37, there is no chance for firms to avoid disclosing environmental provisions with the reason that the underlying asset has an indeterminable useful life (Wegener et al. 2017). On January 31st 2019, the following decision was made by the supreme court of Canada : “*failed oil and gas companies must meet [their] provincial environmental obligations before repaying [their] creditors*”⁴. Therefore, one of the main effects of this decision is that creditors will require higher quality of environmental disclosure and environmental performance from oil and gas companies, they also require these companies accurately estimate the provisions for its environmental obligations.

1.3 The differences in setting the discount rate by different countries

In 2018, the European Public Sector Accounting Standards (EPSAS) issue paper on applying discount rate, the research paper indicated that the volatility in applying discount rate may result in insufficient comparability and diversity in practice within the European Union (EU). These results may be sensitive to the information that is used for decision-making purposes. Furthermore, the diversity in applying discount rate even more complex because of the different methodologies applied by

⁴<https://notesdelacolline.ca/2019/04/25/les-obligations-environnementales-avant-les-creanciers-dit-la-cour-supreme-du-canada/>

some governments.

In the United Kingdom, the standard setter for government financial reporting is the FRAB (Financial Reporting Advisory Board). On 16 March 2017 and 15 June 2017 the Treasury and FRAB addressed a wide range of issues related to the application of discount rates. According to the discussion of FRAB, provisions are discounted using three rates regard to short (less than five years), medium (five to ten years) and long-term (over ten years) in the public sector. It is assumed that the cash flow forecasts consolidated all risks and therefore the discount rate mirrors a risk-free rate. Although short and medium-term rates are updated annually, the long-term rate only updated at each spending review cycle. Government gilt yields were used by the Treasury on the assumption that these represent risk-free investments and negative real rates were generated by this approach across all durations.

*The provision discount rates are based on market data published by the Bank of England as described below:*⁵

- *Short-term (0-5 years): A real discount rate based on the yield on UK index linked Gilts as determined by Bank of England data for the spot yield curve at 2.5 years to maturity.*
- *Medium-term (5-10 years): Spot yield curve at 7.5 years to maturity.*
- *Long-term (over 10 years): Spot yield curve at 25 years to maturity.*

According to the standard 12 'Non-financial liabilities' in the French central government's financial statements (CGE 2016). The provisions for risks and liabilities shall be valued at the amount representing the best estimate of the outflow of funds needed to settle the obligation towards another party. The number of provisions for risks and liabilities shall be adjusted at each reporting date to account for the best estimate at that date. Generally, the methodology in measuring provisions is in line with IFRS. For instance, Electricité de France (EDF) applied the discount rate for nuclear provisions that must comply with two regulatory limits, which changed in 2017. Until 2016 (Order of 24 March 2015) the applied discount rate had indeed to remain lower than:

- *A regulatory ceiling "equal to the arithmetic average over the 120 most recent months of the constant 30-year rate (TEC 30 years), observed on the last date of the period concerned, plus one point".*
- *The expected rate of return on assets covering the liability (dedicated assets).*

As of 2017 (Order of 29 December 2017) the calculation of the regulatory ceiling changes as follows: the regulatory ceiling is defined until 31/12/2026 as weighted averages of a 1st term fixed at 4.3% and a 2nd term corresponding to the arithmetic average over the last 48 months of the TEC 30 plus 100 points. The weighting assigned to the 1st constant term of 4.3% decreases linearly from 100 % at the end of 2016 to reach 0% at the end of 2026. Under the new formula, the regulatory ceiling will gradually migrate over 10 years from its level at 31 December 2016 (4.3%) to a level in 2026 equal to the average constant 30-year rate (TEC

⁵Discount rates update. June 15, 2017. Available online at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/620855/FRAB_130_03_Discount_rates.pdf

30 years) over the four most recent years, plus 100 base points. The application of the formula as at 31/12/2017 presents a discount rate regulatory ceiling of 4.16%. The new regulatory ceiling leads to a decrease in the actual discount rate from 2.7% to 2.6% resulted in a + 727 million euro increase in nuclear provisions in 2017 ⁶.

In the Germany context, the discount rate used is based on a 10-year average of month-end yields of Federal government bonds with a remaining maturity of 15-30 years. Otherwise, the discount rate of long-term provisions is the rate of central government bonds with a matching maturity in Spain. Besides, government bonds with different duration are used as a reference for the discount rate in Sweden. In addition, Paola Rossi (2016) document that the discount rate for provisions in Italy is the adjusted risk-free rate. Given the uncertainty in timing and amount of environmental provisions, the volatility of the discount rate can significantly impact the number of liabilities in the financial statement. It is interesting for future research to investigate the comparability issue in application discount rate.

Overall, the first chapter shows that the variation in applying the discount rate in order to estimate environmental provisions can increase the risk that the company will expose in the future. Besides, the increase in enforcement of the environmental regulations in European countries could lead to higher environmental performance and environmental disclosure of companies. Following this chapter, the second chapter presents prior research and discussion on IAS 37 *Provisions, Contingent Liabilities, and Contingent Assets*.

⁶Electricité de France. Annual Results 2017. Available online at: https://www.edf.fr/sites/default/files/contrib/groupe-edf/espaces-dedies/espace-finance-en/financial-information/publications/financial-results/2017-annual-results/pdf/fy-results-2017-appendices_20180216.pdf

Chapter 2

Prior research on IAS 37 Provisions, Contingent Liabilities, and Contingent Assets

This chapter presents the existing studies on IAS 37 *Provisions, Contingent Liabilities, and Contingent Assets*. Firstly, it investigates the discussion and the finding in the research project of IFRS's staff on IAS 37 from the period between 2014 and 2018. Secondly, it shows critical literature about the application of IAS 37. Finally, we explore the value relevance of extra- financial information.

2.1 The discussion and finding of IAS 37, related to IASB research project on discount rates.

According to IAS 37 standard, the present value of environmental provision can be calculated by two important elements which are future estimated cash flow and the discount rate. With the same future estimated cash flow, companies can use different discount rate to achieve different results in the present value of environmental provision. For instance, companies use the discount rate which is the risk-free rate will have a higher present value of environmental provision than companies use the discount rate which is added their own credit risk. Therefore, the higher environmental provision can affect the value relevance of environmental performance. During the 2011 Agenda Consultation, many respondents proposed that the divergence in using discount rate could lead to the inconsistent in IFRS requirement. Based on these suggestions, a research project was decided by the International Accounting Standards Board (IASB) to exploring the discount rate requirements in IFRS. The purposes of this research project are to find the reasons for the divergent in applying discount rates and any potential financial reporting problems that the IASB should address. One of the main standards to be reviewed is IAS 37 *Provisions, Contingent Liabilities and Contingent Assets*. Research findings of IAS 37 remained unchanged from 2015 to 2016 in IASB Meetings, that include:

- In the area of measurement basis, IAS 37's measurement objective is unclear, this can be considered as potential financial reporting problems. The consequence of not addressing the problem is a different understanding of objectives could lead to inconsistent measurement.
- Components of present value measurement (PVM) in IAS 37. There were five components in measuring provisions, that is: central estimate of cash flows, time value of money (not refer to risk free – rate), risk premium (implicit, potential divergent in practice related to inclusion of risk in IAS 37), liquidity

premium (not explicit), own non – performance risk (not explicit, in practice no).

- Measurement methodology in IAS 37: risk adjustment in either rate or cash flows, using pre-tax rate, implicit using either real rate or nominal rate.

Some potential issues in IAS 37 were addressed in the research paper including:

- Both the ‘best estimate of expenditure required to settle . . . at the end of the reporting period’¹ and ‘what you would rationally pay to settle or to transfer it to the third party’² are the measurement objective in IAS 37. Therefore, the consequence is the divergence in the practice of different entities.
- In measurement for provisions, whether the estimate of cash flow should include profit, it is not clear in IFRS. This issue could lead to the inconsistencies in the measurement.
- There was diversified in the costs included in the estimation of provisions. IAS 37 does not clear about “unavoidable cost” in measurement onerous contract.
- IAS 37 does not clear whether an entity could take into account its own credit risk in the discount rate. This can lead to diversity in practice.

Furthermore, one of the discussion in the Emerging Economies Group Meeting (IASB Agenda ref 1B, 25 May 2015) is that in some situations in IAS 37, tax effects could be double counted and because of the overstatement of deferred tax, IAS 37 provisions could be understated. These issues were expected to be resolved in the IASB’s existing project on the new *Conceptual Framework*. The IFRS staff’s research also suggests that a company can capture risk either in the discount rate or in cash flow. Therefore, it is interesting for future research to explore whether the company should capture risk in the discount rate or in cash flow is better. In December 2018, a pipeline of research projects that focus on Provisions was activated. One of the main purposes of this research project is to find evidence to support the decision of the Board on whether to add a project to amend some aspect of IAS 37 *Provisions, Contingent Liabilities and Contingent Assets*. In case the Board considers a project to amend IAS 37, some aspect could be clarified, including the elements in the measurement of provisions; the measurement objective for provisions and whether an entity should add their non – performance risk in the discount rate.

2.2 Critical literature about the application of IAS 37

IFRIC 21 Levies is an interpretation of IAS 37. Nevertheless, it has been criticized by a range of stakeholders, including preparers, users, national standard setter and auditors of financial statement. One of the reason is that when addressing the same issues, the requirements of some Standard and the requirements of IFRIC 21 are not consistent. For instance, “*IFRS 2 Share-based Payments addresses liabilities for cash-settled share-based payments. It requires an entity to recognize a liability when it receives the goods or services acquired in exchange for a share-based payment—even if at that time the payment is still subject to vesting conditions. Vesting conditions could include future*

¹IAS 37 *Provisions, Contingent Liabilities, and Contingent Assets*, page. A1258, 36. IFRS Foundation

²IAS 37 *Provisions, Contingent Liabilities, and Contingent Assets*, page. A1258, 37. IFRS Foundation

performance targets, such as increases in revenues or profits. In such situations, the liability is recognized while the entity could still, in theory at least, avoid the payment through its future actions”³. Besides that, IAS 37 has some contradict principals and inconsistency in practice. In the definition of a liability, IAS 37 does not clear on the term ‘present obligation’. This issue will be addressed in the *Conceptual Framework* project. Furthermore, whether costs payable to third parties should be included in the measurement of provisions is not clear in IAS 37.

In the stakeholder’s point of view, investors can be suspicious about the reliability of the methodology in measurement provisions, because most companies do not disclosure about how their environmental provisions are calculated. Besides, some regulators also reported issues with regard to IAS 37, for instance, companies can make a mistake by adding risks to the discount rate instead of excluding risks from the discount rate; this is challenging for the regulators to determining the very long – term discount rate; there was evidence for divergence in the application of IAS 37 in Canada. In addition, there was different between equity analysts perspective and credit analysts perspective in analyzing long – term provisions. In one hand, equity analysts announce that because of the investment horizon, sometimes they excluded decommissioning liabilities in their analysis. On the other hand, some credit analysts consider long – term provisions and cost of borrowing related to it as debt or operating items (IFRS Agenda ref 17C, Stakeholder views, January 2016). Hence, the use of discount rate is very flexible in the calculation of environmental provision. Although discount rate is useful to estimate the present value of environmental provision but it could increase the risk that companies do not have enough resource to fulfilling its environmental obligations, in the case that companies employ the inaccurate discount rate.

Furthermore, some respondents in the IASB Meeting argued that the discount rate in the measurement of provisions was not fully updated in line with the movements of the market. For instance, the annual report of a company show that: “We use a long-term bond rate to match the long-term nature of most of our provisions and, although the discount rate is reviewed annually, we do not adjust for changes in that rate which we consider to be more short-term in nature, the effects of which would not be material”⁴, even there were material provisions in this company’s annual report. Another potential issue in measurement methodology of IAS 37 is that the use of the bond rate to discount provisions can lead to misstatement because sometimes provisions and bonds are not taxed in the same way. There was evidence that few jurisdictions used the average rate (over a number of years) instead of using the current discount rate in estimating provisions (IFRS Agenda ref 14B, Possible problems with IAS 37, July 2015).

2.3 Extra financial information

In the research about the value relevance of extra financial information, Yeldar (2012) indicated that both analysts and investors use extra – financial disclosure as a relevant source in their investment decision – making or analysis. Extra – financial

³International Accounting Standards Board (IASB), Agenda ref 14B. Research – provisions, contingent liabilities and contingent assets. Staff paper, page 5, July 2015. IASB Education Session. IFRS Foundation

⁴International Accounting Standards Board (IASB), Agenda ref 17B. Present value measurements – discount rates research. Staff paper, page 118, January 2016. IASB Meeting. IFRS Foundation.

information is defined as: *“Information incorporating a wide range of issues which are likely to have a short, medium and long-term effect on business performance. Extra-financial issues typically exist beyond the traditional range of financial variables that are considered as part of investment decision-making processes. Extra-financial factors include, but are not limited to, corporate governance, intellectual capital management, human rights, occupational health and safety and human capital practices, innovation, research and development (RD), customer satisfaction, climate change and natural resource management, consumer and public health, reputation risk, and the broader environmental and social impacts of corporate activity such as biodiversity impacts and community impacts”*⁵.

Overall, extra – financial disclosure are classified into three board group as environmental, social, governance (ESG). Especially, both investors and analysts consider that governance is an important factor in their investment decision – making or analysis. According to this study, the GRI Reporting Framework, Carbon Disclosure Project (CDP) and KPI – set created by an industry association are the most used standards and guidelines by analysts and investors. In 2018, Carbon Disclosure Project announced their annual A-List that identified the world’s businesses leading on environmental performance. Using the scoring methodology in response to the urgency of the environmental issues and market perspectives, CDP identified over 150 companies as the pioneers acting on water security, deforestation and climate change. In the climate change sector and European scope, France is a pioneer country with 23 companies in A-List. Following are Germany with 7 companies; Spain, Switzerland, and Finland with 4 companies; Netherlands and Italy with 3 companies; Poland, Sweden, and Portugal with 1 company.

In the 2018 Reference documents, EDF Group noted some events regard to the environment: *“the presence of yellow dustfall near the combined cycle gas turbine in Bouchain (France) with no certainty on the link with the startup emissions, and the death of some raptors on wind farms in France and Mexico. In addition, the period of heat and drought created unfavourable conditions for fish life and made water management difficult especially in the lower Ain valley and the étang de Berre”*⁶. These events can increase the warning from the French Nuclear Safety Authority or non – profits organization. In France, EDF has to pay approximate 1.94 million euro as the penalty amount for the damages on the Bugey site in 2013 and soil cleaning work related to land sales transactions in Perpignan in 2010 and in Saint-Malo in 2007 (EDF 2018 Annual Report, p.154). Around 60% of global greenhouse gas emissions were accounted for by energy production, 25% of anthropogenic CO₂ emissions was produced by the electricity and heat generation. Because of the EDP’s size, it is still the main factor in carbon emitter worldwide. According to an analysis of 26 European firms in 2011, the provisions over total liabilities ratio was highest for oil and gas and mining companies that at least 20%, and lowest for banks that no more than 0.4% (IFRS Agenda ref 17B, January 2016, p.35). Therefore, it may exist a link between environmental performance (extra – financial information) and the number of environmental provisions in each

⁵Yeldar, R. (2012). The value of extra-financial disclosure, What investors and analysts said?. Available online at: <https://www.globalreporting.org/resourcelibrary/The-value-of-extra-financial-disclosure.pdf>

⁶Electricité de France. Reference Document 2018 including the Annual Financial Report, page 154. Available online at: <https://www.edf.fr/sites/default/files/contrib/groupe-edf/espaces-dedies/espace-finance-en/financial-information/regulated-information/reference-document/edf-ddr-2018-en.pdf>

industry. It is interesting for future research to take the investigation on the combination of extra – financial information to better estimate environmental provisions.

In a short conclusion, this chapter shows that the application of IAS 37 *Provisions, Contingent Liabilities, and Contingent Assets* lead to several issues such as the unclear in measurement objective and the variation in applying the discount rate. Therefore, whether the combination of extra-financial information can help firms to better estimate environmental provisions is an interesting research path for scholars.

Chapter 3

A literature review on environmental accounting research

This chapter presents three strands of environmental accounting research. The first strand of literature is the value relevance of environmental disclosure. Furthermore, the second strand of literature explores the factors affecting managerial decisions to disclose environmental liabilities information. Finally, the third strand of literature is the relationship between environmental performance and environmental disclosures. In basic definition, environmental disclosure is the way that companies report about their organization's activities which have effects on the environment to the stakeholders. Furthermore, environmental provision and environmental liabilities are sub part of environmental disclosure. Shareholders and stakeholder can find information about environmental provision and environmental liabilities in companies financial statement or their annual report. Therefore, they can be more accurate in the assessment of the firm's environmental performance.

3.1 The value relevance of environmental disclosure

According to Clarkson et al. (2008), prior research in environmental accounting can be classified into three broad groups: “ *studies that explore the valuation relevance of corporate environmental performance information, studies that examine factors affecting managerial decisions to disclose potential environmental liabilities, studies examine the relation between environmental disclosure and environmental performance*” ¹ (p.305). In the first strand of literature, there are several studies that examine the valuation relevance of environmental disclosure. Prior researches illustrated that corporate environmental performance information (environmental disclosure) is valuable to investors and stakeholders for assessing environmental liabilities of companies. Furthermore, Cormier and Magnan (1997) analyzed three-industries sample (i.e the pulp and paper firms, chemicals, and oil refiners) that regard to the individual and institutional's concerns about corporate social responsibility for pollution and environmental issue. They document that the stock market valuation was reduced in the firm's poor environmental performance. The firms are identified as poor environmental performance when they do not have the ability to fulfilling their environmental obligations or target in their environmental policy. It is also considered as they do not prepare enough provision for their environmental obligations in the future. In addition, Clarkson et al. (2004) studied the value relevance of environmental capital expenditure by using the sample firms in the pulp and paper industry. The authors

¹Clarkson, P., Li, Y., Richardson, G., Vasvari, F. (2008). Revisiting the relation between environmental performance and environmental disclosure: an empirical analysis. *Accounting Organizations and Society*, 33, 303–327.

indicated there were incremental economic benefits for low polluting firms. The results from prior research suggested a relationship between firm value and environmental disclosures.

Prior research illustrated that there was a negative relationship between firm value and environmental liabilities (Li and McConomy, 1999; Bewley, 2005). Nevertheless, recent research demonstrated that voluntary environmental disclosure quality² can enhance firm value or have a positive relationship with firm value (Plumlle et al., 2015; Clarkson et al., 2013). Overall, prior research about the relationship between voluntary environmental disclosure quality and the components of firm value (i.e cost of equity capital and expected future cash flow) indicated mixed results. For instance, Plumlle et al. (2015) employ a sample of firms from both sensitive and non-sensitive industries (i.e oil gas, chemical, food/beverage, pharmaceutical and electric utilities) over the period from 2000 to 2005 to explore the association between voluntary environmental disclosure quality and firm value. The authors document that there was both a negative and positive relationship between the cost of capital and voluntary environmental disclosure quality, depending on the type and nature of the disclosures. In contrast, Clarkson et al. (2013) failed to find the association between the cost of equity capital and disclosure quality. In addition, recent research also focuses on the value relevance of environmental provisions under IAS 37 and the role of environmental provisions in the relationship between market value and firm's environmental performance (Schneider et al., 2017; Wegener et al., 2017; Diogenis Baboukardos, 2018).

Wegener and Labelle (2017) document that the estimated environmental provisions under both Canadian/U.S GAAP and IFRS accounting frameworks are associated with higher market values, but only benefits to the investor in the oil and gas industry, not for the mining sector. In order to explain the result, they argued that environmental provisions in the oil and gas industry indicate a higher percentage of book value than environmental provisions in the mining industry. In contrast, Schneider et al. (2017) fail to find a material association between market value and environmental provisions. One of the main reasons for the different findings is that Wegener and Labelle (2017) employ a larger sample size and more control variables than the research of Schneider et al. (2017). Furthermore, Baboukardos (2018) employs a model based on the model in the valuation framework of Ohlson's (1995) and a sample of 692 French listed companies over the period 2005 – 2014. The author document that stakeholders assess a higher value and positive on the environmental performance of firms which reported environmental provisions on their financial statement.

3.2 Factors affecting managerial decisions to disclose potential environmental provisions

In the second strand of literature, prior researches find that manager's decisions to disclose potential environmental provisions information were affected by strategic factors. Based on the legitimacy theory, Patten (1992) document a material increase in environmental disclosure of petroleum firms after the effect of the Exxon Valdez oil spill in 1989. This study suggested that the pressure about the environmental

²The voluntary environmental disclosure quality is measured by employing disclosure index which consistent with the Global Reporting Initiative (GRI, 2006) disclosure framework.

performance of public and regulations can impact the firm's environmental disclosure quality. From a behavioural economics point of view, it is also a salience bias which means that individual mostly focuses on information that is more important, especially when the extreme case becomes possible and vivid (Daniel Kahneman, 2011).

Barth et al. (1997) investigated the factors that can influence the firm's disclosure decisions about environmental provisions under the accounting framework of the US GAAP and the Securities and Exchange Commission (SEC). The authors document that there were five factors which include: "(1) regulation, including enforcement activity, (2) management's information, including site uncertainty and allocation uncertainty, (3) litigation and negotiation concerns, (4) capital market concerns, and (5) other regulatory influence"³. Their study employs a sample of firms in Superfund site involvement and empirical method to explore the relationship between five factors (information about these factors was based on public sources, including the Environmental Protection Agency) and the number of environmental provision disclosure (information based on Forms 10-K and firm's annual reports). The authors indicated that all factors have a significant impact on the firm's disclosure decisions, except site uncertainty factor. They document that the coefficient on the site uncertainty variable is insignificant and negative which is contradictory with their prediction. In order to explain this result, they suggested that manager's disclosure decisions may not be affected by the lack of information about the cost of the remediate sites. Prior research on discretionary disclosure also illustrated that the more firms dependence on capital markets, the more firms disclose information about their environmental provisions (Frankel et al., 1995).

G. Arabatzis et al. (2017) document that government ownership, which was measured by the percentage of publicly reported holdings by government, is a significant determinant of climate change disclosure (environmental performance). The authors employ a sample of 215 firms with cross-sectional data which was extracted from the Bloomberg terminal of the European 500 index in the year 2014. Their study aims to explore the determinants of the firm's climate change disclosure for European companies. They also indicated that climate change disclosure can be considered as an effective managerial approach to reduce information asymmetry between managers and shareholders. In addition, Guzmán et al. (2010) indicated that there is a positive relationship between a firm's size and the extent of environmental disclosure. The authors employ a sample of 109 large firms operating in Portugal to explore the determinants of environmental disclosure. Therefore, it is interesting for future research to explore the determinants of environmental disclosure and the relationship between state ownership factor and the level of environmental disclosures.

Li et al. (1997) document that there were firms that do not satisfy the requirement of environmental disclosure. By the discretion of managers, firms can disclose information strategically and hide bad information about environmental liability level. instance, manage will choose to not reveal information about environmental liabilities which overreach a threshold level. Furthermore, Cormier et al. (2007) examine the effect of environmental disclosure on the association between a firm's stock market value and its earning. The authors employ a sample of firms from three

³Barth, M., McNichols, M., Wilson, P. (1997). Factors influencing firms' disclosures about environmental liabilities. *Review of Accounting Studies*, 2, 35–64.

countries (Canada, France, and Germany) with different governance regimes and reporting, they document the moderating influence of environmental reporting on the stock market valuation of firm's earnings in Germany. For Canadian and French firms, the study fails to address a significant relation between stock valuation multiples and environmental information. Furthermore, the results also suggest future research about the differences among national institutional contexts that may influence the firm's earning valuation.

3.3 The relationship between environmental disclosure and environmental performance

Prior research suggested that there does not exist a material relationship between environmental performance and environmental disclosure (Ingram and Frazier, 1980; Wiseman, 1982; Freedman and Wasley, 1990; Hughes et al., 2001). These studies have the same feature that they all employed the Council on Economic Priorities (CEP)⁴ rankings as a proxy for environmental performance. Nevertheless, Patten (2002) identified that selecting a sample from the CEP could be problematic. Because the CEP – a non-profit organization only analysis a small group of firms and they use different criteria and methodology to ranking environmental performance in divergent industries. In order to proxy for environmental performance and handle the issue, Patten selected data from a toxics release inventory (TRI) which is a public database from the United States Environmental Protection Agency. The author document a negative relation between environmental disclosure and environmental performance. This result was supported by Bewley and Li (2000), when they used a sample of Canadian firms and voluntary disclosure theory perspective to investigate the factors associated with environmental disclosure.

In contrast, Al – Tuwaijri et al. (2004) demonstrated that there was a positive relationship between environmental disclosure and environmental performance. The authors analysed these association by using TRI based data, a simultaneous equations approach and mandatory disclosure. Furthermore, Clarkson et al. (2008) also document a positive association between discretionary environmental disclosure and environmental performance. By testing competing forecasts from both socio-political and economics based theories of voluntary disclosure, their results only supported for the forecast of the economics based theories. The economics disclosure theories forecast that “high – quality” companies will use the voluntary environmental disclosure to diverse themselves with “low – quality” companies. That lead to a positive relation between voluntary environmental disclosure quality and environmental performance. In contrast, socio-political theories forecast a negative relation between voluntary environmental disclosure quality and environmental performance (Cho and Patten, 2007; Cormier et al., 2011). Nevertheless, the authors also find that “ *socio-political theories explain patterns in the data (“legitimation”) that cannot be explained by economics disclosure theories*”⁵ (p.303). Overall, the results from previous studies are mixed on the association between environmental

⁴the Council on Economic Priorities (CEP), is a public service research organization, dedicated to the accurate and impartial analysis of the social and environmental records of corporations. From Council on Economic Priorities. Available online at: https://www.sourcewatch.org/index.php/Council_on_Economic_Priorities

⁵Clarkson, P., Li, Y., Richardson, G., Vasvari, F. (2008). Revisiting the relation between environmental performance and environmental disclosure: an empirical analysis. *Accounting Organizations and Society*, 33, 303–327.

disclosure and environmental performance.

In a very short conclusion, this chapter shows that the prior research on the value relevance of environmental provisions and the value relevance of environmental disclosures provide mixed results. In addition, there is little understanding of the association between state ownership and the level of environmental disclosures.

Chapter 4

Empirical research on environmental provisions and environmental performance

This chapter presents the methodology and the main findings of prior research. The first section explores the association between environmental liabilities and equity value. Furthermore, the next sections investigate the value relevance of environmental performance and environmental provisions.

4.1 The relation between environmental liabilities and equity value

Denis Cormier and Michel Magnan (1997) argued that there was a relationship between the firm's pollution measure (firm's environmental performance) and the firm's implicit environmental liabilities. These implicit liabilities will be expected to incur, but it not accounted for in the firm's balance sheet yet. Prior research suggested that there is a positive association between environmental performance and stock market valuation (Barth and McNichols 1994; Cormier et al, 1993). Therefore, the stock market valuation of firms will increase when firms have better environmental performance or lower implicit environmental liabilities. Based on these empirical results, the authors predicted that firm's stock market valuation could be reduced when firms have higher implicit environmental liabilities, and the amount of implicit environmental liabilities will increase when firm's pollution record become worse. They used a pollution measure method similar to Cormier et al. (1993). Furthermore, the scope of their sample was limited because of focusing on water pollution. Nevertheless, a firm's environmental performance also includes information about forest management, air emissions. The authors employ a cross-sectional valuation approach and many financial statement variables, that included net monetary working capital, inventories, fixed assets, other assets (liabilities), debt, preferred stock, and minority interests. They find that there is a negative relation between the firm's pollution record and the firm's market valuation, and the more firm's pollution record, the more the existence of implicit environmental liabilities.

On the other hand, Bewley (2005) employs a sample of the U.S and Canadian firms during the period from 1984 to 1997, and a residual – income valuation model based on the Ohlson (1995) framework, to investigate the role of financial reporting regulation on the association between reported environmental liabilities and market valuation. Under difference financial reporting framework in the United State

(US) and Canada (Securities and Exchange Commission, Financial Accounting Standard Board, the American Institute of Certified Public Accountants, the Ontario Securities Commission, the Canadian Institute of Chartered Accountants), the author predicted that the association between reported environmental liabilities and market value was significantly affected by the regulation with higher enforceability. In their research design, the regulatory enforceability is broadly defined as a method to identify the divergent level of regulation cost. The higher the regulation cost, the higher the enforceability of these regulations. In order to explore her argument, the author employs various variables that included book value of equity, reported environmental liability, abnormal earnings, the time period under different regulations, control variables for industry and market index level, the interaction terms between environmental liability, time period and industry. Although the empirical results are mixed and controversial, the finding suggested that the association between environmental liability and market value will change from the pre-regulation to the post-regulation period, that enhanced signal about the impact of the regulation enforceability power. In the U.S sample, the SAB92 regulation has higher regulatory enforceability than the SOP96-1 regulation. In the Canada sample, the S.3060 regulation also has higher regulatory enforceability than the AuG19etc regulation. She suggested future research could explore the interaction between legal environmental and financial reporting regulation enforcement, the impact of this interaction on the value relevance of environmental liability. The authors also demonstrated there is a negative association between reported environmental liability and market valuation.

4.2 The value relevance of environmental performance

Baboukardos (2018) document that environmental provisions play a significant moderator role in the association between environmental performance and market value. In order to provide evidence for their argument, the author employs a data sample of French listed firms from the Thomson Reuters ASSET4 database and a linear price – level model based on Ohlson’s (1995) valuation model. Based on prior research in this area, the author established several model and variables to test his hypothesis. These main variables included book value of equity, earning per share, binary variable loss, the interaction term between earning per share and loss, environmental performance, environmental provision, the interaction term between environmental performance and environmental provision, dummy variable that controls for industry and year fixed effects.

On average, the results indicated that there is a negative relation between firms’ environmental performance ratings and the firm’s market valuation. Nevertheless, they also find that the more firms recognized environmental provisions on the balance sheet, the more positive that investors assess the environmental performance of firms. Furthermore, the interaction term between environmental performance and environmental provision has a positive effect on the firm’s value. In addition, the author also employs a probit model to test the robustness of these results. There are various variables in the regression, that control for size effect, leverage, profitability, the book to market ratio (control for risk), binary variable environmental provision, growth opportunities, sustainability reporting, emissions – trading scheme, dummy variable control for industry and year fixed effects. The regression results illustrated that environmental performance ratings of firms with the identified environmental

provision on their balance sheet were positively assessed by investors.

Information about the firm's environmental performance is not only value for equity holders, stakeholders, standard – setter, but also for bondholders. Schneider (2011) demonstrated that there is an association between environmental performance and bond pricing in the U.S Pulp and Paper and Chemical industries. In order to explore this relationship, the author employs the Toxic Release Inventory (TRI) as a proxy for environmental performance. Besides, several variables to control for firm-specific and bond specific were used in the regression, that included leverage, volatility, Altman's Z – score, asset novelty, asset tangibility ratio, size, SP bond rating, time to maturity, bond covenant. Overall, the author finds that environmental performance is a determinant that bondholders take into account on bond pricing progress. Nevertheless, the effects of environmental performance on bond pricing decreases when bond quality increases.

4.3 Diversity in practice and the value relevance of environmental provisions

Schneider et al. (2017) indicated that under IAS 37 framework, there is material diversity in practice. Because IAS 37 does not state clearly that an entity is not allowed to including the firm's non – performance risk (own credit risk) which is the risk that companies can not fulfill its obligations. To response this issue, IFRS Interpretations Committee noted that exclude non – performance risk is the predominant practice, own credit risk is mainly viewed as the risk of an entity instead of the risk specific to the liability. In contrast, Schneider et al. (2017) provided evidence that oil, gas and mining companies with high environmental provision are choosing to include non – performance risk. Although the divergence in practice only noted clearly in Canada, the authors argued their results have international implication. Because of the large amount environmental provision of Canadian companies and these firms play a significant role in the oil, gas and mining sector. In order to investigate their main research question, the authors employ a quite small sample with 87 companies from both oil, gas and mining industries. Their probit model was based on the research papers of Wiedman and Wier (1999); Beatty and Weber (2006). The authors employ several independent variables to complete their multi-variate probit model. These variables included environmental provision, Oil and Gas, US Ownership, Size, Z – score (adopt from the Altman Z – score model 1968 to estimate firm's expected credit risk), Leverage, Media Exposure, Volatility, Auditor. They document that the amount of the firm's environmental provision and firm's exposure to the U.S capital market are two key determinants in managers choosing to include non – performance risk in discounting environmental provisions.

In additional analyses, the authors aim to investigate the value – relevance of environmental provision in an IFRS transition setting. In order to understand the value – relevance of environmental provision at IAS 37 adoption, the authors employed a modified model that based on Ohlson (1995) 's valuation model and the method of Barth et al. (2014). They explore the relationship between share price and the book value of equity, net income, the change in book value of equity and net income due to the transition. Schneider et al. (2017) failed to find the value – relevance of environmental provision with the transition to IFRS in Canada. The authors document that there is no incremental value – relevance of environmental provision under IAS

37 that compared to Canadian GAAP. In contrast, Wegener and Labelle (2017) concluded that environmental provision is value – relevance under both Canadian/ U.S GAAP and IFRS accounting framework, but this result was supported only in oil and gas industry, not for the mining industry. In order to explain the result, they argued that environmental provisions in the oil and gas industry indicate a higher percentage of book value than environmental provisions in the mining industry. From the corporate social responsibility perspective, Wegener and Labelle (2017) also explored the value relevance of environmental provisions by using a modified model based on Ohlson (1995)'s model. They investigated the association between firm value and environmental provisions by employing various variables under a quasi-experimental setting. These variables included the environmental provision, book value of equity, net income, loss, corporate social responsibility, the interaction between net income and loss, the interaction between environmental provision and corporate social responsibility, gas (control for industry differences).

In order to explore the association between manager's decision to include non – performance risk to estimate environmental liabilities and the value – relevance of environmental provision under market perspective, Schneider et al. (2017) employ a modified model that also based on Ohlson (1995)'s valuation model. The authors used several variables that included book value of equity, net income, environmental provision, own credit risk, the interaction term between environmental provision and own credit risk, oil and gas. Their results suggested that both the reported environmental provision and the choice of different discount rate are not relevant in the firm valuation of investors. In contrast, Wegener and Labelle (2017) document that environmental provision can be understood as a costly signal about firm's future growth for firms in the oil and gas industry and these firms do not report stand-alone corporate social responsibility. To explore the role of environmental provision as a signal of earning expectancy, the authors investigate both the association between environmental provision and future cash flow and the association between environmental provision and future period's total depreciation expense. They employ many independent variables that included the environmental provision, depreciation, cash flow from operations, price to book value ratio, the CSR dummy variable, earnings before interest, taxes, depreciation, and amortization.

In terms of cost, Wegener and Labelle (2017) indicated that there is a positive relationship between environmental provision and future period depreciation in the oil and gas industry, but this association does not hold in the mining industry. In terms of benefits, there is a positive relationship between environmental provision and cash flow from the operation, this association also does not hold in the mining industry. In addition, the authors demonstrated that for companies in the oil and gas industry, standard – alone corporate social responsibility reports play a moderating role in the association between market value and environmental provisions. They suggested that future research could explore the determinants of this relationship and the interaction between environmental provisions and CSR reports. Overall, prior research about the value – relevance of environmental provision in market value provided mix results. These researches mostly employ a modified model based on the Ohlson (1995) valuation model and quantitative method.

Overall, this chapter shows that prior research provides mixed results on the value relevance of environmental performance and the value relevance of environmental provisions. Therefore, it is interesting for future research to revisiting these

value relevance and explore the factors that can affect the value relevance of environmental provisions.

Chapter 5

Decommissioning cost and extra-financial information regard to environmental issues

This chapter presents some factors that can affect the disclosures of decommissioning provision and the factors affecting the relationship between decommissioning provision and the firm's value. In the second section, it explores the definition and the objectives of environmental governance. Finally, it investigates the effect of pollution, industrial accidents on the firm's value and the role of NGOs, proxy advisor in addressing environmental issues.

5.1 Decommissioning provision

In 2014, The International Energy Agency (IEA) document that: *“Almost 200 of the 434 reactors operating at the end of 2013 are retired in the period to 2040, with the vast majority in the European Union, the United States, Russia, and Japan. We estimate the cost of decommissioning plants that are retired to be more than 100 billion dollars. Considerable uncertainties remain about these costs, reflecting the relatively limited experience to date in dismantling and decontaminating reactors and restoring sites for other uses. Regulators and utilities need to continue to ensure that adequate funds are set aside to cover these future expenses”*¹. In addition, according to the European Commission's report in Brussels (2017) over a third of the European Union's reactors will be shut down by 2025. Therefore, the company needs to be forthcoming for decommissioning and dismantling cost. Similar to environmental provision, the measurement of decommissioning costs are also subject to uncertainty and transparency. Because these liabilities still exist even when these environmentally sensitive industries went into insolvency. In this situation, other stakeholders such as government, institution, and the public need to cover their liabilities.

Paananen et al. (2018) indicated that an important determinant of disclosure quantity and quality in narrative disclosure is visibility in media. In addition, the authors collected data from all publications in the Factiva database to measure the visibility. In order to measure disclosure quantity and quality, they first collect data from the firms financial report. After the first step, they employ computerised text analysis to estimate the disclosure quantity and quality. They investigated whether media attention affects disclosures of companies about decommissioning provisions. The authors used a sample of all European companies in environmentally sensitive

¹International Energy Agency. World Energy outlook 2014 Factsheet: Power and Renewables. https://www.qualenergia.it/sites/default/files/articolo-doc/141112_WEO_FactSheet_PowerRenewables.pdf

industries to test the association between the quality of disclosure regard to decommissioning provisions and the visibility of firms. They document a positive relationship between a company's disclosure quality and its' visibility. The more visible the company are, the more information about discount rates and horizons were provided in the decommissioning provision report. The authors show that only 44% (45%) of their sample companies provided information about discount rates (horizons) which was used to measure the decommissioning provision. We can predict the reason for this result is that companies are not mandatory to disclose their assumption and discount rate which were used to estimate the provisions. Prior research suggested that regulatory climate, financial risk, and business risk are factors that can drive the association between decommissioning provision and firm value (Julia D'Souza et al., 2000; Inder K. Khurana et al., 2001).

Abdo et al. (2018) examine three aspects regard to decommissioning provision disclosures in oil and gas industry, that include the level of compliance with the disclosure requirements of the International Accounting Standards (IAS 16 *Property, Plant and Equipment* and IAS 37 *Provisions, Contingent Liabilities and Contingent Assets*, IFRIC 1 *Changes in Existing Decommissioning, Restoration and Similar Liabilities*), the respond of key stakeholders on firm's disclosure and the factors affect disclosure decisions of firms. The authors employ both the content analysis method and semi-structured interviews to address these issues. They investigated the annual report in the period 2014 and 2015 from 68 firms which was listed on the London Stock Exchange. The authors document that in general there was a high level of compliance with disclosure requirements regard to decommissioning provisions. In particular, they document that there are approximately 53% of oil and gas firms in their sample that comply with over 70% of the requirements. Nevertheless, they demonstrated that there are companies which revealed the only minimum required information about decommissioning provision in their annual report. Therefore, stakeholders can be misunderstood when they assess decommissioning provision of companies because of the lack of additional explanation about the amount of decommissioning provisions. The results from the interview with key stakeholders (i.e regulators, consultants, auditors and academics) illustrated that decommissioning provisions are important and useful in the stakeholder's point of view. Their findings suggested that proprietary costs, regulatory requirements, the complexities in accounting processes and lack of information demand are factors that can affect disclosure decisions of companies in the oil and gas industry.

5.2 Environmental governance

Rodela and Swartling (2019) document that: "*Environmental governance is generally understood as the process where different actors work together to cope with and try to solve environmental issues at different scales, including the design and creation of conditions for institutions, structures, and suitable decision-making processes*" ² (page 83). In particular, the goal of environmental governance is to ensure environmental protection target and outcome by control of actors (i.e government, institutions, companies, non-governmental organizations) and individual actions. Bennett and Satterfield (2018) identified that there were four main objectives in environmental governance.

²Rodela, R., and Swartling, G. A. (2019). Environmental governance in an increasingly complex world: Reflections on transdisciplinary collaborations for knowledge coproduction and learning. *Environmental Policy and Governance*, 29(2), 83-86.

These objectives included effective environmental governance, equitable environmental governance, responsive environmental governance, and robust environmental governance.

The environmental governance is considered to be effective when the environmental protection process assists in maintaining the system functioning and solidarity (i.e through the perpetual of biodiversity, habitat or species). Prior researches document that equitable environmental governance should respect and recognize the cultures, values, knowledge systems and aspect of different actors in establishing policies and the processes (Borrini-Feyerabend et al., 2015; McDermott et al., 2013; Lockwood et al., 2010). Nathan J. Bennett et al. (2018) demonstrated that the changing in social and environmental conditions need to be ensured by responsive environmental governance. In addition, environmental governance is determined to be robust when it maintains performance and functioning of institutions, manage crisis and perturbations.

Nowadays, global environmental issues (i.e climate change, plastic pollution, waste and chemical management, biodiversity loss, gas emissions) need to be addressed by the cooperation of several governments, institutions, business and public in different countries. Therefore, environmental provisions are increasingly contained into various bilateral trade agreements. Jinnah and Morgera (2013) examine the indication of environmental provisions in American and European Union free trade agreements (FTAs) for environmental governance. They document that the inclusion of environmental provisions in European Union FTAs is not only to harmonize environmental protection targets but also support environmental development and protection in developing countries, that can lead to robust environmental cooperation and effective global environmental governance.

In the European context, the European Union Strategic Environmental Assessment (SEA) Directive (2001/42/EC), can affect the features of new environmental governance. Unalan and Cowell (2009) illustrated that transparent decision-making processes, participatory and integrated are the main features of the new modes of environmental governance. Furthermore, the development of technology in the communications and media field enhanced the interaction between environmental activist groups and the public. This can lead to increasing pressure for organization behaviors when it comes to environmental issues. Especially, environmental sensitive industries need to adapt to both regulatory regimes and 'social license to operate' (Knox et al. 2017). Hence, this study suggests that future research could explore the association between environmental governance and environmental provisions, to better understand the role of environmental provisions in enhancing firm's legitimacy and firm's 'social license'.

5.3 The effect of pollution, industrial accidents on the firm's value and the role of NGOs, proxy advisor in addressing environmental issues

Industrial accidents or the polluted activities from extractive industries can lead to serious consequence in the environment and human's health. When it comes to some extreme cases such as oil spill or chemical leak, companies have to prepare

enough environmental provision to fulfilling their environmental obligations such as clean-up cost. In American history, the worst oil spill and environmental crisis is the BP oil spill. The Deepwater Horizon offshore oil rig exploded in the Gulf of Mexico on April 20, 2010. This disaster killed 11 workers, threatening thousands of animals live and hundreds of miles of beaches. It also leads to bad consequences for tourism industries and local fishing (Reuters). This event was received several critical judgments from stakeholders. Therefore, they expected an increase in environmental regulation and disclosure from oil and gas firms. Heflin and Wallace (2017) document that the shareholder wealth of oil and gas companies with more environmental disclosure recognized smaller loss than others after the BP oil spill. Their findings were supported by voluntary disclosure theory. The authors also find negative share price reactions for firms in the same industry. In contrast, Patten and Nance (1998) illustrated that there was an increase in share price reactions for oil and gas companies after the Exxon Valdez oil spill in 1989.

On the night of December 2-3, 1984 the world's worst industrial accident happened in Bhopal, India. It is called the Union Carbide chemical leak, the consequences of this accident are not only thousands of people's death but also water and soil pollution (Reuters). Blacconiere and Patten (1994) document that there were less negative share price reactions for companies with high environmental disclosure quality, following the Union Carbide chemical leak. In Japan, the most significant nuclear incident (i.e the level 7 event classification of the International Nuclear Event Scale) was the Fukushima Daiichi nuclear disaster on 11 March 2011. Beelitz and Hodgkinson (2013) employ event study methodology to examine the impact of the Fukushima Daiichi nuclear disaster on share price reactions. The authors demonstrated that companies with higher environmental and investment reputation suffered less negative share price reactions.

In the European context, Fogleman (2013) document that there were 352 industrial accidents (i.e 4 accidents from Toxic spills from mining activities, 339 Non-mining accidents, and 9 Oil spill industrial accidents) in Europe for the period of 11 years from 1998 to 2009. On September 21, 2001, in France, the explosion of the AZF factory in Toulouse is the most serious industrial disaster of the post-war period. This accident costs over 2 billion in compensation for property damage and bodily injury claims from Total and its insurers. Especially, the estimated rehabilitation and clean-up costs of the environmental and other damage is over 250 million euro. In addition, the Aznacóllar mining disaster happened on 25 April 1998 in Spain, this industrial accident cost 136.7 million euro for clean-up costs and restoration of surface water from the national government. It is interesting for future research to investigate the association between environmental provisions and these industrial accidents in the event study design.

Overall, there was a serious consequence for environmental, social and economic after these industrial accidents which were commonly caused by negligence. Because of the cost for rehabilitation and clean-up of the environmental damage can increase over billion of currency units, the stakeholders also required more disclosure and transparency information about firm's risk assessment, environmental provisions, and environmental performance. Islam and Staden (2018) document that the collaboration between companies and non-government organizations (NGOs) or activist protest can increase the transparency and comprehensive of the firm's conflict mineral disclosures. Therefore, it is interesting for future research to explore the role

of organizational outsiders such as NGOs or proxy advisors on the firm's environmental disclosure and environmental performance.

Chapter 6

Provisions in the annual report of the leading energy companies in France, Germany, and Italy

This chapter presents the different way in accounting for provisions in different European countries. The first section explores deeply in the 2018 annual report of Electricité de France (EDF) - a leading producer and the largest electricity supplier in France. Furthermore, the second section shows the 2018 annual report of Rheinisch-Westfälisches Elektrizitätswerk AG (RWE) - the second largest electricity producer in Germany. Finally, the third section investigates the 2018 annual report of Ente nazionale per l'energia elettrica (ENEL) – an Italian multinational energy firm.

6.1 Electricité de France (EDF)

In 2018 annual report, Electricité de France (EDF) - a leading producer and the largest electricity supplier in France and Europe document that they take into account several levels of risk and uncertainty factors (i.e changes in the regulations, changes in the regulatory decommissioning process, changes in discount rates) to estimate provisions. Because there are only two times in the 2018 annual report that they mention specifically to environmental liability (environmental provision), this part of the study aims to look at provisions of EDF in general. Note 28 below (p.379) that extract from their 2018 annual report, includes all the provisions for the 2018 fiscal year and compares to 2017 fiscal year.

<i>(in millions of euros)</i>	Notes	31/12/2018			31/12/2017		
		Current	Non-current	Total	Current	Non-current	Total
Provisions for the back-end of the nuclear cycle		1,515	22,362	23,877	1,479	21,378	22,857
Provisions for decommissioning and last cores		302	26,842	27,144	290	25,032	25,322
Provisions related to nuclear generation	29	1,817	49,204	51,021	1,769	46,410	48,179
Other provisions for decommissioning	30	91	2,033	2,124	80	1,977	2,057
Provisions for employee benefits	31	998	17,627	18,625	1,106	20,630	21,736
Other provisions	32	3,104	2,908	6,012	2,529	2,356	4,885
TOTAL PROVISIONS		6,010	71,772	77,782	5,484	71,373	76,857

In the French context, all the details with regard to significant provisions that related to nuclear generation back-end of the nuclear cycle, plant decommissioning and last cores were indicated in note 29.1 below (p.381).

<i>(in millions of euros)</i>	Notes	31/12/2017	Increases	Decreases	Discount effect ⁽¹⁾	Other movements ⁽²⁾	31/12/2018
Provisions for spent fuel management	29.1.1	10,786	488	(986)	651	(241)	10,698
Provisions for waste removal and conditioning	29.1.2	726	10	(29)	43	1	751
Provisions for long-term radioactive waste management	29.1.2	8,814	38	(231)	826	399	9,846
Provisions for the back-end of the nuclear cycle		20,326	536	(1,246)	1,520	159	21,295
Provisions for nuclear plant decommissioning	29.1.3	14,920	52	(138)	752	399	15,985
Provisions for last cores	29.1.4	2,387	-	-	97	42	2,526
Provisions for decommissioning and last cores		17,307	52	(138)	849	441	18,511
PROVISIONS RELATED TO NUCLEAR GENERATION		37,633	588	(1,384)	2,369	600	39,806

On a year-over-year basis, total nuclear provisions increased by 2,173 million euro, or an increase of 5.8%. They document that the change in provisions regard to nuclear generation is mostly due to a lower discount rate in France (i.e the discount rate that applied to calculate nuclear provisions in France at 31 December 2018 was 3.9% incorporating an average inflation rate of 1.5%, respectively 4.1% and 1.5% at 31 December 2017). In order to explain the discount effect, they demonstrated that: “*The discount effect comprises the 1,534 million euro cost of unwinding the discount, and the 835 million euro effect of the change in the real discount rate in 2018, which were recorded in the income statement for provisions with no related assets (cost of unwinding the discount)*”¹ (2018 annual report, p. 381).

6.2 Rheinisch-Westfälisches Elektrizitätswerk AG (RWE)

Rheinisch-Westfälisches Elektrizitätswerk AG (RWE) is the second largest electricity producer in Germany, mainly based on coal. In 2014, they were ranked first among European polluters due to CO₂ emissions of their production units. Therefore, it is interesting to explore their dismantling and environmental provisions in their 2018 annual report. The provisions note (p.128) below was taken from the report and it included all the important provisions such as provisions for nuclear waste management, provisions for dismantling or environmental protection obligations.

¹Electricité de France. Reference Document 2018 including the Annual Financial Report, Available online at: <https://www.edf.fr/sites/default/files/contrib/groupe-edf/espaces-dedies/espace-finance-en/financial-information/regulated-information/reference-document/edf-ddr-2018-en.pdf>

Provisions € million	31 Dec 2018			31 Dec 2017		
	Non-current	Current	Total	Non-current	Current	Total
Provisions for pensions and similar obligations	3,287		3,287	5,420		5,420
Provisions for nuclear waste management	5,659	285	5,944	5,725	280	6,005
Provisions for mining damage	2,460	56	2,516	2,263	60	2,323
	11,406	341	11,747	13,408	340	13,748
Other provisions						
Staff-related obligations (excluding restructuring)	378	446	824	723	844	1,567
Restructuring obligations	109	23	132	234	83	317
Provisions for taxes	1,497	43	1,540	1,620	349	1,969
Purchase and sales obligations	905	92	997	1,208	321	1,529
Provisions for dismantling wind farms	358	4	362	359	1	360
Other dismantling and retrofitting obligations	528	52	580	587	78	665
Environmental protection obligations	90	7	97	108	38	146
Interest payment obligations	261	1	262	398	11	409
Obligations to deliver CO ₂ emission allowances/certificates for renewable energies		885	885		1,600	1,600
Miscellaneous other provisions	331	721	1,052	604	1,472	2,076
	4,457	2,274	6,731	5,841	4,797	10,638
	15,863	2,615	18,478	19,249	5,137	24,386

On a year-over-year basis, total provisions decreased by 5,908 million euro, or a decrease of 24%. Therefore, the depreciation of lower present value of provisions will be favourable for the income statement of company. The change in provisions is mostly due to the decrease of provisions for pensions and similar obligations. The approach to calculating provisions for nuclear waste management, provisions for mining damage and other provisions is different from Electricité de France (EDF). RWE company used the real discount rate which was the difference between the discount rate and the escalation rate (i.e the rate based on expectations that related to the general increase in price and wage and productivity growth). For instance, the real discount rate regard to calculating provisions for nuclear waste management was negative 1.1% in 2018 annual report (p.133) and the real discount rate regard to calculate provisions for mining damage was positive 1.3% in 2018 annual report (p.135).

6.3 Ente nazionale per l'energia elettrica (ENEL)

Ente nazionale per l'energia elettrica (ENEL) is an Italian multinational energy firm. It is the largest geothermal energy producer in the world with 32 power stations in Italy and 20 worldwide. Their main activities are in the sectors of electricity generation and distribution, as well as in the distribution of natural gas. In April 2016, the main shareholder of the company is the Italian state (i.e through the Ministry of Economy and Finance) with 23.6% of the share capital. Therefore, it is interesting to investigate their provisions for litigation, nuclear decommissioning and site restoration in their 2018 annual report. The provisions note (p.296) below was extracted from their annual report.

Millions of euro

	at Dec. 31, 2018		at Dec. 31, 2017	
	Non-current	Current	Non-current	Current
Provision for litigation, risks and other charges:				
- nuclear decommissioning	552	-	538	-
- retirement, removal and site restoration	986	71	814	64
- litigation	1,315	191	861	70
- environmental certificates	-	27	-	29
- taxes and duties	409	23	300	23
- other	742	603	778	637
Total	4,004	915	3,291	823
Provision for early retirement incentives	1,177	397	1,530	387
TOTAL	5,181	1,312	4,821	1,210

On a year-over-year basis, total provisions increased by 462 million euro, or an increase of 7.7%. The change in provisions is mostly due to the increase of provisions for litigation and provisions for retirement, removal and site restoration. In particular, there was no information about the discount rate and the approach that was used to estimate the provisions for nuclear decommissioning or the provisions for retirement, removal and site restoration.

Overall, depending on the firm's size and their environmental policy, Electricité de France has the highest amount of environmental provision, follow by RWE company and ENEL has the lowest amount of environmental provision. In particular, there could be a divergence in the discount rate that was used to estimate provisions in different companies. The variation in the discount rate can be explained by the different environmental regulations, environmental governance in different countries and by the difference in management strategies of companies. Furthermore, Gray et al. (2019) suggest that it is interesting for future research to explore the factors that affect value relevance and transparency of social and governance performance and disclosure.

Chapter 7

Research problem and research contribution

This chapter presents the research gap that we propose to address in future research. As we show in our paper, there are several possible research path in regard to environmental accounting. In this study, we will address three specific research questions the value relevance of environmental performance and the level of environmental disclosures.

7.1 Research Problem

Nowadays, many environmental concerns (i.e global warming, air pollution, climate change, waste disposal, deforestation, water pollution, loss of biodiversity and nuclear issues, plastic pollution,...) have become to an alarming rate. Every individual, institutions or countries over the world are seriously affected by these environmental disasters and industrial accidents. Furthermore, the main reason for the air pollution, water pollution, soil, and land pollution mostly come from industrial and agricultural activities. For instance, toxic emissions from mining activities and its harmful chemicals can cause soil and air pollution. Besides that, the use of chemical products such as pesticides and fertilizers in agricultural activities can harm crops, plants, human and animal's life. In addition, these consequences of environmental degradation have to be recover by not only a huge amount of money and time but also the global cooperation on environmental problems. Nevertheless, there are some environmental issues that can not be easily recovered such as the loss of biodiversity, deforestation and global warming. Therefore, it is important for companies which are sensitive to environmental problems to capture their future risk in the environmental provisions.

In this study, we first identified the general problem is that the way environmental provisions were accounted for may increase the risk which firms will expose in the future. In particular, whether or not companies should exclude their own credit risk in the discount rate which is used to estimate environmental provision, is not clear under IAS 37 standard. In addition, Schneider et al. (2017) document that there was a material divergence in practice of Canadian firms under IAS 37 *Provisions, Contingent Liabilities, and Contingent Assets*. Their findings illustrated that the more the number of environmental provisions in the firm's financial report, the more probability that firms add its non-performance risk (own credit risk) in the discount rate. Hence, when the discount rate increase, the present value of environmental

provisions will decrease. Therefore, companies could deal with higher financial distress and insolvency risk if their environmental provisions do not enough for rehabilitation and clean-up costs in the environmental crisis.

Second, we perform a review of existent research with regard to environmental accounting, that we explored around three key areas of (i) the value relevance of environmental disclosure, (ii) the relationship between environmental disclosure and environmental performance, (iii) the factors affecting managerial decisions to disclose potential environmental provisions. As we show in our literature review, managers have the discretion in environmental disclosure to enhance their environmental performance. Especially, when there are several differences in environmental regulations, environmental governance and discount rate setting between different countries, the use of environmental information for earning management strategies could be an interesting problematic. Furthermore, Wretman et al. (2012) document that there was the existent of “big bath provisions” in Sweden from 2000 to 2002. It was reduced in 2005 when Sweden companies were mandatory to adopt IFRS. Hence, our paper aims to investigate the role of some factors such as the collaboration between firms and NGOs, state ownership in the transparency and the level of environmental disclosure.

7.2 Research questions

Prior research suggests that extra – financial information is an important factor in the investment decision – making or analysis of both analysts and investors (Yeldar, 2012). In addition, corporate social responsibility information, environmental provisions information and extra financial information (i.e environmental impacts of corporate activities such as climate change, air and water pollution, the loss of biodiversity) can be combined to give better information for investors in their decision – making progress to assess firm’s value. Furthermore, the combination with extra financial information will enhance a benchmark for environmental sensitive companies to better estimate the environmental provisions due to its uncertainty about timing and amount. Therefore, the company will be more appropriate when they capture risk in the environmental provisions.

Recent research demonstrated that the collaboration between companies and non-government organizations (NGOs) or activist protest can increase the transparency and comprehensive of the firm’s conflict mineral disclosures (Islam and Staden, 2018). Furthermore, other factors like proxy advisors also start to add environmental problems and the firm’s environmental performance to their activity. It is interesting for this study to explore the impacts of the collaborations between non-government organizations and companies on the transparency of the firm’s environmental disclosure. In addition, whether the collaborations between non-government organizations and firms can enhance the firm’s value through their earning management strategies, it could be an interesting research path for the future. Besides, this study also suggests that company which was partially owned by state ownerships factor will have a higher level of environmental disclosures. Hence, our paper aims to investigate three specific research questions as follow:

1. What is the role of extra financial information factor in the value relevance of environmental provisions?

2. What is the relationship between state ownership and the level of environmental disclosure?
3. Does the cooperation between firms and NGOs enhance the transparency of environmental disclosures? What is the stakeholder views of this collaboration?

7.3 Research contribution

Gray et al (2019) indicated that the understanding of reporting that associate with governance and social issues (e.g the value relevance of governance and social performance, and disclosures) is limited. Therefore, our study will contribute to both academics and professional's perception of the role of the company's social performance and governance performance. Furthermore, our research will also contribute to the perception of the collaboration between companies and non-government organizations (NGOs) regard to environmental issues.

Chapter 8

Research methodology for the first and the second research question

This chapter presents the sample and the database that we will employ in our research. It also describes the empirical model in order to examine the first research question: “*What is the role of extra financial information factor in the value relevance of environmental provisions?*”. Furthermore, the third section explains the methodology that will be used to investigate the second research question: “*What is the relationship between state ownership and the level of environmental disclosure?*”.

8.1 Sample and data collection

In the study for the first research question, the objective is to investigate the role of extra financial information such as environmental performance, social performance, governance performance in the value relevance of environmental provisions. The sample in our study for the first and the second research question will focus on environmentally sensitive industries that have operations in European countries. The data on environmental provisions and environmental performance will be collected from the Thomson Reuters ASSET4 database in the period between 2005 and 2015. In addition, we will also hand-collect data on social performance and governance performance from corporate sustainability report and the corporate governance section on the company website. Furthermore, Yeldar (2012) document that 72% of their sample use the governance sections of the company website as the favourite source for governance performance, and 68% of their sample use the corporate sustainability reports as the favourite source for social performance. The remain accounting and market data will be collected from the Thomson Reuters Datastream.

8.2 Research design for the first research question

This study aims to explore the role of extra-financial factors in the value relevance of environmental provisions. As we show in our literature review, it may exist a link between extra-financial information and the number of environmental provisions in each industry. Therefore, the following hypothesis will be tested in the research:

Hypothesis 1: The market valuation of environmental provisions is positive and materially higher for companies with higher environmental performance, social performance, governance performance.

A modified model of the Ohlson (1995) valuation framework will be employed to examine the difference in market valuation. This research will use similar valuation

model that was used in prior environmental provisions studies (Schneider et al., 2017; Wegener and Labelle., 2017; Baboukardos 2018). The model will be as follow:

$$\begin{aligned} PR_{it} = & \beta_0 + \beta_1 BVS_{it} + \beta_2 EPS_{it} + \beta_3 LOSS_{it} + \beta_4 (LOSS_{it} \times EPS_{it}) + \beta_5 ENVPRO_{it} \\ & + \beta_7 ENVPERF_{it} + \beta_8 SOCPERF_{it} + \beta_9 GOVPERF_{it} + \beta_{10} (ENVPRO_{it} + ENVPERF_{it}) \\ & + \beta_{11} (ENVPRO_{it} + SOCPERF_{it}) + \beta_{12} (ENVPRO_{it} + GOVPERF_{it}) \\ & + \beta_{13} STATEOWN_{it} + \beta_{14} INDACCI_{it} + \sum_{j=1}^{j=n} \beta_{15j} IND_{it} \\ & + \sum_{y=2005}^{y=2015} \beta_{16y} YR_{it} + \epsilon_{it} \end{aligned}$$

Where:

- PR_{it} is the per share market value of firm i in year t .
- BVS_{it} is the per share book value of equity.
- EPS_{it} is the per share earnings before interest and taxation.
- $LOSS_{it}$ is the binary variable, which equals zero if EPS is positive and one otherwise.
- $LOSS_{it} \times EPS_{it}$ is the interaction term between loss and the per share earnings before interest and taxation.
- $ENVPRO_{it}$ is the environmental provisions.
- $ENVPERF_{it}$ is environmental performance.
- $SOCPERF_{it}$ is social performance.
- $GOVPERF_{it}$ is governance performance.
- $ENVPR_{it} \times ENVPERF_{it}$ is the interaction term between environmental performance and environmental provision.
- $ENVPRO_{it} \times SOCPERF_{it}$ is the interaction term between social performance and environmental provision.
- $ENVPRO_{it} \times GOVPERF_{it}$ is the interaction term between governance performance and environmental provision.
- $STATEOWN_{it}$ is the control variable for the government ownership.
- $INDACCI_{it}$ is the binary variable, which equals one if firm has industrial accident and zero otherwise.

The new variables in our empirical model compare to prior research models are $SOCPERF_{it}$, variable and $GOVPERF_{it}$ variable, which is the total score of the Environmental Performance Pillar of the Thomson Reuters ASSET4 database. This database includes more than 180 key performance indicators that are classified into three pillars of environmental, social, governance. We will also compare the score from the database and the information which will be collected from the company's

website to better estimate environmental performance, social performance and governance performance. The remain accounting and market data will be collected from the Bloomberg Data, Thomson Reuters datastream and firm's annual report.

8.3 Research design for the second research question

In order to investigate the relationship between state ownership and the level of environmental disclosures, we will employ a content analysis method. For companies in our sample, we will hand collect their annual reports, the sustainability section of corporate websites and the corporate sustainability report between 2016 and 2018 from the company's websites. For the measurement regard to the level of environmental disclosures, we will use the environmental disclosure index that similar to the environmental disclosure index in the research of Clarkson et al. (2008). In their scoring model for environmental disclosure index, there were 95 line items that consistent with the Global Reporting Initiative (GRI) reporting guideline. Furthermore, they classified disclosures items into hard and soft disclosures, the dichotomous scoring approach was used to score each item.

Chapter 9

Research methodology for the third research question

This chapter presents the sample and the database that we will employ in our research for the third research question. In particular, we will employ a mixed methodology that includes an empirical model and semi-structured interviews to investigate the third research question: *“Does the cooperation between firms and NGOs enhance the transparency of environmental disclosures? What is the stakeholder views of this collaboration?”*

9.1 Sample and data collection

In the study for the third research question, the main objective is to investigate the role of the collaboration between companies and non-government organizations (NGOs). The sample in our study for the third research question will focus on environmentally sensitive industries that have operations in European countries. The data on environmental disclosures and environmental performance will be collected from the Thomson Reuters ASSET4 database. In addition, we also hand collect-data from companies and NGOs website. The remain accounting and market data will be collected from the Bloomberg Data.

9.2 Research design for the third research question

Islam et al. (2018) document that the collaboration between companies and non-government organizations (NGOs) or activist protest can increase the transparency and comprehensive of the firm’s conflict mineral disclosure. As we show in our literature review, it is interesting to explore the determinants of the environmental disclosure of firms. Therefore, the following hypothesis will be tested in the research:

Hypothesis 2: *The cooperation between firms and non-government organizations (NGOs) will lead to a higher level of environmental disclosure.*

This research will employ a similar model and method (i.e three stage least square analysis) that was used in prior study (Islam et al., 2018). The model will be as follow:

$$\begin{aligned} \text{ENVDIS} = & \alpha_0 + \alpha_1\text{NGOCOOPER} + \alpha_2\text{ENVPERF} + \alpha_3\text{SIZE} + \alpha_4\text{ROA} + \alpha_5\text{LEV} \\ & + \alpha_6\text{TOBIN Q} + \alpha_7\text{VOLAT} + \sum_{i=1}^{i=n} \beta_i\text{INDUSTRY} + \sum_{j=1}^{j=m} \beta_j\text{COUNTRY} \end{aligned}$$

Where:

- ENVDIS is the environmental disclosure index. NGOCOOPER is the number of cooperations between company and NGOs.
- ENVPERF is the environmental performance score.
- SIZE is the natural log of total assets.
- ROA is the return on asset.
- LEV is financial leverage.
- TOBIN Q is the level of intangible assets in a firm.
- VOLAT is the share price volatility.

The environmental disclosure index will be based on the environmental disclosure index in the research of Clarkson et al. (2008). In their scoring model for environmental disclosure index, there were 95 line items that consistent with the Global Reporting Initiative (GRI) reporting guideline. Furthermore, the environmental performance score will be based on the total score of the Environmental Performance Pillar of the Thomson Reuters ASSET4 database.

9.3 Semi-structured interviews

In the second phase on the research design for the research question 3, we employ semi-structured interviews to explore the perception of NGOs, companies and other stakeholders on the collaboration between firms and NGOs to enhance the transparency and the comprehension of environmental disclosures. The objective of this phase is a better understanding of the results that were obtained from the first phase and to investigate the determinants that can affect managerial decisions regard to environmental disclosures. We will interview divergent stakeholders that were experts and knowledgeable on the environmental reporting and analysis. In particular, we will send email or mail to invite academics, investors, consultants, auditors, proxy advisors, NGOs, environmental protection agency, environmental protest groups, regulators to participate in the interview. Furthermore, we will base on the results of the first phase on this research question and the findings from prior research, in order to develop the interview's guideline. The semi-structured interviews will be audio recorded and ranged from 20 to 60 minutes.

Conclusions

In this study, we first identified the mechanism in accounting for environmental provisions under IAS 37 *Provisions, Contingent Liabilities, and Contingent Assets*, in order to understand how uncertainty to account for environmental provision. Secondly, we conducted a review of existing research environmental accounting research which we investigated in three key areas of (i) the value relevance of environmental disclosure, (ii) the relationship between environmental disclosure and environmental performance, and (iii) the factors which can possibly affect to the managerial decisions to disclose environmental information. Overall, this study points out that there are several possible research path for environmental provision under IAS 37 such as the comparability issue in application discount rate, and whether it better to adjust for risk in the discount rate or in future cash flow in order to estimate the present value of environmental provision.

Prior research on IAS 37 suggests that the main issue in applying IAS 37 is related to the discount rate that was used to estimate the present value of environmental provision. Schneider et al. (2017) document that there is diversity in accounting practice for environmental provision under IFRS in Canadian oil, gas and mining firms. In contrast, the research paper of IFRS staff (2015) indicated that this is not significant that the firm includes their non-performance risk (own credit risk) in the discount rate. Nevertheless, this research suggests that there are several divergences in environmental regulations and environmental discount rate set in different European countries. Therefore, we encourage future research to investigate whether or not this is existing the diversity in accounting practice for environmental provision in European countries. Furthermore, can firms enhance earning management strategies through the variation of the discount rate, in order to send a costly signal as bank loan loss provision about the company's future growth and income?

As we show in our paper, the literature studies on the value relevance of environmental provision are limited. Most of the existing research focuses on the value relevance of voluntary environmental disclosure (Clarkson et al., 2008; Plumille et al., 2015). Hence, this study aims to explore the determinants in the association between environmental provision and the firm's value. We argued that extra-financial information (i.e environmental performance, social performance, and governance performance) is factors that can have significant effects on the value relevance of environmental provision. In particular, we expected that companies with a higher level of environmental performance, social performance, and governance performance will have a positive and higher market valuation of environmental provision.

In addition, the prior research document that there were firms that do not satisfy the disclosure standard about environmental liability. By the discretion of managers, firms can disclose information strategically and hide bad information about environmental liability level (Li et al 1997). Furthermore, research on IAS 37 also suggests

that companies do not clearly disclose what assumption they use and how they discount for the present value of environmental provision. Sometimes, it is difficult for investors and shareholders to assess the company's environmental provision or decommissioning provisions through only one number on the financial statement (Abdo et al., 2018). Therefore, this study also focuses on investigating the factors that can have an impact on the level of environmental disclosure. We predicted that companies with recognized state ownership in the corporate structure will perform a higher level of environmental disclosure and will have a higher level of environmental provision.

Furthermore, Islam et al. (2018) investigate the collaboration between NGOs and firms based on both social movement theory and collaboration theory. The authors illustrated that the collaboration between companies and non-government organizations (NGOs) or activist protest can increase the transparency and comprehensive of the firm's conflict mineral disclosures. As we show in our paper, there are little understanding of the factors that can affect the level of environmental disclosure. Therefore, this paper aims to explore the role of the cooperation between companies and NGOs to enhance the transparency of environmental disclosures and the stakeholder's view of this cooperation. As a general note, our review on the prior studies about environmental accounting research could be limited in the content of Europe, the U.S, and Canada. Hence, we encourage future review on environmental accounting research in other countries such as China, South Africa, Asia 's market where it has significant environmental problems.

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List of Tables

Table 1. Annual A-List of Carbon Disclosure Project for the company leading on environmental performance in 2018

Country	Number of company
France	23
Germany	7
Spain	4
Switzerland	4
Finland	4
Netherlands	3
Poland	3
Italy	1
Sweden	1
Portugal	1

Table 2. List of papers in three strands of literature regard to environmental accounting research.

The value relevance of environmental disclosure	Bewley, K. 2005. The impact of financial reporting regulation on the market valuation of reported environmental liabilities: Preliminary evidence from U.S. and Canadian public companies. <i>Journal of International Financial Management and Accounting</i> 16 (1): 1–48.
	Cormier, D. and Magnan, M. (1997) Investors' assessment of implicit environmental liabilities, <i>Journal of Accounting, Auditing and Finance</i> , 16(2), pp. 215–241.
	Clarkson, P., Li, Y., Richardson, G., (2004). The market valuation of environmental capital expenditures by pulp and paper companies. <i>Acc. Rev.</i> 79 (2), 329–353.
	Clarkson, P., Fang, X., Li, Y., Richardson, G., (2013). The relevance of environmental disclosure: are such disclosures incrementally informative? <i>J. Acc. Public Policy</i> 32, 410–431.
	Diogenis Baboukardos, (2018). The valuation relevance of environmental performance revisited: The moderating role of environmental provisions. <i>The British Accounting Review</i> 50 (2018) 32-47.
	Li, Y. and McConomy, B. J. (1999) An empirical examination of factors affecting the timing of environmental accounting standard adoption and the impact on corporate valuation, <i>Journal of Accounting, Auditing & Finance</i> , 14(3), pp. 279–314.
	Matthew Wegener and Real Labelle, (2017). Value Relevance of Environmental Provisions Pre- and Post-IFRS. <i>Accounting Perspective</i> Vol. 16 No. 3 — PC vol. 16, no 3 (2017) pages 139–168.
	Plumlee, M., D. Brown, R. Hayes, and R. Marshall. (2015). Voluntary environmental disclosure quality and firm value: Further evidence. <i>Journal of Accounting and Public Policy</i> 34 (4): 336–61.
	Schneider, T., G. Michelon, and M. Maier. (2017). Environmental liabilities and diversity in practice under International Financial Reporting Standards. <i>Accounting, Auditing and Accountability Journal</i> 30 (2): 378–403.

Factors that effecting managerial decisions	Barth, M., McNichols, M., & Wilson, P. (1997). Factors influencing firms' disclosures about environmental liabilities. <i>Review of Accounting Studies</i> , 2, 35–64.
	Guzmán, B. A., and Monteiro, S. (2010). Determinants of Environmental Disclosure in the Annual Reports of Large Companies Operating in Portugal. <i>Corporate Social Responsibility and Environmental Management</i> , 17(4), 185–204.
	Cormier, D., and Magnan, M. (2007). The revisited contribution of environmental reporting to investors' valuation of a firm's earnings: An international perspective. <i>Ecological Economics</i> 62 (3–4): 613–626.
	Arabatzis, G., Zafeiriou, E., Partalidou, X., and Giannarakis, G. (2017). Determinants of Corporate Climate Change Disclosure for European Firms. <i>Corporate Social Responsibility and Environmental Management</i> , 25(3), 281-294.
	Frankel, R., McNichols, M., & Wilson, P. (1995). Discretionary disclosure and external financing. <i>The Accounting Review</i> , 70, 135–150.
	Li, Y., Richardson, G. D., & Thornton, D. (1997). Corporate disclosure of environmental information; theory and evidence. <i>Contemporary Accounting Research</i> , 14(3), 435–474.
	Patten, Dennis (1992). Intra-industry Environmental Disclosures in Response to the Alaskan Oil Spill: A Note on Legitimacy Theory. <i>Accounting, Organizations, and Society</i> , 17, 471–475.
The relationship between environmental disclosure and environmental performance	Al-Tuwaijri, S. A., Christensen, T. E., & Hughes, K. E. (2004). The relations among environmental disclosure, environmental performance, and economic performance: A simultaneous equations approach. <i>Accounting, Organizations and Society</i> , 29(5-6), 447–471.
	Bewley, K., & Li, Y. (2000). Disclosure of environmental information by Canadian manufacturing companies: A Voluntary Disclosure Perspective. <i>Advances in Environmental Accounting and Management</i> , 1, 201–226.
	Clarkson, P., Li, Y., Richardson, G., Vasvari, F., (2008). Revisiting the relation between environmental performance and environmental disclosure: an empirical analysis. <i>Acc. Organ. Soc.</i> 33, 303–327.
	Cormier, D., Ledoux, M., Magnan, M., (2011). The informational contribution of social and environmental disclosures for investors. <i>Manage. Decis.</i> 49 (8), 1276–1304.
	Cho, C., Patten, D., (2007). The role of environmental disclosures as tools of legitimacy: a research note. <i>Accounting, Organizations, and Society</i> , 32 (7/8), 639–647.
	Freedman, M., & Wasley, C. (1990). The association between environmental performance and environmental disclosure in annual reports and 10 Ks. <i>Advances in Public Interest Accounting</i> , 3, 183–193.
	Hughes, S. B., Anderson, A., & Golden, S. (2001). Corporate environmental disclosures: Are they useful in determining environmental performance? <i>Journal of Accounting and Public Policy</i> , 20, 217–240.
	Ingram, R. W., and Frazier, K. (1980). Environmental Performance and Corporate Disclosure. <i>Journal of Accounting Research</i> , 18(2), 614–622.
	Patten, D., (2002). The relation between environmental performance and environmental disclosure: a research note. <i>Acc. Organ. Soc.</i> 27, 763–773.
Wiseman, J. (1982). An evaluation of environmental disclosures made in corporate annual reports. <i>Accounting, Organizations and Society</i> , 7(1), 553–563.	

Table 3. List of papers in the first strand of literature regard to the value relevance of environmental disclosure and environmental provision.

Authors, year	Model used	Main parameters	Sample (size, nationality, source)	Main findings
Diogenis Baboukardos, 2018	They used a linear price-level model, based on the valuation framework of Ohlson's (1995)	Their main variables included book value of equity, earning per share, binary variable loss, the interaction term between earning per share and loss, environmental performance, environmental provision, the interaction term between environmental performance and environmental provision, dummy variable that controls for industry and year fixed effects.	Their sample included 692 firm-year observations of French listed firms. Thomson Reuters ASSET4 database	They find that the more firms recognized environmental provisions on the balance sheet, the more positive that investors assess the environmental performance of firms
Matthew et al. 2017	They use a modified model based on Ohlson's (1995) model.	These variables included the environmental provision, book value of equity, net income, loss, corporate social responsibility, the interaction between net income and loss, the interaction between environmental provision and corporate social responsibility, gas (control for industry differences).	Their final sample included 92 oil and gas firms and 103 mining firms. They use Canadian listed companies. Their data was collected from Compustat, SEDAR and company website.	Environmental provision is value – relevance under both Canadian/ U.S GAAP and IFRS accounting framework, but this result was supported only in the oil and gas industry, not for the mining industry.
Schneider et al. 2017	They employ a multi-variate probit model to test the diversity in practice. In order to test the value relevance of environmental provision, they use a modified model based on Ohlson's (1995) model.	These variables included environmental provision, Oil and Gas, US Ownership, Size, Z – score (adopt from the Altman Z – score model 1968 to estimate firm's expected credit risk), Leverage, Media Exposure, Volatility, Auditor.	Their sample included 87 Canadian listed companies from both oil, gas and mining industries. Their data was collected from Compustat, Center for Research in Securities Prices and Report on Business database.	There is material diversity in practice under IAS 37 in Canada. There is no incremental value – relevance of environmental provision under IAS 37 that compared to Canadian GAAP.
Plumlee et al. 2015	They employ a modified Ohlson (1995)	These variables included book value per share, abnormal earnings per	Their sample included 474 firms year from US-	They find that there was a relationship between voluntary

	<p>model.</p> <p>They also use regression model for expected future cash flows and the cost of equity capital</p>	<p>share. They also control for voluntary disclosure and environmental performance.</p>	<p>listed firms in five industries (oil & gas, chemical, food/beverage, pharmaceutical, and electric utilities) over a six-year period (2000–2005).</p> <p>They collect data from KLD Research and Analytics database and company website.</p>	<p>environmental disclosure quality and firm value.</p>
Clarkson et al. 2013	<p>They use a modified model based on Ohlson's (1995) model.</p>	<p>These variables included book value per share, abnormal earnings per share, environmental disclosure, management guidance.</p>	<p>Their sample included 117 public U.S. companies in 2003 and 119 public U.S. companies in 2006</p> <p>They collect data from Compustat, Center for Research in Securities Prices, EPA TRI and the First Call Company Guidelines database.</p>	<p>They find that there is no relationship between voluntary environmental disclosures and the cost of capital.</p>
Bewley, K. 2005	<p>They use a modified model based on Ohlson's (1995) model.</p>	<p>These variables included book value per share, abnormal earnings per share, environmental liability.</p>	<p>Their sample included 170 U.S. listed companies and 156 Canadian listed companies.</p> <p>They collect data from the Securities and Exchange Commission (SEC).</p>	<p>They document that the association between reported environmental liabilities and market value was changed in some cases by the regulation factor.</p>
Clarkson et al. 2004	<p>They use a modified model based on Ohlson's (1995) model.</p>	<p>These variables included book value per share, abnormal earnings per share, pollute.</p>	<p>Their final sample included 29 U.S. pulp and paper companies from the period 1989-2000.</p> <p>They collect data from Compact Disclosure USA, 10-Ks, TRI, BOD database.</p>	<p>They find that there is relationship between incremental economic benefits and environmental capital expenditure investment by low-polluting firms.</p> <p>They also document that environmental performance</p>

Table 4. List of papers in the second strand of literature regards to factors that affecting managerial decisions.

Authors, year	Model used	Main parameters	Sample (size, nationality, source)	Main findings
G. Arabatzis et al. 2017	They use the ordered logit regression model.	These variables include Climate Performance Leadership Index, Climate Change Policy, Government Ownership, Size, Profitability, Board size.	<p>Their sample includes 215 European firms in the year 2014.</p> <p>They collect data from European 500 index and the Climate Performance Leadership Index.</p>	They find that government ownership is a significant determinant of climate change disclosure.
Beatriz Aibar-Guzmán et al. 2010	They employ a content analyst technique and regression model.	These variables include firm size, industry membership , quotation on the stock market, profitability, foreign ownership and environmental certification	<p>Their sample includes 109 firms operating in Portugal between 2002 and 2004.</p> <p>They collect data from the Portuguese stock market (Euronext Lisboa), ISO 14001 and EMAS database.</p>	They find that there are a positive relationship between firm size and the extent of environmental disclosure.
Cormier et al. 2007	They employ stock market valuation model	These variables include market to book premium, equity, earnings, environmental reporting.	<p>Their sample includes listed firms from different industries and different countries (i.e France, Germany, Canada)</p> <p>Their France sample includes 237 firm-year observations and their Germany sample include 308 firm-year observations. They collect data from Datastream and annual report.</p> <p>Their Canada sample includes 580 firm-year observations and they collect data from the StockGuide.</p>	They find that the managerial decisions to disclose environmental information have a moderating effect on the stock market valuation of a German company's earning.
Bewley et al. 2010	They employ a regression model.	These variables include	Their sample includes the 188	They find that there are a

		Environmental Disclosure, Outsiders' Knowledge of Firms' Environmental Exposure, Pollution Propensity, Political Exposure, Auditor Quality, Financial Performance.	Canadian manufacturing firms They collect data from the Canadian Business and Current Affairs database, the Compact Disclosure Canada database, the National Pollutant Release Inventory database, firm's firm annual report.	relationship between the pollution propensity of the firm's industry, firm size and the disclosures of the financial environmental information They also find that public knowledge level of firms' environmental exposure, corporate pollution propensity, and firm size are material factors that can affect managerial decisions on general environmental disclosure.
Barth et al. 1997	They employ a multivariate regression model.	These variables include regulatory influence, management's information, capital market, control variables.	Their sample includes 257 U.S firms over the 1989 - 1993 period. They collect data from the annual report and 10-K disclosures.	They find that there are five factors that can affect the firm's disclosure decisions about environmental provisions under the accounting framework of the US GAAP and the Securities and Exchange Commission (SEC).

Table 5. List of papers in the third strand of literature regard to the relationship between environmental disclosure and environmental performance.

Authors, year	Model used	Main parameters	Sample (size, nationality, source)	Main findings
Clarkson et al. 2008	They employ a regression model to test their hypotheses	These variables include environmental performance, voluntary environmental disclosures, the Janis–Fadner coefficient, the amount of debt or equity capital, Tobin’s Q, stock price volatility, the total return on assets, leverage ratio, firm size, asset newness, capital intensity.	<p>Their sample includes 191 U.S firms from five most polluting industries.</p> <p>They collect data from the Global Reporting Initiative, TRI, Investor Responsibility Research Center, US Environment and Protection Agency, Factiva, Compustat, and Corporate Environmental Profile database.</p>	They find a positive relationship between the level of discretionary environmental disclosures and environmental performance.
Cho et al. 2007	They employ content analysis approach.	Their main variables are environmental performance and environmental disclosure.	<p>Their sample includes 100 U.S firms</p> <p>They collect data from KLD Research and Analytics, the SEC’s EDGAR database.</p>	Their finding support that firms use disclosure as a legitimizing tool.
Al-Tuwaijri et al. 2004	They employ a simultaneous equations models	Their main variables are environmental performance and environmental disclosure, economic performance, unexpected earnings, growth opportunities, public visibility, firm size, environmental concern, environmental exposure, predisclosure environment, profit margin.	<p>Their final sample includes 198 U.S firms.</p> <p>They collect data from the 1994 IRRC Environmental Profiles Directory, Compustat, the LexisNexis database.</p>	<p>They suggest that there is a positive relationship between environmental performance and economic performance.</p> <p>They also find that good environmental performance provides more environmental disclosures.</p>

Patten et al. 2002	They employ a regression model	These variables include environmental disclosure, environmental performance, firm size, industry, the level of toxic release.	Their sample includes 131 U.S firms from both sensitive and non-sensitive environmentally industries. They collect data from TRI, Compustat, the toxic release data from Environmental Protect Agency.	They find that there is a negative association between environmental performance and environmental disclosure.
Hughes et al. 2001	They employ content analysis method.	Their main variables are environmental performance and environmental disclosure.	Their sample includes 52 U.S manufacturing firms for 1992 and 1993. They collect data from the US Securities and Exchange Commission.	They find that divergent level of environmental performance provides divergent information regard to environmental disclosures. They also find that the poor environmental performer provides more information regard to environmental disclosures.
Wiseman et al.1982	He employs content analysis method.	The main variables are environmental performance and environmental disclosure.	His sample includes 26 U.S firms in environmentally sensitive industries. He collects data from the Council on Economic Priorities and the firm's annual report.	He finds that there is no relationship between environmental disclosure and environmental performance.

Table 6. List of papers regards to decommissioning provisions.

Authors, year	Model used	Main parameters	Sample (size, nationality, source)	Main findings
Mari Paananen, et al, 2018	Computerised text analysis to measure for the narrative part of the disclosures (quantitative) and how specific the narrative disclosures provided in the decommissioning provision note. General model and the logit model	These variables are visibility, provision scaled by total assets, Size, market to book ratio, change in revenue, ROA, DE, annual stock return, FreeFloat, BidAsk, StateOwn, number of analysts following the firm.	Their sample includes 453 firm – years observation All European firms in environmentally sensitive industries from 2005 to 2014 Measure visibility from Factiva, a public available databased provided by Dow Jones Reuters. Thomson Reuters Worldscope	Only 44% (45%) of their sample companies reveal information about discount rates (horizon) which was used to measure the provision. There are divergences in disclosure quality between Eastern and Western Europe. The more visible companies are, the more they disclose about discount rates and horizons.
Hafez Abdo et al, 2018	They use content analysis method to investigate each annual report. They employ semi – structured interviews that were ranged from 22 to 60 min between May and June 2016. They interview key stakeholders such as regulators, consultants, auditors, academics.		The sample included 68 Oil and gas companies from different countries and was listed on the London Stock Exchange The authors employ the latest annual reports that were published in the period 2014 and 2015 from the company's website.	They show several factors affect the firm's disclosure decision. These factors included proprietary costs, regulation requirement, lack of information demand and the complexities in the accounting processes. They document that there was a high level of compliance regard to disclosure requirements in the oil and gas industry. However, firms prefer to providing minimum disclosure.
Inder K. Khurana et al, 2001	The authors employ a cross-sectional valuation model	Book value of asset, book value of liabilities, unfunded nuclear decommissioning cost, regulatory environment, financial risk	Their sample included 95 firm-year observations of electric utilities with nuclear power plant over the period between 1995 and 1997 They collected data from Compustat, 10-K fillings from the Compact Disclosure database, the SEC's EDGAR database and the	The effects of unfunded decommissioning costs on share price are different from other liabilities of the company. Other liabilities are likely to have a larger incremental negative effect on the firm's market value than unfunded decommissioning costs. Financial risk and regulatory climate are two factors that may drive the investor pricing of unfunded decommissioning costs.

			National Automated Accounting Retrieval System	
Julia D'Souza et al, 2000	They employ a modified model based on Ohlson (1995) valuation framework	The market value of equity, the book value of assets, book value of regulatory assets, book value of liabilities, net income, decommissioning liability, unfunded decommissioning liability, future decommissioning cost	They use the annual reports and forms 10-K of 53 investor-owned utilities They collect data from Standard & Poor's Compustat database and Goldman Sachs.	They document a negative relation between decommissioning cost and firm value for companies with higher financial and business risk.

List of Abbreviations

CDP: Carbon Disclosure Project. CEP: Council on Economic Priorities.

CICA: Canadian Institute for Chartered Accountants.

CSR: Corporate Social Responsibility.

EU: European Union.

EPSAS: European Public Sector Accounting Standards.

EDF: Electricité de France.

FASB: Financial Accounting Standards Board.

FRAB: Financial Reporting Advisory Board.

GAAP: Generally Accepted Accounting Principles.

GRI: Global Reporting Initiative.

IAS: International Accounting Standards.

IASB: International Accounting Standards Board.

IEA: International Energy Agency.

IFRS: International Financial Reporting Standards.

IFRIC: International Financial Reporting Interpretations Committee.

KPI: Key Performance Indicator.

NGO: Non-Governmental Organization.

PVM: Present Value Measurement.

SEC: Securities and Exchange Commission.

TRI: Toxics Release Inventory.