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Explaining the variation in adoption rates of information content of environmental disclosure: an exploration of innovation adoption theory

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Abstract

Purpose: Corporate management decides what types of environmental information content to disclose. It is explored whether internal context—decision-makers' perception of characteristics of the information content—might predict the variation in adoption rates of different types of content, and whether innovation adoption theory might represent important factors of this decision-making process.

Design/methodology/approach: Actual adoption rates of 13 information content categories are computed using content analysis of annual reports for 62 listed companies. Each content category is seen as an innovation the company decides to adopt or not. Interviews with management in several companies illustrate the decision process of disclosure, and help predict adoption rates. Predicted and actual adoption rates are compared.

Findings: Adoption rates vary considerably among the 13 types of content. The absolute level of adoption rates is affected by company size and environmental risk. However, those content categories that have either relatively high or low adoption rates are consistent among the subsamples, regardless of these corporate characteristics. This consistent variation in adoption rates seems to be predicted well by innovation adoption theory and its focus on the five attributes of the information itself: compatibility, trialability, complexity, observability and relative advantage.

Research limitations/implications: The theoretical framework allows for different or changing internal and general contexts, and should be applicable to other settings, even though the particular predictions for adoption rates in this paper may not be applied as such.

Originality/value: The level of analysis is changed from the company level, which dominates previous research, to information content (individual content categories). Perceived attributes of the information content itself and innovation adoption theory are used for the first time to explain reason for the reporting practice, and are considered fruitful tools to predict consistent variations in adoption rates among different types of content. This approach provides new insight into the driving forces of supply of disclosure.

Keywords: Environmental disclosure, innovation adoption theory, adoption rate, information content, internal context, compatibility, trialability, complexity, observability, relative advantage

1. Introduction

Before the 1970s/80s, few companies in Western countries systematically disclosed environmental information in their annual reports. Currently, however, environmental reporting is common practice (Lessem, 1979; Fallan and Fallan, 2009). This development indicates that a reporting innovation has taken place.

Similarly, research on environmental reporting has developed during the same period. A voluminous body of literature addresses questions such as the extensiveness, quality, quantity and completeness of reporting, and regulation versus voluntarism (Adams, 2002:224). In addition to these issues, it appears obvious that the actual information content disclosed should matter to users and therefore to researchers. Adoption rates (the proportion of companies that disclose information) vary significantly among various kinds of environmental content (Tilt, 2008; Beck et al., 2010; Guidry and Patten, 2010). It is crucial for users and regulators to understand what kinds of information content are frequently and infrequently disclosed in corporate reporting, and why the adoption rates differ. If corporate reporting does not provide the needed information, knowledge of the reasons for this will help stakeholders and regulators take appropriate action to secure future supply. Alternatively, users will realise that expectations towards corporate environmental disclosure must be adjusted.

The motivation for the study of environmental information content comprises three factors. First, few papers analyse the different types of information content that companies actually disclose. Even fewer explain why adoption rates vary. The few existing studies relate adoption rates of individual content categories to variables such as country and industry (Roberts, 1991), industry and disclosure medium (Patten and Crampton, 2003), time (Ljungdahl, 1999), country and time (Beck et al., 2010), and several other corporate characteristics and general contextual factors (Brammer and Pavelin, 2008). This paper seeks to provide further evidence about which types of content are frequently and infrequently adopted, and why this happens.

Second, Adams (2002) states that while research has been primarily concerned with the impact of corporate characteristics (e.g., industry, size and profitability) or general contextual factors (e.g., country, legal requirements, media pressure, economic cycles, culture and time), these factors alone cannot fully explain corporate social responsibility (CSR) reporting practice. Adams (2002:246) adds internal contextual factors to the explanation model. Internal context is split into two components: internal processes, and views and attitudes of key corporate players concerning decisions of reporting. “Internal processes” consist of the composition of the board and committees, structure and corporate governance, involvement of stakeholders and consultants, etc. “Attitudes” includes attitudes towards perceived costs and benefits of reporting; views on reporting bad news, regulations and verification; and the impact of corporate culture on disclosure. These internal factors seem to be relevant for considering what types of information content are frequently and infrequently reported. This is

supported by other studies (Lee and Hutchison, 2005; McMurtrie, 2005). However, the model has some limitations:

The power of the various variables to influence the reporting also appears to differ across countries, industries and companies, and this model suffers from the same failings as the contingency models of management accounting in not being able to predict which will be the most important under different circumstances. (Adams, 2002:245–246)

This challenge should be addressed by research on internal factors. However, limited research has been done on internal processes and managerial attitudes. Adams (2002) could only identify two papers that analyse internal “processes” (Cowen et al., 1987; Campbell, 2000). Some more exists now. Said et al. (2009) discover that government ownership and (non-executive directors sitting on) audit committees affect CSR reporting, based on data from annual reports. Ljungdahl (1999) use interview data to explore the second part of the internal context: managers’ attitudes towards several external and internal explanatory factors. A study by O’Dwyer (2002) suggests that managers do not understand why their company discloses CSR information, at least as a tool of legitimation. However, none of these studies explain adoption rates of individual content categories. Adams (2002) calls for additional research into internal contextual factors. This paper addresses these challenges by changing the level of analysis from the company to the information content: The idea is that the attitudes of reporting companies’ decision-makers towards disclosing different kinds of environmental content are influenced by the attributes of the information content itself. The reasoning is simple and intuitive: In order to explain why you buy a specific car, researchers cannot only focus on your wealth and where you live (characteristics of the buyer) or economic cycles in your country (general contextual factors). It is fair to assume that your perceptions concerning the price of the car, the brand, the colour, safety and fuel efficiency (characteristics of the car) matter as well. It is argued in this paper that this applies to reported information content as well as cars.

Third, Adams (2002:245) points out that the common application of legitimacy theory, stakeholder theory and political economy is inadequate:

Prior work has clearly demonstrated that these theories can at best offer only a partial explanation for the nature of corporate social reporting. The theories have limited explanatory power and there is no conclusive evidence in support of any of them. ... this study does allow some tentative conclusions to be reached with regard to other internal contextual variables which have an influence on social reporting and which are worthy of further research.

This view also holds for the topic of this paper. These frequently used theories are not well-suited for predictions or explanations about adoption rates for a large variety of individual information content categories. Looking at each type of environmental content as an innovation provides a new theoretical perspective. Innovation adoption theory (Rogers, 2003) forms part of the widely used innovation theory. Even though this theory is used in financial-, management- and tax accounting research, its

adequacy has not been explored in relation to environmental disclosure. The theory extends the understanding of why adoption rates of information content vary by identifying important elements of the decision models of decision-makers. The theory explains disclosures based on management of reporting companies' attitudes towards different attributes of information content. One purpose of this paper is to explore whether innovation adoption theory may account for the variation in adoption rates for different content of environmental disclosure. The proposed framework is a flexible tool. It allows for integration of elements of other theories such as legitimacy and agency theory, and Adams' (2002) finding that explanatory variables influence each other. Its use in this paper is also partly context-based, so different settings might offer different predictions.

This study sets out to answer two main research questions: What are the adoption rates for different types of environmental information content? Why do these rates differ? The second question concerns reasons for the current reporting practice, and will be analysed using innovation adoption theory, and specifically perceived attributes of the innovation. The second research question is then answered by ranking the adoption rates of different information content categories. Such a study has not been conducted previously. The challenges described in connection with the three motivations for the paper above are addressed in the process of answering these two research questions.

In the following sections, innovation adoption theory is presented and methodological issues are addressed. These two sections are prerequisites for the subsequent prediction of the adoption rates, calculation of actual adoption rates and comparison of predicted and actual rates. Five attributes of information are used to consider the likelihood of adoption of 13 information content categories. Because this framework is new to CSR and environmental disclosure research, a thorough discussion is provided.

2. Innovation Adoption Theory

“Demand and supply of financial reporting should be seen as choice behaviour” (Walker, 1988:170). Adoption of environmental disclosure is one type of decision-making. To predict or explain disclosure, it is therefore necessary to study what aspects organisations consider in the decision process. Adams (2002) points out that the views and attitudes of the management of reporting companies—management's perception of advantages and disadvantages of reporting— influence decisions about CSR disclosure. For example, in buying or investment decisions, this assessment is likely to include price, economic and social benefits, difficulty of use, etc. These perceptions of costs and benefits are attributes of the reported information and the reporting process, but, strangely enough, are hardly addressed in CSR reporting research. To study this issue, a new theoretical framework is introduced: innovation adoption theory (Rogers, 2003).

Innovation adoption theory and diffusion theory are parts of the widely used innovation theory. Rogers's *Diffusion of Innovations*² has been the second most cited book in the social sciences (Singhal, 2005). "No other field of behaviour science research represents more effort by more scholars in more disciplines in more nations" (Rogers, 2003:xviii). Rogers (2003) estimated that there have been thousands of innovation theory studies. Some of the disciplines in which innovation theory is used are closely related to environmental reporting: management accounting (Olsen, 2012), tax planning (Fallan et al., 1995) and financial and tax accounting (Copeland and Shank, 1971; Comiskey and Groves, 1972; Hussein, 1981; Bao and Bao, 1989). Nevertheless, the theory is hardly ever used to explain environmental disclosure. Fallan (2007 and 2013b) and Fallan and Fallan (2007) have made some initial explorations. This is among the first studies to systematically use innovation adoption theory to predict or explain adoption of environmental disclosure.

"An innovation is an idea, practice, or object that is perceived as new by an individual or other unit of adoption" (Rogers, 2003:12). The idea does not have to be objectively new; it is sufficient for it to seem new to the individual. Newness in an innovation may be expressed in terms of knowledge, persuasion, or decision to adopt. A person or an organisation may have known about an innovation for some time without having developed either a favourable or unfavourable attitude towards it or having decided to adopt or reject it (Rogers, 2003). Significant changes in the context in which it is used might make also affect perceived newness. Shephard (1967:470) emphasises that, "When an organisation learns to do something it did not know how to do before, and then proceeds to do it in a sustained way, a process of innovation has occurred" (or correspondingly if it stops doing something it did do).

Accounting changes can be perceived as innovations (Shank and Copeland, 1973; Hicks Jr., 1978; Harrison and McKinnon, 1986). Similarly, environmental disclosure and each type of information content individually fulfil these requirements (Fallan and Fallan, 2009; Ljungdahl, 1999). The content types can be seen as innovations of reporting, each having specific characteristics that may explain how easily they are adopted, *ceteris paribus*.

Some strong generalities have emerged from a large number of studies of innovations (Rogers, 2003). The adopter's perception of five identified attributes of an innovation affects the rate of adoption. For example, research on adoption has shown that, *ceteris paribus*, the higher the perceived relative advantage of an innovation, the more likely it is that the innovation will be adopted and the more quickly this will happen. The identified attributes are perceived compatibility (+), complexity (-), trialability (+), observability (+) and relative advantage (+) (signs in parentheses indicate the direction of the relations) (Rogers, 2003). Rogers (1962) identified 39 characteristics in previous research, which are subsumed in these five general attributes. According to Rogers (2003:223), the

² The book addresses both diffusion and adoption of innovations. Diffusion is the cumulative effect of individual adoption decisions (Rogers, 1983).

five attributes are somewhat empirically interrelated, but conceptually distinct. The objective was generality and succinctness: to find comprehensive characteristics that are as mutually exclusive and universally relevant as possible. Several studies will be used below to clarify the content of these constructs, including a validated measure instrument (Moore and Benbasat, 1991) and a meta-study based on 105 studies (Tornatzky and Klein, 1982). Rogers (2003) states that the five attributes explain 49–87% of the variance in the rate of adoption of innovations. Rothman (1974:419) “essentially confirms the validity and utility of Rogers’s original formulations”. Still, Rogers (2003) emphasises that not all (types of) innovations are equivalent in this respect.

Innovation adoption theory considers management’s *perception* of the five attributes, not objective measures. Rogers quote psychological research: “If men perceive situations as real, they are real in their consequences” (Rogers, 2003:219). This corresponds to Adams’ (2002) focus on the views and attitudes of managers.

In this paper, Rogers’s five attributes of innovations are used to analyse the adoption rates of different information content categories:

Information content category ↔ Perceived attributes of information content → Likelihood of adoption

3. Research Method

The first research question requires identification of actual rates of adoption for different types of environmental information content. This is achieved through content analysis of annual reports.

The second research question concerns the reason for variation in adoption rates and whether innovation adoption theory is a fruitful framework for predicting/explaining adoption rates. This is addressed by comparing predicted and actual rates for corresponding types of content. Predictions are made by theorisation of Rogers’s five attributes of innovations on different types of environmental information content. The prediction process (the implications of the adoption theory) is assisted and improved by interviews with managers of reporting companies, previous research on environmental disclosure and other theories.

The two sources of data collected—interviews (used to assist prediction of adoption rates) and content analysis of annual reports (used to identify actual adoption rates)—are not integrated, and will be described separately below.

3.1 Interviews

Semi-structured interviews with chief accounting and/or environmental officers (CAO) from companies listed on the Oslo Stock Exchange (OSE) were conducted in the autumn of 2011. An interview guide was developed, based primarily on the innovation adoption theory framework. The CAOs clarify the process of deciding the disclosure of environmental information content in annual reports, and reveal perceptions of attributes of information content. Companies are selected from

different industries—according to their Global Industry Classification Standard (GICS) classification—to allow answers to be influenced by heterogeneity of operations, products and environmental impacts. The interviews were recorded and transcribed. Quotes are translated to English by the author.

Table 1: *Interviews with managers*

Company	GICS sector	No. of people interviewed	Length in minutes
C1	Consumer staples	1	87
C2	Consumer staples	1	44
C3	Energy	2	58
C4	Industry	2	174
C5	Financials	1	84
SUM		7	447

3.2 Content Analysis of Annual Reports

3.2.1 Sample

Cross-sectional data for environmental disclosure were collected from annual reports for 2008. At the end of 2008, there were 203 Norwegian companies and equity certificates (hereafter companies) listed on OSE. The total sample consists of 62 companies.

A main finding in the literature is that disclosure on an aggregate level is positively related to the corporate characteristics' environmental risk/industry and company size (Fifka, 2013). This finding means that the adoption rates of large or high environmental risk companies will be higher on average than those of other companies. To explore whether attributes of information content affect adoption rates, it is necessary to control for size and environmental risk. Two pairs of subsamples are based on environmental risk and size, respectively. The first pair separates the 17 listed companies classified by the Climate and Pollution Agency (KLIF) as having the highest environmental risk, and 45 companies selected from two GICS sectors assumed to have minor environmental risk, namely finance (including equity certificates) and information technology. The last pair consists of the 31 largest and 31 smallest companies in the sample, as measured by number of employees³ reported in the annual report.

³ Company size is usually measured with data for market value, number of employees, sales/turnover or total assets (e.g., Ljungdahl, 1999). The two accounting measures are not considered because both financial institutions and other companies are included in the sample. The results of the study were not significantly affected by the choice of employees or market value as proxy.

Norwegian data are used partly because of similarity to other Western countries and partly because environmental reporting regulations have existed since 1989. The latter would imply a possibility of internalisation, and illustrates management's discretion in decisions regarding disclosure. Some types of content are mandatory (Table 2). Still, the decisions regarding whether, how much, what type and in what form environmental information is disclosed fall almost entirely to the company (Fallan and Fallan, 2009), or at least company management seems to have this perception. A reason is that disclosure of most types of information content is voluntary. Existing regulations are minimum requirements, so excess information on these types of content can be perceived as predominantly voluntary as well. Additionally, there has never been direct enforcement of the regulation by the government. The same seems to apply for auditors (Melting and Tungen, 2012). The enforcement of environmental disclosure regulations differs from that of the financial statements. A relatively large proportion of companies in Norway does not comply with regulations of environmental and other CSR disclosure (Fallan and Fallan, 2009; Melting and Tungen, 2012), a result that is similarly found in many countries (Larrinaga et al., 2002; Day and Woodward, 2004).

3.2.2 Selected data source

The annual report is selected as the only data source for this study. It has a genuine status and is a clearly defined document. If reporting is measured by volume of disclosure, separate reports and/or websites should be included as well (Unerman, 2000; De Villiers and Van Staden, 2011). However, the focus of this paper is information content. Then, the annual report is representative of total disclosure (Tilt, 2008; Fallan, 2013c).

3.2.3 Operationalising environmental information content

Information content is classified in predefined content categories. Hence, content analysis is used to identify, separate and describe environmental information content. The categorisation of disclosures is based on two main principles. All possible and relevant types of environmental content are included in one of the categories, and each type of information is included in only one category.

What kind of information content is sought? First, the categorisation should be sufficiently detailed to indicate the (non-)existence of useful financial and non-financial information—according to resource allocation and stewardship objectives of financial accounting (Gjesdal, 1981), in combination with externalities—thereby reflecting the broader boundaries of environmental disclosure. Second, the categorisation should be sufficiently aggregated to suit the differing characteristics of various industries or environmental risks and impacts. While balancing this non-trivial trade-off, Ljungdahl (1999) developed a list of important information content categories based on the comprehensive identification work of UNCTC (1991). Third, the categorisation must separate mandatory and voluntary disclosure. The current categorisation is similar to Fallan and Fallan

(2009)—an adaptation of Ljungdahl (1999), primarily to fit regulations in the Norwegian Accounting Act. The 13 information content categories are listed in Table 2 and further described in Appendix A and Fallan and Fallan (2009). This categorisation is used in many studies and is shown to be adequate for measuring the content of the environmental disclosure practice (Fallan, 2013b; 2013bc; Fallan and Fallan, 2009; Hofsmo and Johansen, 2012; Stellander and Jørgensen, 2010).

Measurement and collection of data are closely connected. Assigning heterogeneous types of information content to 13 categories is demanding, and could result in occasional ambiguity. Several measures are taken to improve different types of reliability. Completeness of identification of relevant disclosures is addressed by reading annual reports carefully and performing electronic searches for key words. The category variables are dichotomous to improve consistency of coding. If the environmental disclosure includes information that belongs to a specific category, the value 1 is assigned (and zero otherwise). Both coding- and category definition reliability are enhanced by applying a thoroughly tested categorisation with existing category descriptions and examples of disclosures for each category (Ljungdahl, 1999; Fallan, 2007). The classification guidance was updated when difficult cases appeared. Data collection was performed by two master students in accounting (Stellander and Jørgensen, 2010). These coders were trained by the author, who has extensive experience on content analysis. Inter-coder reliability (Milne and Adler, 1999) is of limited relevance because the coders registered the data jointly, twice for each company. The approach also reduces the risk that coding changes over time.

On a company level, the content variable will reveal whether a content category is adopted. On a sample level, adoption rates reveal the proportion of companies that have disclosed information belonging in each content category. Adoption is measured as actual implementation, not the decision of whether to adopt. Analysis of the primary data source (annual reports) also avoids challenges of self-reporting bias (e.g., questionnaire surveys) (Adams et al., 1999).

Table 2: Environmental information content categories

No.:	Category:	Regulation:
1	Environmental policy	Voluntary
2	Environmental objectives	Voluntary
3	Environmental impact – process	Mandatory
4	Environmental impact – product	Mandatory
5	Environmental organization	Voluntary

6	Environmental auditing	Voluntary
7	Environmental authorities	Voluntary
8	Environmental events	Voluntary
9	Environmental investments	Voluntary
10	Environmental costs/-revenues	Voluntary
11	Environmental liabilities	Voluntary
12	Definition of environmental concepts/accounting principles	Voluntary
13	No environmental impact	Mandatory

Source: Fallan and Fallan (2009) and Appendix A

4. Prediction of Adoption Rates of Environmental Content Categories

The supply of corporate environmental reporting is affected by both supply- and demand-side factors. This study focuses on the supply side by exploring the decision-making process of the reporting company, and especially the perceived attributes of the potentially disclosed information content. However, this includes decision-makers' perception of demand issues as well. Predictions should ideally be made for one innovation in one organisation at one point in time. Regardless of individual variations, the law-like generalisations of Rogers (2003) strongly indicate that decision-makers on average share some common attitudes towards important features of environmental disclosure. The predictions below are not based on a survey measuring the attitudes of decision-makers. Instead, (probable) common attitudes are established by innovation adoption theory, interviews, previous research and other theories. In fact, while there are not clear two-way influences between explanatory variables, and dominant theories can only partly explain reporting practice (Adams, 2002), the current framework uses other theories and previous research to clarify understanding of relations and improve predictions.

The 13 content categories (the innovations of this study) are evaluated by exploring dimensions of Rogers' five attributes—perceived compatibility, trialability, complexity, observability and relative advantage—to identify whether some categories are more easily adopted than others. Both absolute and relative differences among the 13 types of content might lead to variation in adoption rates. Some issues promote adoption of some information content categories and hamper adoption of others (absolute differences), while other factors affect the adoption of content categories in the same direction, but to different degrees (relative differences). The discussion in connection with each attribute will concentrate mostly on important factors perceived to make adoption rates differ among information content categories.

In Norway, both corporate management and boards of directors make environmental disclosure decisions on behalf of the company. They are referred to as “the adopters”.

An objective of this paper is to explore how innovation adoption theory can be used to predict or explain adoption rates of individual environmental content categories. In connection with each of Rogers’ five attributes (and additional subattributes), a detailed illustration of how this could be done for potentially influential factors is provided.

The predictions made under each attribute below are summarised in Table 3.

4.1 Compatibility

Compatibility is the degree to which an innovation is perceived to be consistent with existing values, norms, beliefs, past experiences, ideas and needs of potential adopters, or congruence with their existing practices (Rogers, 2003; Tornatzky and Klein, 1982). Compatibility will decrease the risk for a potential adopter. An idea that is perceived as fully compatible with the values and norms of a social system (e.g., society) has a higher probability of being adopted than ideas that are incompatible.

Compatibility is closely related to legitimacy theory, the most used theory to explain environmental reporting:

“Legitimacy is a generalised perception or assumption that the actions of an entity are desirable, proper, or appropriate within some socially constructed systems of norms, values, beliefs, and definitions” (Suchman, 1995:574).

Aldrich and Ruef (2006:186) divide legitimacy into cognitive and socio-political legitimacy. Cognitive legitimacy refers to the degree of acceptance in a social network, where the highest form would mean that something is so familiar or common to expect or use that it is taken for granted. Socio-political legitimacy refers to acceptance of something by key stakeholders as appropriate and right. It consists of two components. Moral legitimacy involves “conformity with cultural norms and values” (assessments of right and wrong), and regulatory legitimacy concerns “conformity with governmental rules and regulations”.

Legitimacy helps predict reporting because it is intertwined with the strategies facilitating it (Aldrich and Ruef, 2006). Environmental disclosure is both an innovation that intrinsically might be compatible with society’s values and a strategic tool companies use to secure compatibility. The validated measure of Moore and Benbasat (1991) identifies the degree of “voluntariness of use” as an important aspect to consider in this respect. Hence, the perception of where on the mandatory-voluntary continuum each environmental content category is placed guides the prediction of its adoption rate. The continuum position is affected by adopters’ perception of regulations and expectations, based on regulatory, moral and cognitive legitimacy considerations. The predictions are developed by discussing reporting regulations (laws, standards and stock exchange requirements), environmental regulations and perceptions of demand.

Dimensions of compatibility are explored in order to make predictions about adoption rates of environmental content categories. Regulatory, moral and cognitive legitimacy affect how adopters perceive content categories to be positioned on a mandatory-voluntary continuum.

Regulatory compatibility

Compliance with formal reporting requirements provides regulatory legitimacy. Companies listed on OSE have to publish an annual statement on corporate governance, and distribution of environmental responsibility should be a natural part of this statement. The requirement is also enforced to some extent. Adoption of content category (5) “Organisation” is likely to be supported by regulatory compatibility.

The Norwegian Accounting Act requires disclosure of categories (3) “Impact–process” and (4) “Impact–product”. The act represents framework legislation and further clarifications are left for accounting standards. According to Norwegian Accounting Standard 16 Director’s Report (NRS 16), companies that fulfil certain requirements in the antipollution law are allowed to report category (13) “No impact” instead of categories (3) or (4). These three categories elaborate the minimum mandatory requirements. Additionally, the generally accepted accounting principles of NRS 16 strongly recommend disclosure of categories (1) “Policy”, (2) “Objectives”, (7) “Authorities”, and (8) “Events”. The Ministry of Finance has stated that companies are supposed to report in compliance with NRS 16 (Den norske revisorforening, 2007). Adoption of these categories is probably enhanced by high perceived regulatory compatibility.

However, the perceived real regulatory compatibility threat might reflect other factors as well. For example, the authorities do not enforce the reporting requirements. Empirical findings suggest that the same applies for auditors (Melting and Tungen, 2012). Non-compliance has no direct formal consequences. Another example is that the interviews with CAOs of large, listed companies indicate varying knowledge of the requirements of the Accounting Act, and general unfamiliarity with NRS 16. “What did you call it [NRS 16]? ... I do not know about it [NRS 16]. ... I know the requirements of the Accounting Act. I have read them several times” (CAO, company C4). The CAO of company C1 is clearly misinformed:

I do not know about specific requirements [in the Accounting Act and NSR 16], only that we have to say something about [the environment] in the annual report. But I am not familiar with more specific requirements. I think that this is something to be solved.

While others close to the disclosure decisions in these companies might know the regulations, it is not a topic that is explicitly discussed with all the CAOs. Both these examples illustrate that in reality, companies might perceive themselves as having some degree of discretion to make decisions whether to disclose, even for content made formally mandatory by laws and standards. This is also substantiated by the fact that a significant proportion of companies fail to comply with the regulations

(Fallan and Fallan, 2009; Melting and Tungen, 2012; Vormedal and Ruud, 2009). It might reduce the adoption effect of regulatory compatibility somewhat, especially concerning NRS 16.

Moral compatibility

Norms and values in society usually favour protecting the environment, as vouched for by authorities' regulations. Reporting regulations reveal which information content is deemed most important to society. It seems intuitively reasonable that knowledge about environmental impact, events, efforts, discharge permits, specified goals of improvement and goal achievement concerning operations and products—examples of regulated information content—should be in line with the values of society. Regardless of whether companies feel bound by requirements in laws and standards, they are likely to disclose this information because it is perceived to be the right thing to do. Listed companies are subject to particular expectations of transparency combined with relatively high public interest. To be in breach with these expectations might challenge moral legitimacy. Therefore, adoption of the above listed categories is also promoted by perceived moral compatibility.

Environmental regulations might also affect decision-makers' attitudes towards reporting in a legitimacy perspective. The antipollution law (and others) means that continued operations of polluting companies depend on obtaining and complying with pollution licences, which are issued by environmental authorities such as KLIF. Information about the terms of and (non-)compliance with these licences [categories (7) "Authorities" and (8) "Events"] is vital for compatibility with the norms and values of society. Environmental regulations do not require public corporate environmental disclosure, but the importance of pollution licences makes moral acceptance of company behaviour conditional on disclosure of such information. It is the right thing to do. Disclosure is a corporate information strategy to ensure compatibility (Suchman, 1995; Aldrich and Ruef, 2006). Perceived moral compatibility with the values of society enhances adoption of the mentioned categories.

Cognitive compatibility

In business, CSR might require a new way of thinking, or "adoption of a new value system, which is a relatively slow process" (Rogers, 2003). Environmental reporting has become common among large and listed companies (Fallan and Fallan, 2009). While stakeholders perhaps not take provision of such information for granted yet, expectations in Norway are moving in that direction. Stakeholders want companies to provide environmental disclosure, and it seems like the current reporting practice is generally accepted, despite major weaknesses (Fallan, 2013a). This opinion is strengthened by the fact that the authorities do not enforce reporting regulations, even though they are not met (Fallan and Fallan, 2009; Melting and Tungen, 2012; Vormedal and Ruud, 2009). On the other hand, it is difficult to identify a common demand for specific information content categories (Fallan, 2013a). A different reporting practice would probably receive at least the same acceptance in society. As long as something is disclosed, the current expectations are fulfilled. For general purposes, it is not possible to

claim that particular content categories are associated with higher cognitive compatibility than others, even though this might be in a process of change.

Predictions based on compatibility

Perceived high regulatory, moral and/or cognitive compatibility indicate that adoption of categories (1) “Policy”, (2) “Objectives”, (3) “Impact – process”, (4) “Impact – product”, (5) “Organisation”, (7) “Authorities”, (8) “Events” and (13) “No impact” is enhanced.

4.2 Trialability

Information categories may be classified on the difficult–easy continuum of trialability, which is the degree to which an innovation may be experimented with on a limited basis (Rogers, 2003).

Innovations that can easily be tried on the instalment plan are generally adopted more rapidly than those that are harder to experiment with. Perceived trialability is positively related to adoption of innovations (Rogers, 2003).

The predictions of trialability adoption rates are based on discussion of different aspects of the construct: divisibility (Rogers, 2003; Tornatzky and Klein, 1982), time and effort requirements (Moore and Benbasat, 1991; Browning and Sørnes, 2008), the psychological trial (Rogers, 1983; 2003) and accessibility (Rothman, 1974).

Dimensions of trialability are explored in order to make predictions about adoption rates of environmental content categories.

Divisibility

Rogers (2003) links trialability to divisibility, which is “the extent to which an innovation can be tried on a small scale prior to adoption” (Tornatzky and Klein, 1982:37). “Accounting innovations are often quite divisible in this sense” (Copeland and Shank, 1971:198), which is illustrated by the present division of environmental disclosure into 13 content categories. Most of the 13 categories might be perceived as easy to subdivide into even smaller units because examples or project/department aggregates are alternatives to complete disclosure. However, the degree of divisibility might vary among categories. Objectives (category 2 “Objectives”) and discharge permits (category 7 “Authorities”) are mainly set and evaluated on the basis of some level of aggregation (e.g., project, department, organisation or time), rather than on single transactions. This leads to less divisibility and makes adoption of these categories less likely than others, even if management chooses to look at one of several objectives or discharge permits.

Other aspects of trialability

Regardless of whether something new is easy to do or learn (which regards the attribute “complexity”), experimentation might require time, effort and other resources. Moore and Benbasat

(1991) and Browning and Sørnes (2008) indicate that these are central aspects of perceived trialability. Company C2 retrieves information to obtain reliable, specific, environmental data regarding its food products and operations, which concern aggregated figures and single batches. Units in an organisation and companies upstream in the supply chain register information in a self-developed online database. Technically, it is easy to obtain most of the data, but it requires a system to record, organise and/or estimate the information. Similarly, environmental reporting of external effects and company-specific monetary/economic information relates to data that are gathered in accounting systems, recognised, classified, measured, calculated or estimated, recorded, verified and then disclosed (Schaltegger and Burrit, 2000:272). All these processes require planning/organisation, and time and effort, which reduces opportunities (or the ease) to experiment with such information content, and hence the perceived trialability. The data are specific for each company and period, and—unlike general policy statements—it is difficult to imitate the reporting of others without committing to environmental programmes (Hasseldine et al., 2005). This also decreases the effect of the “psychological trial” (Rogers, 1983:231)—the degree to which perceived need for a company’s own trial of the innovation is reduced by other organisations’ “vicarious trial” (Rogers, 2003:258).

The relative lack of trialability of specific information hinders adoption of monetary/economic content in categories (6) “Auditing”, (9) “Investments”, (10) “Costs/revenues”, (11) “Liabilities” and (12) “Definition of concepts and accounting principles”; other quantitative content in categories (2) “Objectives”, (3) “Impact–process”, (4) “Impact–product”, (7) “Authorities” and (8) “Events”; and narrative environmental content additionally applicable to category (5) “Organisation”. Categories (6) and (12) have particularly low trialability: (6) cannot be tried before the information content to be audited is tried, while the effect of (12) can only be evaluated by subsequent trial of other content categories. On the other hand, disclosure of general rhetoric, opinions, policies or other non-specific information is based on little or easily accessible data (e.g., companies’ own decisions on environmental policy and distribution of responsibility). Then, experimentation requires less planning, time and effort. Additionally, it is easily copied from other companies, thereby making vicarious trial sufficient. The latter argument is also related to the opportunity to get help from others (Moore and Benbasat, 1991). The resulting high-perceived trialability promotes the adoption of categories such as (1) “Policy”, (5) “Organisation” and (13) “No impact”.

Moore and Benbasat (1991) also identify items such as opportunity, availability, ability and knowledge of areas to try the innovation. Accessibility will affect availability of an innovation for trial (Rothman, 1974). Accessibility might be affected by the frequency and regularity of events. Serious environmental incidents are rare, which hampers adoption of category (8) “Events”. On the other hand, accessibility is enhanced in some companies because information content exists as a by-product of private reporting necessary to comply with requirements in discharge permits, etc. Such existing systems make it easier to experiment with disclosure in categories (3) to (8).

Predictions based on trialability

All in all, perceived high trialability promotes adoption of categories (1) “Policy”, (5) “Organisation” and (13) “No impact”. While the trialability of categories (3) “Impact – process” and (4) “Impact – product” are not decided, low trialability hinders adoption of the remaining categories.

4.3 Complexity

Complexity is the degree to which the adopter perceives an innovation to be relatively difficult to understand and use for the adopting unit (Rogers, 2003), or “comprehend, implement and use” (Browning and Sørnes, 2008:53; Tornatzky and Klein, 1982). For reporting innovations, the complexity attribute regards both the reporting process (implementation) and the adopters’ own use of the reporting information. Complexity considerations concerning the adopter’s use of information are similar to other stakeholders’ use, and are discussed in connection with the attribute “relative advantage”.

According to Rogers (2003:257), “any new idea may be classified on the complexity–simplicity continuum”. Some innovations are clear in their meaning to the adopter, while others are not. Rothman (1974) illustrates this aspect with the notion of diffusibility. The validated measure of Moore and Benbasat (1991) illustrates that, compared with trialability, the focus is on mental rather than physical effort. The perceived complexity of an innovation is negatively related to adoption.

Dimensions of complexity are explored in order to make predictions about adoption rates of environmental content categories.

Implementation

The validated measure of Moore and Benbasat (1991) identifies elements of the complexity construct: requires mental effort, interaction with the innovation is clear and understandable, easy to learn to operate, believed easy or cumbersome to use overall, often frustrating to use, etc. Complexity focuses on how technically difficult the reporting is. While some stages of the reporting process—as described by Schaltegger and Burrit (2000) above—might be complex in financial accounting, several features make it significantly more difficult in environmental disclosure. It is hard to define the content of concepts like environmental costs, investments and liabilities, both in theory and practice. Is it an environmental investment if a machine improves environmental performance and has a positive net present value of cash flows (irrespective of environmental issues)? The Norwegian Accounting Standards Board gave up developing an accounting standard for economic environmental disclosure because of such difficulties. Ljungdahl (1999) discusses these issues. While financial accounting concentrates on the company, consideration of external effects is naturally embedded in the basis of environmental disclosure. These broader boundaries open up a new world of definition and estimation challenges. The measurement unit of financial accounting is money, whereas for the natural

environment, there are many, hard-to-compare, relevant parameters. All these factors make it even harder to determine adequate detailing and aggregation levels. The CAO in company C3 illustrates estimation challenges: “To calculate economic consequences of environmental impacts is a demanding task. So far, I think no one has succeeded in developing a practical way to provide such information outside the academic research community”.

In addition to different boundary setting issues, complexity is affected by the immaturity of this reporting craft, as compared to financial accounting, for instance. There is less research, standards and other guidance, education and experts, software, etc. to assist such reporting. The NRS 16 states: “Reporting on environmental conditions are still in a phase of development and companies are requested to develop new methods to arrange such information.” The CAO of company C5 illustrates how the high complexity of quantitative environmental information hampers adoption: “When no one asks for it, and there are no mandatory requirements, we have to make an assessment. Providing such information is so demanding that we do not give priority to it just now”.

The difficulty of preparing disclosures varies among different types of information content, because the information needed is not the same. The relatively low perceived complexity of implementation of content categories linked to general, narrative information, will promote adoption of categories (1) “Policy”, (5) “Organisation” and (13) “No impact”. Adoption of categories associated with monetary, other quantitative and non-quantitative specific environmental information content (the 10 remaining categories) is hampered by relatively high perceived complexity. It should be emphasised that clarification and control concerning the described challenges is the objective of categories (12) “Definition of concepts and accounting principles” and (6) “Auditing”, respectively, which make these categories particularly complex.

Like trialability, the existence of information as a by-product of other information sources might lead to a perceived lower complexity for categories (3) “Impact–process”, (4) “Impact–product”, (5) “Organisation”, (6) “Auditing”, (7) “Authorities” and (8) “Events”, even though the boundary setting might differ and mental challenges remain significant.

Predictions based on complexity

Perceived low complexity supports adoption of categories (1) “Policy”, (5) “Organisation” and (13) “No impact”, and high complexity hampers adoption of categories (2) “Objectives”, (6) “Auditing”, (9) “Investments”, (10) “Costs/revenues”, (11) “Liabilities” and (12) “Definition of concepts and accounting principles”. The other categories are undecided.

4.4 Observability

Observability is the degree to which the results of an innovation are visible to others (Rogers, 2003). Tornatzky and Klein (1982:36) find that the concept is “very similar” to communicativeness—the

degree to which aspects of an innovation may be conveyed to others. According to the validated measure of Moore and Benbasat (1991:210), “Observability as originally defined by Rogers seemed to be tapping two distinctly different constructs, Result Demonstrability and Visibility”. These two aspects are used below to derive predictions for adoption rates for each of the 13 environmental content categories. Perceived observability, both result demonstrability and visibility, is positively related to rates of adoption.

Result demonstrability

Result demonstrability regards “the tangibility of the results of using an innovation” (Moore and Benbasat, 1991:203). Adoption is enhanced if the advantages of using an innovation are visible (easily observed, communicated or measured), and hindered if benefits or consequences of use are not apparent or are difficult to explain.

The accounting act and NRS 16 require disclosure of content categories (3) “Impact–process”, (4) “Impact–product” and (13) “No impact” in the board of directors’ report. Board members must sign the document and are formally accountable for fulfilling the regulation. The forced selection perspective (Abrahamson, 1991; Olsen, 2012) affects their actions. It is easy to communicate that reporting is a legal requirement, which will support the adoption of these categories. However, this perceived result demonstrability is probably reduced by the apparent lack of enforcement and consequences of non-compliance.

Some industries experience a close relation among environmental and economic and operational risks, e.g., the food industry of company C1 and C2. Additionally, compliance with discharge permits is vital for companies’ continued operations. Then, the value of environmental disclosure is more easily explained to primary stakeholders. Relatively high-perceived result demonstrability increases the adoption of content categories (7) “Authorities” and (8) “Events”.

According to quality-signalling theory, characteristics of reporting signal companies’ environmental commitment and performance, and ultimately environmental reputation (Hasseldine et al., 2005). Without actual commitment to environmental programmes, it is harder to disclose company- and period-specific information than general rhetoric that can be copied from others (Toms, 2002). Brammer and Pavelin (2008) state that high-quality disclosure—externally verified, quantitative and company-specific information—is more costly than low-quality information such as general narratives. Specific, high-quality and relatively costly disclosures are perceived as more credible signals of real commitment, and enhance result demonstrability of the effects of environmental disclosure (e.g., legitimacy or green competitive advantages). This supports adoption of categories (2) “Objectives”, (3) “Impact–process”, (4) “Impact–product”, (6) “Auditing”, (7) “Authorities”, (8) “Events”, (9) “Investments”, (10) “Costs/revenues”, (11) “Liabilities” and (12) “Definition of concepts and accounting principles”, and hampers adoption of category (1) “Policy”.

Environmental certification of the organisation, (e)co-labelling of products and participation in environmental programmes (e.g., UN Global Compact) are other ways to signal environmental accountability and performance. Even if stakeholders are unfamiliar with the company, they know the meaning of these symbols and labels. The CAO of company C4 emphasises this:

In what way should you communicate and prove that the company takes environmental protection responsibility? It is useless only to state that you are responsible, and therefore we have to find a system. And here these certification affairs emerged. That is our intention.

To improve reputation, these efforts must be known. Reporting is a tool to increase knowledge. Association with familiar environmental certifications, labels and programmes eases result demonstrability and promotes adoption of content categories (1) “Policy”, (4) “Impact–product” and (5) “Organisation”.

Visibility

The visibility of the idea of the innovation, as opposed to its results, is also relevant (Moore and Benbasat, 1991). It is based on research on human behaviour: “When objects are presented to the individual on repeated occasions, the mere exposure is capable of making the individual's attitude toward these objects more positive” (Zajonc and Markus, 1982:125).

The adopter is more likely to favour disclosure of environmental content that (s)he has seen/been exposed to frequently than content that is unfamiliar. A consequence is that adoption of the most common corporate environmental reporting practices is enhanced. The resulting isomorphism is similar to institutional theory and imitation of perceived successful company practices (DiMaggio and Powell, 1983). It also means that companies disclose the same information as in previous years—imitating themselves—because this is the information most visible and familiar to them.

A voluminous body of literature suggests that environmental reporting practice has certain dominant characteristics. First, disclosure contains mainly positive or neutral information, while negative information is relatively rarely disclosed (Niskanen and Nieminen, 2001; Patten and Crampton, 2003; Frost, 2007; Islam and Deegan, 2010). Even mandatory requirements do not make companies report negative information (Larrinaga et al., 2002). Visibility supports adoption of categories (1) “Policy” and (13) “No impact”, which are purely associated with positive information, and category (5) “Organisation”, which consists of positive and neutral information. According to Ljungdahl (1999), category (8) “Events” is characterised mainly by negative information, which hampers adoption. Another trait is that narrative disclosures are more common than monetary or quantitative information (Williams and Pei, 1999; Llana et al., 2007; Beck et al., 2010). There are also studies indicating that general rhetoric is disclosed more often than specific information (De Villiers and Van Staden, 2006; Frost, 2007; Brammer and Pavelin, 2008), though this finding is more ambiguous. This will typically

increase adoption of categories (1) “Policy”, (5) “Organisation” and (13) “No impact”, and hinder adoption of the remaining categories.

Predictions based on observability

Perceived high observability enhances adoption of categories (1) “Policy”, (3) “Impact – process”, (4) “Impact – product”, (5) “Organisation”, (7) “Authorities” and (13) “No impact”. The rest are not decided.

4.5 Relative Advantage

“Relative advantage is the degree to which an innovation is perceived as being better than the idea it supersedes” (Rogers, 2003:229). The perceived advantages are compared to other potential innovations as well as present practice (Rothman, 1974). Empirically, relative advantage is an important explanatory variable because it is often the content of the network messages about an innovation (Rogers, 2003). Consideration of advantages and disadvantages, reducing the uncertainty of the cost-benefit analysis, is a core feature of innovation adoption decisions. Shank and Copeland (1973) interpret relative advantage to be perceived economic advantages, unlike the four sociological attributes discussed above. However, it is clear from the literature that non-economic factors are relevant too.

Relative advantage is a ratio of the expected benefits and costs of adoption of an innovation. Subdimensions of relative advantage include economic profitability, low initial cost, a decrease in discomfort, social prestige, a saving of time and effort, and immediacy of reward. Rogers (2003:233)

According to Tornatzky and Klein (1982) and Moore and Benbasat (1991), the most important elements of relative advantage on an organisational level are costs, profitability, image and other factors. These four elements of the construct are discussed below in order to make predictions of adoption rates for each category. Relative advantage as an overall concept is positively related to adoption rates. As an exception, low costs are usually thought to increase relative advantage, and that element is negatively related.

Costs

Many types of costs are mentioned in the literature: cost, economic cost, initial cost, continuing cost and cost of production (Rogers, 1962, 2003; Tornatzky and Klein, 1982). Tritschler (1970) addresses compliance costs for meeting the objective of financial and tax accounting innovations: fixed start-up costs, incremental ongoing costs, and costs related to revocable innovations and potentially later rounds of start-up costs. Even sunk cost (e.g., investment in former system development), which is theoretically irrelevant to economic decisions, might be perceived as relevant by adopters (Tritschler,

1970). Empirical tests show that people make systematic errors in economic decision-making situations, especially concerning sunk cost (Fallan, 2013). Mental processes cannot be described only by normative theory of rationality alone. The costs of an innovation are assumed to be negatively related to adoption and implementation (Tornatzky and Klein, 1982).

The higher “the extent and precision of quantification [and specificity of narratives], and the degree of commitment to future actions and/or environmental performance”, the higher the direct and indirect costs of disclosure (Brammer and Pavelin, 2008:126). Direct costs include “measuring, verifying, collating and publishing environmental information” (Brammer and Pavelin, 2008:122). The CAO of company C2 illustrates efforts needed to provide specific, mainly quantitative information:

It is more resource demanding, you need more time because you have to go through several sources to get the information you need. You cannot just get it from a computer program, you are dependent on others. We have used one year to develop a system that will get this on track, with information on both the company and group level. We have worked with external partners to get information directly from them as well, making it easier to retrieve information. This concerns energy consumption, fossil fuels, emissions, waste, raw materials, transport etc. so that CO₂ emissions are calculated automatically, and we do not have to do it ourselves.

In contrast, general information, such as environmental policies, does not require such efforts in company C2: “We always have access to general information; it is a part of running our business”. According to Adams (2002:237), “the cost of producing the HSE report [is] estimated at between around [EUR 200 000] and [EUR 600 000]”. The judgment of company C2 reveals that direct costs of reporting influence companies’ behaviour and content of reporting:

For the time being we have decided not to verify the information. You must continuously consider how much to spend, because it is quite costly to have several audits carried out. We must keep a level that is decent, necessary, and which we can defend.

Indirect costs of disclosure might be caused by “the loss of strategic discretion associated with making public commitments to verifiable future actions and/or performance” (Brammer and Pavelin, 2008:122). This is in line with the stewardship incentive mechanism (Gjesdal, 1981): the fact that reporting is to be done—with subsequent possibility of being made accountable for actions or performance—causes behaviour to change ex ante. Indirect costs of CSR reporting are perceived as relevant by the British companies that Adams (2002) examines, because of increased pressure to meet targets, criticism when targets are not met and stakeholder cynicism regarding corporate motives for reporting. The approach of company C4 illustrates that they want to keep both direct and indirect costs low, while complying in most material aspects with the reporting regulations: “to be honest, it is hot air and prose, where we say that our impact is this and that, and we try to avoid precise and binding information beyond a few main focus areas”.

High-quality disclosure imposes a greater burden regarding information gathering, analysis and verification, and reduces flexibility of corporate strategy. Low-quality disclosures are cheap because they are easily copied from other companies (no more data are needed), and involve less extensive commitments (Toms, 2002). Perceived direct costs will promote adoption of categories (1) “Policy”, (5) “Organisation” and (13) “No impact”, and hinder adoption of categories (2) “Objectives”, (3) “Impact–process”, (4) “Impact–product”, (6) “Auditing”, (7) “Authorities”, (8) “Events”, (9) “Investments”, (10) “Costs/revenues”, (11) “Liabilities” and (12) “Definition of concepts and accounting principles”. Perceived indirect costs support adoption of categories (1) and (13), and hamper adoption of the other categories. However, information as a by-product (e.g., originating from reporting required in discharge permits) might make disclosure seem cheaper, especially concerning direct costs. This is relevant for categories (3) to (8).

Profitability

Profitability is “the difference between economic returns resulting from adoption of an innovation and the innovation’s economic cost” (Rogers, 1962:136). Tornatzky and Klein (1982) identified profitability items such as rate of cost recovery, payoff and riskiness. According to economic theory, profitability or firm/project value is affected by future cash flows and cost of capital/rate of return (Miller and Modigliani, 1961). Perceived profitability is positively related to adoption (Tornatzky and Klein, 1982).

Environmental disclosure might influence the net present value of companies and projects (Margolis et al., 2009). Information economics states that more information is preferred to less because it reduces uncertainty in decision-making processes (Walker, 1988). Reduced risk and risk premiums lower the cost of capital/rate of return (Menz, 2010). Adams (2002) indicates that CSR reporting causes better understanding of corporate operations and products, and reduces political, operational and economic risk. Guidry and Patten (2010:42) agree: “Disclosure could lead to future cash flow benefits for the firm by reducing the likelihood of future adverse social and political actions”. However, certain types of information are probably more relevant than others in influencing and estimating the net present value of future cash flows. Demand for reporting to serve resource allocation decision-making purposes is derived from information economic (Gjesdal, 1981). Certain characteristics are identified as necessary for this information to be useful: reporting should be, for instance, complete, consistent, free from error, neutral, quantitative, relevant (predictive or confirmative), reliable and verifiable (Snively, 1967; IASB and FASB, 2010). Most of these criteria require specific, quantitative and/or monetary information. The empirical evidence of Guidry and Patten (2010) seems to support such a view. Perceived risk-reducing effects of reporting might support adoption of categories (2) to (13) and hamper adoption of (1).

Incentives to disclose information is another approach to the concept of profitability. The public sector in Norway has to include environmental requirements for companies and products as part of the conditions of tender in public procurement. Many private sector companies are following suit. Environmental certification of organisations, operations and products is a common solution to the challenge of proving environmental compliance, as illustrated by the CAO of C2: “We certify our suppliers. We might also demand external certification depending on what they are going to produce for us, and whether it will be input in goods resold to customers who have demands for us again.”

Documentation or self-declaration of compliance must be included in tender and contract documents. However, public disclosure might affect assessments of companies’ ability to win contracts. The CAO of company C4 expresses it as follows:

We understand that the certificate [ISO 14001] is important for us because the customers demand it. We have to keep the certificate, and we wish DNV [Det Norske Veritas] to issue the certificate because DNV shines so bright. People have great respect for DNV, whether they deserve it or not. If we can refer to a certificate issued by DNV, it is a doorway to the market.

Disclosure might affect assessments of firm value. Participation in environmental guidelines or action programmes is also used as a similar “external certification of approval”. Perceived revenue, risk and profitability effects can support adoption of category (1), (4) and (5).

Image

Image is “the degree to which use of an innovation is perceived to enhance one’s image or status” (Moore and Benbasat, 1991:195). The notion of “social approval” (Tornatzky and Klein, 1982) is similar. It is a non-financial aspect of reward and a product of interaction of the innovation and the adopting unit. The validated instrument of Moore and Benbasat (1991) identifies key items such as “prestige”, “use improves my image”, “seen as valuable by others”, “high profile” and “status symbol”, while Tornatzky and Klein (1982) add “scientific status”. Reputation is also a connected item. Rogers (2003:230) claims that social status is an important motivation for most individuals. Perceived image is positively related to adoption (Tornatzky and Klein, 1982; Moore and Benbasat, 1991).

The companies in Adams (2002) perceive that CSR reporting benefits corporate image. Generally, organisations prefer to be considered as good environmental stewards, or at least as not causing serious harm to the environment. Disclosure of positive environmental information about the company’s operations and products is perceived to be less risky for the image than is negative information. While the attitude among the interviewees in Adams (2002) towards the reporting of bad news is ambiguous, none of the companies reported much bad news—which is the acid test. Islam and Deegan (2010) report that the more negative media coverage an industry experiences on specific CSR

issues, the more positive information these companies report on related issues. The result is backed by legitimacy theory. The CAO in company C4 expressed a need to balance a perceived consistent bias towards negative press in news media with positive disclosures:

I primarily believe that this is about news agencies making more money publishing negative news. It's probably this simple. Perhaps you remember [project X]. The newspapers wrote about [it] every day because of its negative impact on the environment. No one wrote anything about the success we felt about [project Y]. When they lost interest in [project X] at last, they started to publish a little about [project Y], but mainly on negative issues. Even though everything was developed according to schedule, there were no environmental impacts, nothing went wrong, and there was an excellent environmental follow-up programme, no one wrote anything about it. In my opinion, the challenge concerning environmental issues is the imbalance in coverage. It is the negative issues that are inflated and published.

Adoption of category (8) is hampered because it contains mainly negative information, while the positive or neutral information of categories (1), (5) and (13) promotes adoption.

Environmental certification of organisations, (e)co-labelling of products, participation in environmental guidelines and even participation in reporting initiatives (e.g., Carbon Disclosure Project and Global Reporting Initiative [GRI]) signal an external approval of corporate actions and performance, and are commonly used to improve image. In order for an image to be improved, however, it must be communicated, and then categories (1), (4), (5) and (12) of environmental disclosure become relevant tools.

Other aspects of relative advantage

Tornatzky and Klein (1982) refer to relative advantage as a garbage pail in which characteristics that do not fit elsewhere are dumped. Other examples of perceived relative advantages are (dis)comfort, time and effort saved and the certainty and immediacy of beneficial consequences (Rogers, 2003); improved performance, effectiveness, control, productivity and speed, quality and ease of work (Moore and Benbasat, 1991); and social benefits, mechanical attraction, hazards removed, reduced labour requirements and regularity of reward (Tornatzky and Klein, 1982). Many of these items affect costs, profitability and image, but can be seen as advantages in themselves as well. Companies do not only have an inward view when considering adoption of innovations. Perception of their own and stakeholders' demand for environmental disclosure might be considered. Perception of risks and opportunities are closely tied to external stakeholders: "The existing literature demonstrates that these costs and benefits are associated with pressure from external agents such as legislators, regulators, community and environmental lobby groups, consumers and socially responsible investors" (Brammer and Pavelin, 2008:122).

Because benefits and disadvantages associated with meeting or disregarding perceived demand are uncertain, demand issues are addressed here. There is a positive relation between perceived relative advantage and rate of adoption (Rogers, 2003).

A first aspect of demand regards usefulness and how difficult it is to understand and use different types of disclosed information content. Adopters' perceptions of complexity of use concerns both their own and other stakeholders' demands for reporting. "Since financial statements are not usually thought of as consumption goods, asking for the reason they are in demand is not trivial" (Gjesdal, 1981:208). Gjesdal (1981) identifies two types of demand for reporting: resource allocation decision-making and stewardship. The former is discussed in connection with "profitability". However, environmental disclosure also reflects a corporate responsibility beyond profitability—external effects, for instance. This idea is related to the stewardship concept. Gjesdal (1981) derives stewardship demand from agency theory, reducing the asymmetric information between company and stakeholders. The custodial and pure control objectives of stewardship are best served by hard information—reporting that leaves little room for dispute or disagreement (Ijiri, 1971, 1975). As delegation of tasks increases, the stewardship concept evolves to include evaluation of managerial effectiveness (Birnberg, 1980; Zeff, 2012), where information requirements are close to those of resource allocation (Snively, 1967; Zeff, 2012). Then, the complexity of use-attribute is represented by understandability, which is an important qualitative characteristic of useful accounting information (GASB, 1987; IASB and FASB, 2010). Understandability is dependent on quantifiability, consistency with user concepts, comparability and simplicity (Snively, 1967). Both hardness and understandability suggest that users of reporting are likely to perceive well defined, verifiable, specific information—monetary, other quantitative and narrative—to have lower complexity of use than general rhetoric. This usefulness promotes adoption of categories (2) to (13), and hampers adoption of category (1). The CAO of company C2 illustrates how such—in other respects more complex—information might improve internal environmental control and performance/quality of work:

We have chosen to build a report that contains a lot of detailed information, to make it a text book for our employees. We have spent quite some time including information so that it can be used for upgrading skills internally, and so that others that may read it. There are many things put together, quite complex, but it goes behind the headlines. ... The employees are definitely the most important target group for our reporting.

It should be emphasised that categories (6) and (12) are fundamental premises for (ease of) use. The former provides reliability through a defined level of security for correct information, while the latter describes how reporting is prepared so that it is possible to interpret its content.

When companies experience no demand for information that is costly to produce, cost–benefit considerations suggest that it will not be frequently supplied—as a quote above illustrates. The perception of the interviewees reveals limited demand for certain types of specific information, and no

demand for economic and audited environmental information. Several studies on user(s) of CSR and environmental disclosure also indicate low demand (Campbell and Slack, 2011; Fallan, 2013a). Low demand hinders adoption of costly content such as categories (6) to (12).

A third aspect of demand regards regulation. Reporting in accordance with regulations may go beyond compatibility or observability issues. A cost–benefit consideration might identify other perceived financial and non-financial benefits as well, as suggested in the list of items above—being an attractive employer, for example. This would promote adoption of categories (3), (4) and (13). In Norway, voluntary reporting standards not yet not broadly used, and are therefore not perceived as important for predicting adoption rates. The CAO in company C3 comments on why diffusion is still limited: “Norway is so thoroughly controlled that the need for special reporting in accordance with GRI is not present in the same degree as in some other countries”.

Predictions based on relative advantage

Perceived low relative advantage hampers adoption of categories (9) “Investments”, (10) “Costs/revenues” and (11) “Liabilities”, while categories (2) “Objectives” and (8) “Events” are undecided. Adoption of the remaining eight categories are is promoted by high perceived relative advantage.

5. Comparison of Predicted and Actual Adoption Rates

5.1 Predicted Rates of Adoption

The last column in Table 3 summarises the predictions for each of the five attributes to form expectations about whether the adoption rates of the 13 environmental content categories are relatively high or low. Perceptions of each attribute for each content category might indicate whether adoption is promoted (+) or hindered (–), but does not provide information about the strength of the relations. Because more than one attribute is relevant for each category, there might be attributes that simultaneously promote and hinder adoption. To predict the influence on adoption, it is assumed that the importance of each attribute is equal both within and among content categories. The number of positive signs compared to the number of negative ones will determine the dominating direction (relatively high or low adoption rate) for each content category. Table 3 shows that six content categories are likely to have high adoption rates, and six others are likely to have low rates. Category (8) “Events” is not decided.

Table 3: Predicted adoption rates for the 13 content categories

N	Category	Perceived compatibility	Perceived trialability	Perceived complexity	Perceived observability	Perceived relative advantage	Expected rate of adoption
1	Environmental policy	+	+	+	+	+	+++++ High
2	Environmental objectives	+	-	-	+/-	+/-	+ -- Low
3	Environmental impact – process	+	+/-	+/-	+	+	+++ High
4	Environmental impact – product	+	+/-	+/-	+	+	+++ High
5	Environmental organization	+	+	+	+	+	+++++ High
6	Environmental auditing		-	-	+/-	+	-- + Low
7	Environmental authorities	+	-	+/-	+	+	+ - ++ High
8	Environmental events	+	-	+/-	+/-	+/-	+ - Not decided
9	Environmental investments		-	-	+/-	-	--- Low
10	Environmental costs/ revenues		-	-	+/-	-	--- Low
11	Environmental liabilities		-	-	+/-	-	--- Low
12	Definition of environmental concepts/ accounting principles		-	-	+/-	+	-- + Low
13	No environmental impact	+	+	+	+	+	+++++ High

5.2 Actual Rates of Adoption

The third column in Table 4 contains the actual adoption rates in annual reports for the total sample of companies. About 60% of the companies have adopted the categories (1) “Policy” and (3) “Impact–process”, while only 2–3% have adopted (9) “Investments” and (10) “Costs/revenues”. The fourth column of Table 4 shows that six categories are found to have relatively high adoption rates, and six

others have relatively low rates. Category (8) “Events” is marked “Not decided” because its adoption rate is not significantly different from either the high or the low group.

Table 4: Actual adoption rates and comparison of predicted and actual adoption rates

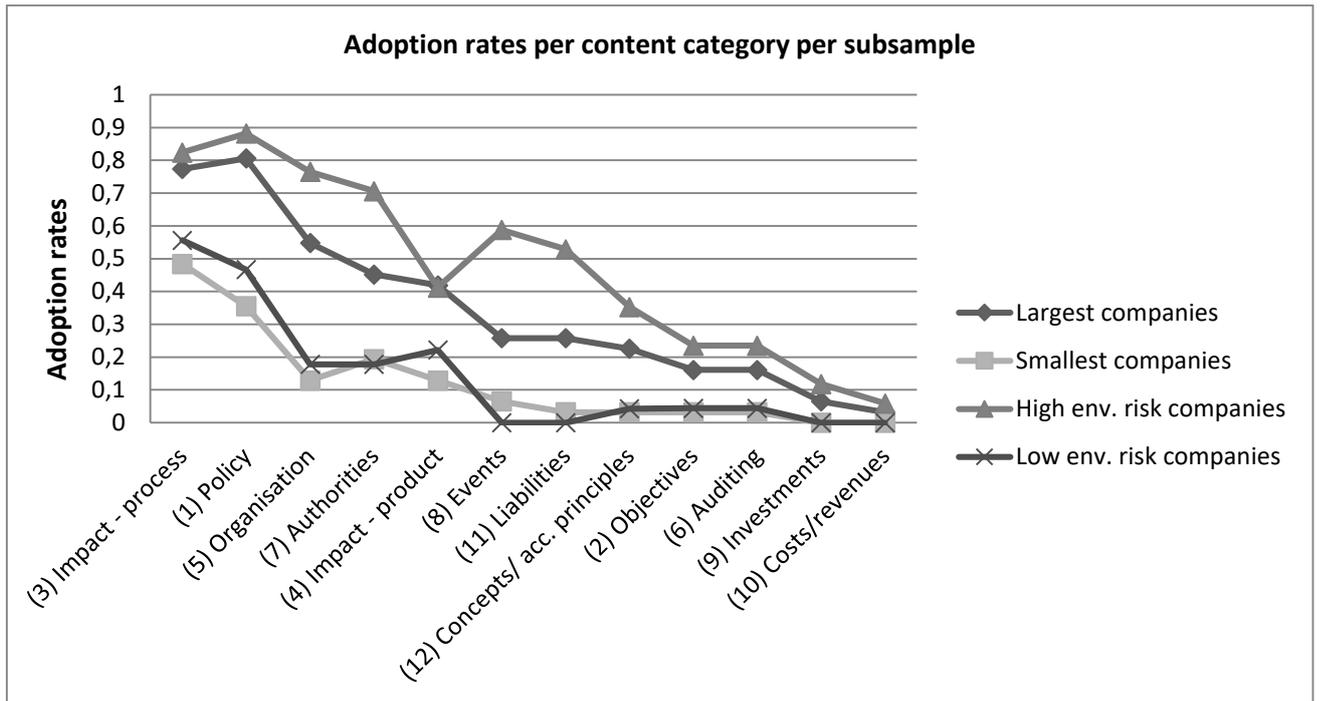
No.	Category	Actual adoption rates – total sample	High or low actual adoption rates ⁴	Correspondence between predicted and actual adoption rates
1	Environmental policy	.581	High	Yes
2	Environmental objectives	.097	Low	Yes
3	Environmental impact – process	.629	High	Yes
4	Environmental impact – product	.274	High	Yes
5	Environmental organization	.339	High	Yes
6	Environmental auditing	.097	Low	Yes
7	Environmental authorities	.323	High	Yes
8	Environmental events	.161	Not decided	Not decided
9	Environmental investments	.032	Low	Yes
10	Environmental costs/ revenues	.016	Low	Yes
11	Environmental liabilities	.145	Low	Yes
12	Definition of environmental concepts/ accounting principles	.129	Low	Yes
13	No environmental impact	.323	High	Yes

Adoption rates for the subsamples separating the largest and smallest companies and companies of relatively high and low environmental risk are illustrated in Figure 1. (The sequence of the categories is determined by the level of the adoption rates in the total sample, from the highest to the lowest.⁵)

Figure 1: Actual adoption rates per information content category per subsample

⁴The grouping of content categories in relatively high and low adoption rates in Table 4 is based on Duncan’s multiple range test for comparison of means. The statistics are available from the author on requests.

⁵ Category (13) is excluded for the same reason as stated in Table 5.



5.3 Comparison of Predicted and Actual Adoption Rates

The last column of Table 4 reveals that the predicted adoption rates of the total sample are in line with the actual rates of adoption, except for category (8) “Events”, which is not decided.

5.4 Robustness

The literature shows that the corporate characteristics’ size and environmental risk/industry are among the most important variables explaining the general extent of CSR and environmental disclosure (Fifka, 2013). Analyses of adoption rates should control for these factors. In consistence with prior research, the largest companies have significantly higher adoption rates than the smallest companies ($t = 4.08$; $p < .01$), and companies having relatively high environmental risk have significantly higher adoption rates than those with lower risk ($t = 5.40$; $p < .001$). In Figure 1, this is seen by two graphs being consistently higher than the others for all categories. Size and environmental risk affect the absolute level of adoption rates.

However, it is more important in this paper whether these corporate characteristics affect how adoption rates vary among content categories. Spearman’s rank correlation test is used to examine this issue. The content categories of each (sub)sample are ranked from 1–13, from the highest to the lowest adoption rate. Spearman’s test coefficient (ρ) shows how similar the ranking is among samples. The value 1 indicates a perfect positive correlation, meaning that each content category has the same rank in both samples, whereas -1 signals a perfect negative relation. Table 5 reveals that all pairs of samples compared have a strong, positive and statistically significant correlation; for example, the correlation between the largest and smallest companies ($\rho = .81$; $p < .01$), and between high and low

environmental risk companies ($\rho = .69$; $p < .05$). One interpretation is that a category that is among the most adopted in one subsample is most likely also among the most adopted categories in the other subsamples.

Table 5: Spearman’s rank order correlation (ρ) between rates of adoption

Rho	Total sample	Largest companies	Smallest companies	High risk companies	Low risk companies
Total sample	1.00				
Largest companies	.94***	1.00			
Smallest companies	.95***	.81***	1.00		
High risk companies	.82***	.95***	.65*	1.00	
Low risk companies	.83***	.70**	.89***	.69* ⁶	1.00

Sign. (two tailed): * = $p < .05$; ** = $p < .01$; *** = $p < .001$

6. Discussion

The results in Table 4 answer the first research question. Actual adoption rates in annual reports for the total sample of companies vary considerably among the 13 categories: Some types of information content are disclosed by many companies, while others are hardly disclosed. According to Figure 1, this also is true for subsamples containing the largest and smallest and relatively high and low environmental risk companies.

The second research question regards the reasons for this variation in adoption rates. The high correlations of Table 5 reveal that even though the level of the adoption rates is consistently higher for all categories⁷ among large companies and high environmental risk companies, virtually the same content categories have the highest and lowest adoption rates within all four subsamples: The level of adoption rates is higher for, e.g., categories (3) and (10) in large and high environmental-risk

⁶ Category 13 is created to separate companies based on similar characteristics as high and low environmental risk. The category is therefore irrelevant and excluded in this calculation.

⁷ Except category 13, which is natural, given its function.

companies than in the two other subsamples, but category (3) [category (10)] is nevertheless among the most [least] frequently adopted categories in all subsamples. In three of four subsamples, the classification in high and low adoption rates is identical to that of the total sample in Table 4, and high environmental risk companies have only minor deviations. These corresponding high and low adoption rates across subsamples are seen in Figure 1, as the graph for each subsample is (almost) consistently falling from left to right—where content categories are ordered from the highest to the lowest adoption rates of the total sample. While the corporate characteristics, company size and environmental risk/industry apparently might help explain the level of adoption rates, it also is necessary to look beyond those factors to predict or explain variation in adoption rates among content categories. This study indicates that attributes of the innovation/information content itself (internal context/attitudes) constitute a significant explanatory variable in adoption rates, and are more relevant than the control variables—company size and environmental risk. This is an important new finding of this paper.

Adams (2002) suggests that focusing on internal context will improve the understanding of environmental reporting because neither corporate characteristics and general context nor the theories from which these variables are derived can fully explain the reporting practice. This view is even more conspicuous for analysis of adoption of individual content categories than it is for the topics listed by Adams (2002:224). When a company is making a (significant) buying decision, it is natural to consider perceived costs and benefits of the object to be purchased—the price, design, quality, ease of use, if use is socially acceptable, etc. The parallel, that management’s perception of characteristics of the information content is relevant for decisions regarding adoption of environmental disclosure, is intuitively reasonable. Still, this corollary is not systematically explored in research. Innovation adoption theory, and especially perceived attributes of the innovation itself (here, information content of disclosure), seems to be a fruitful tool to structure analyses of perceived costs and benefits of adoption decisions. This claim is also supported by the match between predictions of adoption rates and actual adoption rates for 12 content categories, as seen in the last column of Table 4. The focus on the characteristics of the innovation and the use of innovation adoption theory are important new features of this paper.

As mentioned above, Adams (2002) points out the shortcomings of the most used theories, such as legitimacy theory, as well as variables, in explaining CSR and environmental disclosure. In addition to being an important supplement to these theories, innovation adoption theory allows integration of other theories to derive expectations about adoption rates. In this paper, legitimacy theory clarifies compatibility issues and related strategies; signalling theory is relevant for result demonstrability; psychological research illustrates visibility effects; agency theory, information economics and financial accounting theory help understand demand issues; institutional theory is drawn upon for several attributes; and cost–benefit analysis is central to “relative advantage”. Hence,

integration of other theories identifies relevant issues, operationalises the meaning, or clarifies the effect of the five attributes of innovations on adoption rates. This approach recognises that the differing corporate characteristics, general contextual factors and internal contexts (Adams, 2002:246) are likely to interact and affect how these five attributes are perceived. The framework tries to reflect several important elements of management's decision-making process, while the theories listed by Adams (2002) focus on single aspects of such a process.

The main objective of this paper is to predict or explain why companies (do not) report the information content they do (not) and why some types are easier adopted than others. What is important is the relation among the five attributes and high or low actual adoption rates of content in environmental disclosure. Table 3 shows that the six content categories with the highest rates of adoption are all characterised by a high degree of perceived compatibility. They are perceived to be consistent with the existing values, experiences and needs of the company through moral and regulatory legitimacy. A high degree of perceived trialability seems to be pertinent for at least three of the content categories that are most frequently adopted. Trialability is related to whether it is possible to provide information on a limited basis to find out how it works. One highly adopted category has a low degree of trialability, but is still among the most frequently adopted, because this disadvantage is more than outweighed by high degrees of perceived compatibility, observability and relative advantage. Three of the six categories are perceived to have a low degree of complexity and hence viewed as simple to prepare. The other categories with high adoption rates seem to be perceived as neutral on the complexity–simplicity continuum. Six content categories have a high degree of observability, and these are the six most adopted. Observability concerns the visibility of the innovation and how easy it is to communicate its results to others. Finally, all six information content categories with the highest rate of adoption are perceived to have a high degree of relative advantage. The relative advantage of disclosing these kinds of information content is perceived as having higher net benefits for the company than does non-adoption.

The six information content categories with the lowest rates of adoption are all characterised by a low degree of perceived trialability, high degree of perceived complexity and to be neutral on observability. They also are the only categories to have high complexity. The adoption rates of three categories are additionally hampered by a low degree of perceived relative advantage. For the last three categories, even though one has high perceived compatibility and two others high perceived relative advantage, this cannot make up for their perceived low trialability and high complexity.

For the undecided category, high perceived compatibility is balanced by low trialability, while it is neutral on the other attributes.

The current predictions of high and low adoption rates are not set once and for all. They are based on perceived general regularities related to Rogers's five attributes of innovations, which is claimed to represent a recent status of companies listed on OSE. Different periods of time, culture,

environmental awareness, (enforcement of) regulations, experience with and use of reporting, etc. will affect how these five attributes are perceived. The model provides different predictions for different realities. Hence, its relevance should not be limited to the current setting, which is used only for illustrational purposes.

As an initial exploration of the usefulness of the theory concerning environmental disclosure, an important aspect of this paper is to motivate further research of its adequacy. This paper illustrates the complexity of such decision models—the many possibly relevant issues. Some items such as costs, might even be relevant for several attributes, with opposite directions of effects. Additional complexity concerns weights of attributes and issues and uncertainty of effects. Therefore, an important step is to develop a validated measurement instrument (Moore and Benbasat, 1991). However, while this study assumes that some common attitudes regularly exist among companies, it is also important to acknowledge that decision models differ among and within individual companies. That is not addressed here.

Contextual factors are important in innovation adoption theory models (Tornatzky and Fleischer, 1990:153). There is a further need for studies of other contexts such as longitudinal and cross-country settings. “Attributes of innovations” is the most important of the five variables in Rogers’s (2003) innovation adoption theory model. Corporate characteristics (attributes of the adopter) are considered in Rogers’ diffusion of innovations model. These variables, and their interaction, also should be explored further.

It is possible to improve the predictions and ease analysis by dividing each content category into monetary, quantitative and narrative; specific and general; or positive and negative information etc. New studies also should be aware of criticisms of innovation (adoption and diffusion) theory research (Brummet, 1971; Nash, 1971; Rogers, 2003).

7. Conclusions

This paper contributes to CSR and environmental disclosure research in multiple ways. First, it addresses a new research question: Why do adoption rates vary among different types of information content? Second, to answer the question, the paper looks beyond corporate characteristics and general contextual factors, and focuses on perceptions of attributes of the information content itself—the internal context that is an important part of the decision-making process. Third, it applies a new theoretical framework—innovation adoption theory—to identify relevant attributes and structure the analysis.

The paper provides evidence revealing that size and environmental risk/industry are not sufficient or even good predictors of variations in adoption rates among content categories. However, both the reasoning and the results strongly indicate that perceived attributes of the innovation are

relevant. Analysing compatibility, trialability, complexity, observability and relative advantage reveals important reasons for the current reporting practice. Innovation adoption theory seems to be a fruitful supplement to previous theorisation

As an initial exploration, this paper does not set out to make contributions to innovation adoption theory beyond its application to a new topic. However, the use of the framework does fill a gap concerning decision-making and internal context in current theorising in CSR and environmental disclosure research. There are potentially important implications of a better understanding of the drivers of disclosed content. Stakeholders, both users and reporting regulators, will better understand the information content they can expect in the current context, factors of significance in the adoption decision-making process, and how to change or affect the perception of some of these measures—regulations, enforcement, improved reporting guidance, demand pressure, etc.—to change their importance as inputs in the adoption decision-making process.

Research would benefit from further focus on perceived costs and benefits of disclosure. This might draw on theories and research from several fields such as accounting, economics, sociology and psychology. Innovation adoption theory might be an adequate framework to incorporate several of these because it focuses on the determinants of decision-making. The large number of issues discussed in this paper, in connection with the five attributes of innovations, illustrates the complexity of predicting or explaining adoption decisions.

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APPENDIX A: ENVIRONMENTAL INFORMATION CONTENT CATEGORIES

No.:	Category:	Definition/description:
1	Environmental policy	Super-eminent objectives and strategies. A minimum requirement is that priority of the environmental focus is expressed or an intention to follow an environmental program, e.g. The International Chamber of Commerce (ICC) Environmental Program, the Charter of World Business Council for Sustainable Development, UN's Global Compact or a national environmental responsibility program. A statement saying that the company has an environmental policy is not sufficient to be included in this category.
2	Environmental objectives	Specific, measurable (and controllable) goals derived from their environmental policy. For example an objective to decrease a specific discharge level of a substance in a definite period, or to implement an environmental programme, reporting standard or get certified within a specific time-frame.
3	Environmental impact – process	Environmental impact from production processes as regards status and environmental improvements. Status includes: e.g. technical environmental accounts of pollution, waste and energy consumption; production methods; waste processing, and environmental risk. Environmental improvements include: e.g. cleaner production process, reduced pollution, and reduced use of inputs.
4	Environmental impact – product	As with the above category 3, this includes impacts from products in a life-cycle perceptive (instead of process). Implemented environmental co-labelling of products is registered here.
5	Environmental organization	Information of how the company has organized their environmental work: e.g. responsibility, division of work, emergency preparedness to meet environmental requirements and disasters, development of environmental expertise, implementation of environmental management standards (e.g. ISO 14001, EMAS, Miljøfyrtårn) etc. Specific auditing is registered in category 6. Plans for future implementation of environmental standards are registered in category 2.
6	Environmental auditing	Planned and completed environmental auditing acts (internal and external), methodology, auditing standards, degree of assurance, reporting of auditing results and the company's follow-up work. Both environmental audits and audits of environmental disclosures are relevant.
7	Environmental authorities	Present and future environmental constraints, laws and regulations, incentives, green certificates, existing disputes, results of closed disputes, results of applications processing of discharge permits and so on. Both national authorities and international agreements are relevant.
8	Environmental events	Specific events that have caused environmental impacts; e.g. excess of discharge permit, serious environmental disasters.
9	Environmental investments	Economic (monetary) information about completed investments to reduce the company's environmental impacts, comply with discharge permits etc. Reported, planned investments are excluded and belong to category 11 below.

10	Environmental costs / revenues	Economic (monetary) information about the environmental costs and revenues of the year, e.g. fines, pollution abatement work. Information about future costs is classified in category 11 below.
11	Environmental liabilities	Economic (monetary) information about future costs, e.g. responsibility for decommission and removal of oil installations in the North Sea after use. Best estimate based on all available information should be adopted for contingent liabilities.
12	Definition of environmental concepts / accounting principles	Definition and clarification of environmental concepts. The category includes: e.g. clarifications, accounting principles, accounting rules, procedures relating to measurement, valuation and disclosure. Important because of the lack of accounting standards in this area.
13	No environmental impact	“The company does not pollute the external environment.” / “The company has no environmental impact.”

Source: Fallan and Fallan (2009)