# Towards a Taxonomy of Environmental Management Decision: From Rudimentary to Sophisticated Model. An Empirical Study on French Coastal Industries

Julie Olivero

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**An Empirical Study on French Coastal Industries.**

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**Abstract**

This article aims to understand how French coastal industries perceive and treat the negative impacts of their daily activities on the natural environment, and question the determinants of environmental management decision. From an analysis of 196 questionnaires, this survey reveals that if regulatory stakeholders and leaders' values primarily guide industries towards a more responsible management, environmental practices are reactive and rather recent. Costs, complexity of regulation, and lack of resources are the main barriers to the pursuit of more ambitious environmental actions. A need for information on the environmental regulations is also mentioned by managers. Finally, environmental management is more an expensive way to legitimize and maintain activities than an economic or competitive advantage. Despite convergences between the investigated cases, especially in terms of motivations and purposes, three models of environmental management decision emerge, ranging from a rudimentary position, and a more sophisticated and proactive approach, and the factors explaining these discrepancies are essentially corporate culture, size, business sector, and leaders' values.

**1. Introduction and conceptual framework**

The increasing number of ecological accidents regularly reminds us the vulnerability of the natural environment to human activities. The oil spill caused by the Erika wreck occurred on December 1999, and more recently the red muds accident in 2010 in a Hungarian alumina industry still draw attention. There are also less apparent but nevertheless harmful environmental damages. Indeed, industrial activities can generate gradual and diffuse pollutions likely to cause long-term negative impacts, called "industrialo-environmental risks" (IER for convenience). These risks cover two dimensions: firstly, the "ecological risk", considered as the probability of an industrial activity to impact its natural environment (air and water pollutions, soil contamination, etc.), and secondly, the "economic risk" which can occur afterward, further to the stakeholders' reactions feeling threatened by this activity. This penalty can take several forms (new laws, warnings and plant closures) whose decision depends on the government. It can also come from other stakeholders and be expressed in terms of boycotts, image degradation, difficulty of finding loans, etc. Consequently, it is not necessarily pollution that creates a threat for income and value of the business assets, but environmental concern and public opinion.

In France, the issue of interactions between organizations and their natural environment is relevant. There are about 500,000 classified installations for environmental protection (ICPE[i]), among which 54,000 are subjected to prefectoral authorization (including Seveso sites) because of the dangerous nature of their activity. These installations are often located in

major cities nearby estuaries and deltas that are ecologically sensitive areas. Five coastal departments are especially selected in our survey: Nord, Seine Maritime, Gironde, Loire Atlantique, Bouches-du-Rhône.

Rooted in the field of CSR, this article aims to understand how the "actors of modernity"[iii] (industries) perceive and treat the negative impacts of their daily activities on the natural environment, and question the determinants of IER management decision. The latter is studied through four dimensions: perception (degree of priority given to environmental issues, constraint or strategic opportunity), evaluation (methods of IER assessment), management (reactive or proactive measures, level of investment in environmental protection), and communication of IER (internal and external communication). We especially reflect on the institutional and organizational influences on the IER management decision in French industries. Indeed, if organizations, subject to many pressures, adopt management practices expected from their environment that determine their legitimacy and survival, their motivations do not solely depend on the phenomenon of institutional isomorphism. It can also be explained by the internal configuration of organizations, especially leaders' values (Oliver, 1991; Viardot, 1997; Egri & Herman, 2000; Fernandez & *al.*, 2006; Kerr, 2006; Reynaud & *al.*, 2007, 2008; Olivero, 2013).

Many studies have demonstrated the relevance of the neo-institutional theory to understand and explain the implementation of environmental practices in organizations (King & Lenox, 2000; Hoffman, 2001; Reverdy, 2005; Boiral, 2006, 2007). According to them, the adoption of environmental practices results from an "institutional isomorphism" (DiMaggio and Powell, 1983), and these practices are far from contributing to the improvement of environmental performance (Boiral, 2006). Because of their significant environmental footprint, industries are faced to more social and political pressures that encourage them to reduce their negative externalities and commit to a sustainable development policy. Then, organizations do not only need inputs (raw materials, equipment, or capital) to exist, they also need social legitimacy (Suchman, 1995; Hoffman, 1999; King & Lenox, 2000; Bansal & Roth, 2000; Champion & Gendron, 2005; Boiral, 2006). They give the illusion of the rationality to stakeholders by adopting standards of the institutional environment (Meyer & Rowan, 1997), and tend to become uniform by conforming to it (DiMaggio & Powell, 1983). Here, we refer to Dohou-Renaud typology (2009) that identifies institutional pressures according to their nature (coercive, normative and mimetic) (DiMaggio & Powell, 1983) and the category of actors who exert these pressures (the "environmental stakeholders") (Marquet-Pondeville, 2003). The latter are represented by the "regulatory stakeholders" (State, public authorities, European Union), the "organizational stakeholders" (leaders, shareholders, employees), the "environmentalists" (NGO, associations, local communities, media, scientists), and the "stakeholders of market" (customers, competitors, professional associations) (see Table 1). But if we consider that institutional pressures encourage organizations to implement environmental practices, the latter are not necessarily homogeneous (Nash & Ehrenfeld, 2001; Andrews *et al*., 2003; Boiral & Dostaler, 2004). We especially propose a taxonomy of the IER management decision, ranging from a rudimentary and reactive position, and a more sophisticated and proactive approach, and the factors explaining these discrepancies are leaders' values, corporate culture, size, and business sector.

**Table 1. The « environmental stakeholders » and the nature of their influence (Dohou-Renaud, 2009, p.120).**

| Pressure / Environmental stakeholders | Coercive | Normative | Mimetic |
|---|---|---|---|
| **Regulatory stakeholders** | European Union, Government, Authorities of regulation | SME/ISO (14001, 26000), GRI, EMAS | |
| **Environmentalists** | Residents associations, NGO, local communities | Universities, Scientific institutions | Media, Press |
| **Stakeholders of the market** | Customers, Associations of consumers, Banks, Insurance companies | Professional organizations (UIC), Charters (UNICEM), Programs (Responsible Care) | Competitors, Suppliers, Rating agencies |
| **Organizational stakeholders** | Leaders, Shareholders, Investors | --- | Employees and trade unions |

According to the authors of the new institutional theory, firms do not all respond at the same time nor in the same way face to institutional pressures. Demil (1998), who works on business strategies face to regulation, shows that some of them adopt a proactive strategy by trying to *"act before the regulatory deadline (or any other type of pressure) and introduce a major innovation in the given context",* while others adopt a strategy consisting in *"acting by the deadline imposed by regulations and not to introducing innovation".* In the first case, decisions are based on anticipating events and a willingness to go beyond the regulations by integrating the ecological environment as a key factor in the success of the development strategy. In the second case, decisions are consecutive to events and institutional pressures with no real anticipation. It's a "problem solving" approach in which organizations manage IER as and when necessary, without holistic and integrated view. Solutions are often curative or palliative. In this perspective, the IER management is considered as a barrier to the economic development of organizations. The various levels of business responsible commitments observed in the literature are probably the manifestation of the joint and unequal influence of different forces on organizations (Carroll, 1979; Hunt & Auster, 1990; Roome, 1992; Hart, 1995; Sharma & Vredenburg, 1998; Martinet & Reynaud, 2004).

From these typologies result two business logics (Martinet & Reynaud, 2001). For some companies, the integration of environmental issues is synonymous of constraints and costs (Denison, 1978; Dufour *et al.*, 1992; Walley & Whitehead, 1994), for others, it is a source of opportunities and creates value (Reynaud & Rollet, 2001; Persaix, 2002). From an internal perspective, the most common motivations are cost reduction (Hart, 1997; Bensédrine, 2001) through a better waste management and use of resources, improvement in productivity (Porter, 1991; Porter & Van Der Linde, 1995) and environmental performance (Foulon *et al.*, 2002). From an external perspective, improving competitiveness (Elkington, 1994; Martinet & Reynaud, 2004), access to markets/ethical funds (Depoers & *al.*, 2003), and a better reputation are mentioned. However, firms report difficulties with the implementation of an

environmental management: lack of human and/or financial resources (Tilley, 2000; Hillary, 2000; Berger-Douce, 2007), lack of information (Lazzareschi, 1998; Hillary, 2000), ignorance of the sustainable development issues (Berger-Douce, 2007), and skepticism about the expected benefits (Tilley, 1999; Zutshi & Sohal, 2004).

## 2. Material and methods

### 2.1 Definition of the target population

The units which compose the target population were identified from the French Ministry of Ecology website[iii]. Sites with ICPE were selected according to their geographical situation (located on one of the five departments), and their level of risks (sites subject to prefectoral authorization, including Seveso high and low thresholds sites). Several business sectors are represented: mining, manufacturing, power generation, waste management, transportation, and storage. 484 sites were finally identified (see Table 2), with 380 Non-Seveso sites, 31 Seveso low threshold sites, and 73 Seveso high threshold sites.

**Table 2. Distribution of the target-population according to the study basins**

| Study basins | Main cities | Example of industries | Number of sites |
|---|---|---|---|
| **Bouches-du-Rhône** | Istres, Fos-sur-Mer, Berre, Rognac, Port de Bouc, Martigues, St Martin de Crau, Meyreuil, Rousset, Gardanne | Plateforme de Lavéra, Arcellormittal de Fos, SNET de Meyreuil, Esso de Fos, Atmel et ST Microelectronics de Rousset | **150** |
| **Gironde** | Bordeaux, Bassens, Ambès, Bègles | Zone de Bassens, Bec d'Ambès | **99** |
| **Loire Atlantique** | Nantes, Saint Nazaire, Montoir de Bretagne, Donges, Saint Herblain, Rezé, Pornic | St Nazaire, EDF de Cordemais, Total de Donges | **97** |
| **Seine Maritime** | Le Havre, Rouen, Dieppe | Port Jérôme, Notre Dame de Gravenchon, zone de Caudebec en Caux, EDF au Havre | **89** |
| **Nord** | Dunkerque, Grande-Synthe, Capelle-la-Grande | Rubis Terminal, Raffinerie de Dunkerque, ALFI | **49** |
| **Number of sites** | | | **484** |

## 2.2. Elaboration and administration of questionnaires

### 2.2.1. Construction of questionnaires

As Evrard & *al.* (2003) underlined, the construction of a questionnaire is the most important step in the implementation of a survey. The difficulty is *"to find the best conciliation between the aim of the researcher who has to follow a theoretical model and respect its concepts, the imperative of the respondent who has to be comfortable to answer questions which must be easily understandable, and finally, the objective of the methods of data analysis imposed by*

*the statistical tools"* (Thiétart & *al.*, 2007, p. 230). The questionnaire was thus made by respecting three main objectives that are *"to translate the information required in a series of specific questions which the participants can and have to answer", "to be motivating and encouraging so that the respondent feels involved in the interview", "to minimize the response errors"* (Malhotra, Décaudin, Bouguerra, 2004, p. 218).

A particular attention was given to the introduction in order to define concepts and specify the confidential character of the survey. Questions were also written in a logical order and according to a thematic clustering[iv] in order to avoid any inward-looking attitude of participants (see Figure 1). In every theme, we distinguished factual questions from more subjective questions to avoid the halo effect. Besides, to minimize the effect of contamination, the "funnel" technique was preferred, paying attention to the order of questions. The latter were so designed "to make comfortable", with the aim of determining the best logical and psychological sequence for respondents. Finally, control and filter questions were inserted to, respectively, test the sincerity and the coherence of answers, and to manage a part of respondents towards intimate questions.

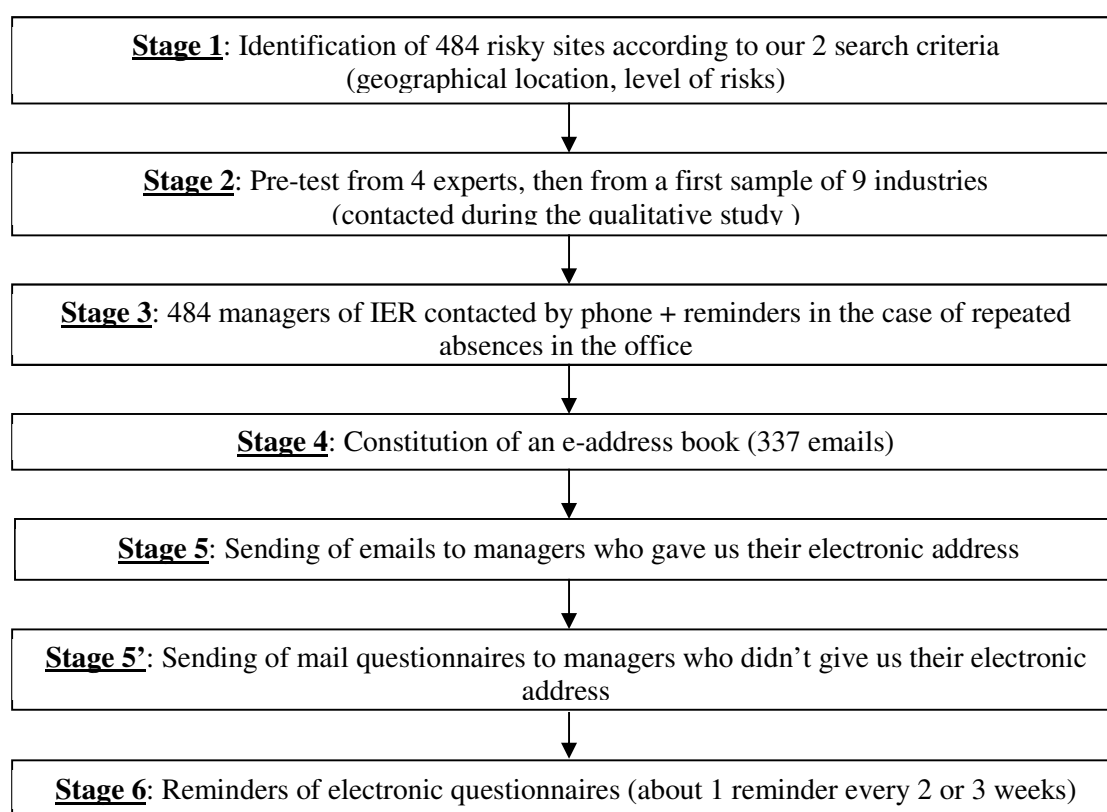**Figure 1. Thematic clustering of the questionnaire**
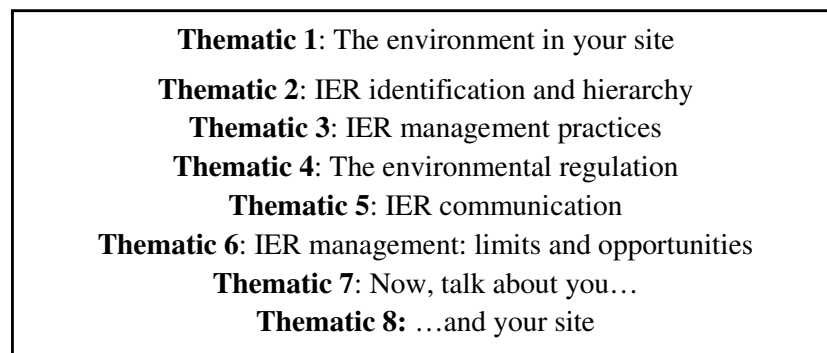
> **Thematic 1**: The environment in your site
>
> **Thematic 2**: IER identification and hierarchy
> **Thematic 3**: IER management practices
> **Thematic 4**: The environmental regulation
> **Thematic 5**: IER communication
> **Thematic 6**: IER management: limits and opportunities
> **Thematic 7**: Now, talk about you…
> **Thematic 8:** …and your site

To make the data processing easier, closed questions (single and multiple choice, rating scale[v]) were mainly used. To make the data processing easier, closed questions (single and multiple choice, rating scale) were mainly used. 7 recto-verso pages finally composed the questionnaire, and the average duration of completion was about 15 minutes according to the pre-test made from 4 experts and 9 managers.

### 2.2.2. Administration of questionnaires

To maximize the response rate, and given the sensitive character of the study, data were collected by e-mail and mail questionnaires. If we recognize their disadvantages (rigidity of the instrument, strong influence of the questionnaire and its logic, its impersonal character, etc.), respondents don't undergo the influence of the investigator and have time to think, that allows a better approach of the opinion questions. Thanks to the ROHM and OHM-BMP[vi] financial support, we decided to contact by phone 484 managers in charge of IER management. This ambitious approach allowed sending 340 questionnaires by Internet. This is less expensive and gets higher quality data than mail questionnaires (Dillman, 2007), especially with sensitive topics (Thiétart & *al.*, 2007). Finally, six stages, detailed in the figure 2, structure our approach:

**Figure 2. Stages of the questionnaire administration process**

| |
|---|
| **Stage 1**: Identification of 484 risky sites according to our 2 search criteria (geographical location, level of risks) |

| |
|---|
| **Stage 2**: Pre-test from 4 experts, then from a first sample of 9 industries (contacted during the qualitative study ) |

| |
|---|
| **Stage 3**: 484 managers of IER contacted by phone + reminders in the case of repeated absences in the office |

| |
|---|
| **Stage 4**: Constitution of an e-address book (337 emails) |

| |
|---|
| **Stage 5**: Sending of emails to managers who gave us their electronic address |

| |
|---|
| **Stage 5'**: Sending of mail questionnaires to managers who didn't give us their electronic address |

| |
|---|
| **Stage 6**: Reminders of electronic questionnaires (about 1 reminder every 2 or 3 weeks) |

### 2.3. Data processing

Thanks to its intelligent optimization system and its Internet dimension, Sphinx iQ software was used for data processing. If the quality of the data set is good (91% filling), the total non-response rate remains high (60%). The impossibility to contact the managers when calling, the impossibility for them to participate in the survey for professional (business travel, overloaded agenda, etc.) or personal (sick leave, maternity leave) reasons, the technical issues (locked access to the questionnaire by the informatics policy of the firm), the sensitivity of the topic or the optional character of the survey may explain these non-responses.

Being unable to control *a priori* the total non-response, the representativeness of the sample was checked *a posteriori* according to the quota method[vii], based on information from the target population (level of risks, geographical location, and business sector). The adjusted data were, firstly, subjected to cross tabulations and frequency tables that highlight the main trends in terms of environmental practices within French industries, and the main issues that the managers of IER are daily exposed. Secondly, given the variety of empirical observations, we propose a taxonomy from a K-means cluster analysis[viii]. Three decisional models of IER management were observed, ranging from a rudimentary and reactive position, and a more sophisticated and proactive approach. After having specified the methodological details of the research, the main results are presented. All the graphs and boards are extracted from the Sphinx software. The significance thresholds are 1% (very significant or TS), 5% (significant or S), 10% (not significant or PS), and figures are rounded to the nearest unit, which can explain the inaccuracy of totals in tables.

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## 3. Results

Finally, 196 managers participated in the survey, a response rate of about 41%. Respondents are essentially men (64.5%), from 25 to 45 years old (67%), and with a training background in engineering (45.2%). Almost half of them practice for less than 7 years within firms. In spite of this low seniority, there is an increasing formalization of the responsibilities regarding environmental issues through the emergent status of the "environment manager" or "HSE/QSE manager". It shows the increasing importance placed on the environmental protection within risky sites. Respondents essentially work within "non Seveso" (78.5%), and small or medium sites (63%). Almost all of them belong to the manufacturing sector (chemistry, food-processing industry). And firms mainly arise from the private sector (94.8%), only two sites depending on the energy public sector.

The analysis of institutional isomorphisms explaining IER management decision within firms highlights convergences between the case studies. Firstly, IER management decision mainly depends on searching conformity with social values (DiMaggio & Powell, 1983): industrial activities adopt environmental practices in order to strengthen their legitimacy and perpetuate their activities (Suchman, 1995; Hoffman, 1999; King & Lenox, 2000; Boiral, 2006; Bansal & Roth, 2000, Champion & Gendron, 2005) much more than to increase their economic performance. Business opportunities and the economic benefits, outlined in some research (Porter, 1991; Elkington, 1994; Porter & Van Der Linde, 1995, Hart, 1997; Bensédrine, 2001; Martinet & Reynaud, 2004) are not clear (see Table 3). Secondly, coercive pressures from environmental regulations are predominant: IER management is implemented to be accountable to the "regulatory stakeholders" in priority; mimetic and normative pressures are minor. Coercive pressures from leaders (the "organizational stakeholders") are also a key element influencing firms in a greener orientation (Oliver, 1991; Viardot, 1997; Egri & Herman, 2000; Fernandez & al., 2006; Kerr, 2006; Reynaud & al., 2007, 2008; Olivero, 2013), especially in very small firms and extractive industries. We thus recognize the institutional (regulation) and organizational (leaders) influences on the IER management decision in French industries (see Table 4).

**Table 3. Main motivations of environmental actions**

Somme des pourcentages différente de 100 du fait des réponses multiples et des suppressions.
L'importance varie de 0 à 11, elle est calculée comme le rang moyen auquel la modalité a été citée.

| | Nb | % obs. | Imp. |
|---|---|---|---|
| Respect de la réglementation | 187 | 95,2% | 9,40 |
| Diminution des risques et nuisances | 182 | 92,9% | 9,01 |
| Pérennisation de l'activité | 158 | 80,5% | 7,76 |
| Amélioration de l'image et de la réputation | 145 | 74,1% | 6,41 |
| Economie/Maitrise des coûts | 98 | 50,0% | 4,50 |
| Obtention d'une certification | 74 | 37,7% | 2,94 |
| Accès à de nouveaux marchés | 48 | 24,5% | 1,92 |
| Amélioration de la compétitivité | 38 | 19,5% | 1,55 |
| Amélioration de la valeur actionnariale | 11 | 5,8% | 0,46 |
| Autres, précisez | 5 | 2,3% | 0,16 |
| Création d'emplois | 1 | 0,4% | 0,01 |
| **Total** | **196** | | |

**Table 4. Pressures felt by managers regarding IER management**

| | | Aucune | Faibles | Moyennes | Fortes | Très fortes | Total |
|---|---|---|---|---|---|---|---|
| **2** | Valeurs dirigeant | 10,5% | 6,9% | 27,0% | 39,8% | 15,9% | 100,0% |
| | Actionnaires et investisseurs | 33,9% | 11,5% | 21,9% | 21,3% | 11,4% | 100,0% |
| | Médias | 36,5% | 13,4% | 21,8% | 20,4% | 7,9% | 100,0% |
| **1** | Réglementation | 2,3% | 1,8% | 9,1% | 39,3% | 47,5% | 100,0% |
| | Salariés et syndicats | 18,3% | 30,6% | 36,8% | 13,8% | 0,5% | 100,0% |
| | Associations écologistes et ONG | 42,3% | 20,5% | 13,1% | 13,6% | 10,5% | 100,0% |
| | Riverains | 31,3% | 20,6% | 21,2% | 16,7% | 10,3% | 100,0% |
| | Concurrents | 49,8% | 23,9% | 17,3% | 7,9% | 1,1% | 100,0% |
| | Collectivités territoriales | 20,8% | 17,7% | 26,0% | 27,8% | 7,7% | 100,0% |
| | Clients | 21,1% | 21,0% | 31,4% | 23,3% | 3,1% | 100,0% |
| | Collaborateurs | 19,9% | 24,3% | 38,8% | 15,3% | 1,6% | 100,0% |
| | **Total** | 25,9% | 17,5% | 24,0% | 21,8% | 10,7% | |

p = **0,0%** ; chi2 = **689,33** ; ddl = **40** (**TS**)

If regulation and leaders' values primarily guide French industries towards a more responsible management, IER management is mainly reactive, and environmental practices have significantly emerged for the last decade. And these practices are only beginning. Indeed, if *"globalization and sustainable development are the keywords of the 21th century"* (Boiral, 2008), most respondents express difficulties in adopting a sustainable environmental management. Costs (Denison, 1978; Dufour *et al.*, 1992; Walley & Whitehead, 1994), regulatory complexity, and lack of resources (Tilley, 2000; Hillary, 2000; Berger-Douce, 2007) are the main barriers to the pursuit of more ambitious environmental actions. A need for information on the regulations is also mentioned (Lazzareschi, 1998; Hillary, 2000) (see Table 5). Actually, only half of respondents say they have adopted an ISO-14001 Environmental Management System (EMS). The low number of sites signing partnerships with environmental associations and/or NGO or using an eco-audit system (EMAS) confirms, besides, the nervousness of environmental initiatives. The emergence of a different way of doing business is not up to date. The role and the mission we wish to give to firms (that is to say a social player working for solidarity and general interest) seem difficult to put into practice. This result strengthens Walley and Whitehead's argument (1994, p.46) that *"responding to environmental challenges has always been a costly and complicated proposition for managers…Talk is cheap, environmental efforts are not "*.

**Table 5. Obstacles perceived by managers regarding IER management**

| | Pas du tout d'accord | Plutôt pas d'accord | Neutre | Plutôt d'accord | Tout à fait d'accord | Total |
|---|---|---|---|---|---|---|
| **1** Coûts | 0,8% | 5,2% | 12,0% | 61,0% | 21,0% | 100,0% |
| Dirigeants | 17,9% | 33,4% | 27,3% | 17,9% | 3,5% | 100,0% |
| Actionnaires18 | 17,8% | 24,3% | 47,2% | 8,4% | 2,3% | 100,0% |
| **2** Réglementation3 | 3,9% | 7,4% | 19,1% | 57,2% | 12,4% | 100,0% |
| **4** Avantages CT | 5,9% | 8,8% | 23,7% | 53,6% | 8,0% | 100,0% |
| **3** Moyens financiers/humains | 4,6% | 9,8% | 23,4% | 50,1% | 12,1% | 100,0% |
| Evaluation | 4,7% | 26,7% | 27,5% | 35,7% | 5,5% | 100,0% |
| **Total** | 7,9% | 16,5% | 25,7% | 40,6% | 9,3% | |

$p = 0,0\%$ ; chi2 = **392,25** ; ddl = **24 (TS)**

However, if we observe convergences between the investigated cases, especially in terms of motivations and purposes, three models of environmental management decision appear from the K-means cluster analysis (see Table 6). This method aims to bring together the closest observations. This criterion of nearest neighbors means that each case is assigned to a class if it is very close to its center of gravity. It is recommended when the number of observations is greater than 100 and when variables are quantitative, which is our case. In addition, the preparation step of the data was facilitated given the absence of missing values and extreme points, and the use of comparable scale (Likert scales). The high value of Cronbach's alpha (0.77) also indicates that the explanatory variables are highly correlated. Finally, to increase the validity of the classification, we first used the method of hierarchical cluster analysis to get a sense of the number and composition of classes. Then we refined this classification with a non-hierarchical analysis as recommended by Punj and Stewart (1983). It appears that the latter has a higher (0.35) than that from the ascending hierarchical method (0.32) discriminating power.

**Table 6. Main results of the K-means cluster analysis**

| Class | Population | Proportion | Average Distance | Standard deviation | Concentration |
|---|---|---|---|---|---|
| A | 75.00 | 38.27 | 3.31 | 1.05 | 0.30 |
| B | 67.00 | 34.18 | 3.88 | 1.32 | 0.35 |
| C | 54.00 | 27.55 | 3.78 | 1.46 | 0.34 |

| Class | degre_re activite | priorite _envt | av_strate gique | diff_eval RIE | effort_invt _RIE | depassement _reglementat ion | com_ interne | com_ externe | eval_ responsa ble_envt | reunion _envt | projet _envt |
|---|---|---|---|---|---|---|---|---|---|---|---|
| A (75) | 2.12 | 4.56 | 3.64 | 1.69 | 3.25 | 2.85 | 4.35 | 3.43 | 3.80 | 4.27 | 4.57 |
| B (67) | 2.61 | 3.79 | 3.07 | 2.91 | 2.55 | 2.30 | 3.69 | 2.69 | 1.70 | 3.15 | 3.73 |
| C (54) | 4.00 | 4.72 | 4.06 | 2.59 | 4.02 | 3.69 | 4.48 | 4.15 | 4.19 | 4.50 | 4.65 |
| Total (196) | 2.81 | 4.34 | 3.56 | 2.36 | 3.22 | 2.89 | 4.16 | 3.37 | 3.19 | 3.95 | 4.31 |
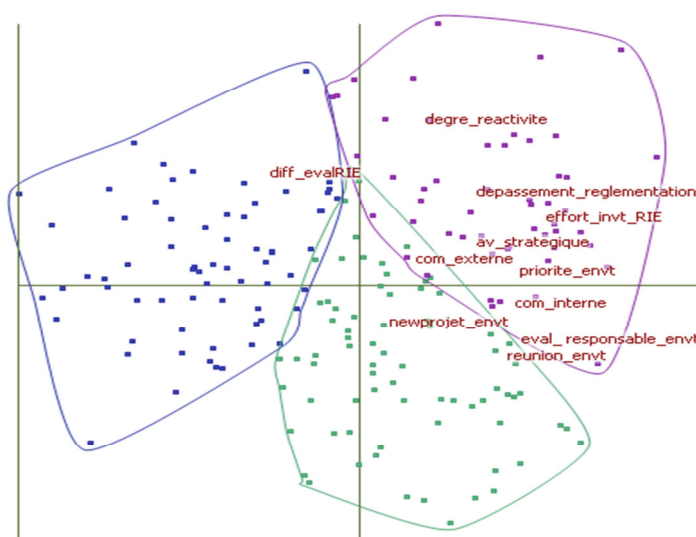


*Note: For variables marked in green (Resp red), the middle class values are significantly higher than in the rest of the sample (lower resp.).*

First, the basic model or class B (34.2% of the sample) includes industries for which environmental issues are perceived as a constraint. They meet difficulty to assess their IER, their environmental investments are limited, and their communication is mainly internal. They have a low environmental culture, and their environmental management is quite reactive. This profile mainly concerns small and medium sites that do not have the support of management, and for which the economic context has put environmental protection in the background. Their environmental approach is rather recent (from 1 to 10 years). They have not implemented EMS and perceive many obstacles in the IER management (costs, reluctance of executives and shareholders, low perception of immediate benefits, lack of human and/or financial resources). Second, the intermediate model or class A (38.3%) concerns firms that adopt a reactive environmental management despite a high priority given to IER, the non-perception of difficulties in assessment, a strong internal communication and a highly developed environmental culture. It mainly includes very small and very large firms

characterized by a leadership sensitive to environmental issues. Most of them have implemented an EMS, but their environmental approach is relatively recent (from 11 to 15 years). Third, the sophisticated model or class C (27.5%) is characterized by a fundamentally proactive attitude towards IER, both from the viewpoint of the management that the internal and external communication. Environmental issues are considered as a real strategic opportunity, compatible with the traditional model of profit maximization and shareholder value. This group mainly covers the big firms with 250-2000 employees, Seveso high threshold sites, and firms with a leadership sensitive to environmental issues. These sites have implemented an EMS and their environmental approach is old (from 16 to 25 years).

Environmental management decision is consequently differently perceived by firms, both in the level of IER perception and related issues, and in actual behavior. In spite of a collective awareness of environmental issues and the development of many actions to reduce IER, only 27.5% reported an IER proactive management. There are contradictions and "organizational paradoxes": industries that report adopting more reactive approaches (the intermediate model) are not necessarily firms ignoring issues related to IER or with a non-existent environmental culture. Instead, they declare implement important internal communication devices, and integrate very common environmental issues in management meetings or new projects. We note as well, through this model, a strong environmental culture and a real involvement of leaders is not enough to adopt a proactive posture. It may take time and need maturity to be able to integrate these issues into business strategies, especially in very small firms. In other words, environmental culture and sensitivity leaders do not they constitute the conditions required for a proactive environmental approach?

## 4. Contributions and research perspective

From a theoretical perspective, if the neo-institutionalist approach is a relevant theoretical framework in management sciences, or even dominant to understand organizations (Greenwood *et al.*, 2008), our survey provides a less deterministic view of the basic model to analyze the adoption of environmental practices in firms. We discuss the development of voluntary actions through a neo-institutional perspective, thus reconciling deterministic and proactive approaches to understand IER management decision. Moreover, while most studies deal with large or small companies (with a long domination of large firms), we propose an empirical study that compares sites of different size, including small organizations which can also be affected by environmental issues given their significant environmental impacts (Hillary, 2000; Friedman & Miles, 2002; Ammenberg & Hjelm, 2003). And contrary to some authors' suggestions (Guyenot *et al.*, 1999), we show that some small firms, characterized by sensitive leaders to environmental issues, are also able to develop proactive environmental management. Finally, while many works discuss the information requirement of small and medium firms about environmental matters (Lazzareschi, 1998; Hillary, 2000), this survey points out that this informational problem is also affecting large organizations.

From an empirical perspective, "*if articles, theses and books on environmental management have developed rapidly since the mid-1990s, how companies daily integrate environmental concerns, the content of these activities in this field, and the process of implementation are still relatively unknown*" (Boiral, 2007). Indeed, the goal of the survey is to "take the organizational pulse" in terms of environmental awareness and management, in a context of high population density and ecological vulnerability. Our approach is pragmatic. It aims to have an "unchaste" look on the environmental practices of French industries, the latter being relatively unclear because of the difficulty to obtain information which are usually "bogged

down" in normative, reassuring speeches, and consistent with the dominant managerial orthodoxy (Boiral 2008, p.64). Moreover, to our knowledge, there are few recent empirical studies describing and analyzing environmental practices within French industries causing risks to the natural and human environment (Glachant *et al.*, 2004). This survey so provides a rich empirical material structured around interviews with managers of IER. It concretely illustrates the decisional process in terms of IER management in polluting firms daily confronted with environmental issues. And although we observe mimetic environmental behaviors, there are discrepancies between the surveyed industries. A taxonomy has been proposed in order to, firstly, simplify the elements of the theory and practice by providing a reading grid built around a limited number of criteria, and secondly, enhance scientific ideas for managers.

### *A critical look at French and European public policies in encouraging environmental protection*

If regulations mainly influence environmental practices in French industries, the solution is not more rules. Indeed, the investigation, contrasting perceptions, practices, motivations and barriers for an IER management, provides a critical look at French and European politics regarding incentives to environmental protection. It reveals the difficulties managers may face through their functions in environmentally responsible arbitrage. The deficit of regulatory information expressed by nearly 60% of respondents especially highlights the relative efficiency of the flow of information between regulatory experts and industries. Then, a particular effort must be made to make sensitive and inform managers through meetings, regular emails about the new regulations, etc. This research leads us to recommend not higher laws, but a gradual hardening which would be more adaptive to one of the main actors of social responsibility. The dissemination of a more qualitative and adaptive regulatory information would, for example, much appreciated by managers. Some industries also fear relocations, plant closures because of high regulations, which let us think that other ways of governance should be considered. For instance, more "flexible" regulations could be likely to improve the environmental performance of organizations in a "win-win" logics (Porter & Van der Linde, 1995). However, this investigation raises questions about the fairness and sustainability of organizational environmental commitments in a context of more flexible regulations. Are risky industries always ready for this "trip" that requires them to improve managerial skills and a continuous focus (Shrivastava & Hart, 1996)? Would we observe a real determination from industries to enroll in an environmentally friendly approach, or, on the contrary, a lack of interest or a total ignorance of environmental issues? The question of integration of environmental issues in organizations, especially in a context characterized by uncertainty and repetitive financial and economic crises, leads to the well-known dilemma. Should we promote a certain "laissez-faire", trusting environmental leaders and considering the possibility of an independent IER policy institutionalized by the industry itself (Oström, 2010)? Or, do we consider Gendron & *al.*'s recommendations (2004, p.78) that *"voluntary measures and regulations are two sides of the same coin and, as demonstrated by Harrison (2001), the first will be more effective than the latter are strict "*?

### *The observation of a contingent phenomenon: "the environmental practices of French risky industries from May 2011 to April 2012"*

For a long time, IER have been no concern on the part of public authorities, society or industry. This is from the late 20th century that awareness for the protection of the global environment appears, especially with the first United Nations Conference on the Human

Environment (Stockholm, 1972). Twenty years later, at the Earth Summit in Rio de Janeiro, the environment is considered as a common and public good. And it is only since the 1990s, under pressure from the public and media, laws have multiplied. Environmental practices within companies have developed in favor of the environmental protection, and will certainly evolve in a different way. If the goal of our investigation is to highlight the structural elements of the IER management decision in risky industries, it is accepted that we only provide a photographed version of reality. Indeed, there is no permanence as in "hard sciences" where, for example, the researcher can observe the behavior of earthworms in an experimental context. Permanence and duration are thus "destroyed" by time and the learning phenomenon; the rules are only valid for a defined period. We are thus "sentenced" to observe obsolete phenomena because of their strong dependence on the context of the study.

In our case, we analyzed an evolutionary phenomenon and dated in time: the IER management in the French risky industries from May 2011 to April 2012. The survey results are not only dependent on the economic situation (economic crisis), the social context (tightening of environmental regulations), but also the cultural context (increasing sensitivity to environmental protection). In China, for example, frequent atmospheric pollution peaks, mainly caused by traffic emissions and industries, contributed to the gradual emergence of protest movements. In 2011, a movement was born around Pekingese public figures, businessmen and writers to require the government pollution measuring and information for populations. If this social pressure prompted the government and the Environment Agency to take measures to better regulate industrial activities, it is mainly multinationals that drive Chinese companies to manage environmental risks (Ortolano, 2012). A "code of practices for Apple suppliers" shows, for instance, that there is a set of rules on hazardous substances, solid waste, sanitary and storm wastewater, and gas fumes in the chapter on environmental impacts. However, when Apple is faulted, as has already occurred, NGOs or the media grab it and point fingers for its laxity vis-à-vis Asian suppliers. We understand that Apple, like other corporations, can defend itself by refusing to deal with ISO 14001 non-certified suppliers. This example shows the effectiveness of the market forces sometimes outweighs the regulators.

***Proposal for a study focusing on the leaders' psychology: what leader and agent of change to address the environmental challenges?***

The survey emphasizes the importance of "displayed" values by leaders to promote proactive environmental practices within firms. A study based on the leaders' psychology would thus identify capabilities for a more integrative IER management in businesses: be able to work with multiple stakeholders and understand their viewpoints, have a systemic view of reality, take into account the complexity of the issues, manage conflict (listening and negotiation), anticipate, etc. Interviews could be conducted with business leaders, whose analysis would lead to a typology of environmental leadership, and identify favorable organizational conditions for a proactive environmental management (selection of managers through an examination of their intrinsic qualities, their awareness of environmental issues; recruitment of ecologists and researchers within the organization, etc.) (Boiral & *al.*, 2009). In a Barrett Brown article (2012), the vertical learning is considered as the main trend of the future in the development of leaders. The vertical learning is *"living deep changes in our mental structures that change the way we see the world."* Leaders committed to sustainable development would require both a horizontal learning to constantly update their knowledge about the world, as a vertical learning to learn to change their way of seeing the world. Questions for which there are not yet answers are numerous. What leader and agent of change to address environmental

challenges? How to guide managers towards action logics more favorable to IER management? While many studies have investigated ethics and leadership from a normative or philosophical perspective, research on ethical leadership, specifically environmental leadership, are still embryonic, which offers opportunities for discovery for researchers and the opportunity for leaders to improve their efficiency to better address the new environmental challenges.

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[i] ICPE : Installations Classées pour la Protection de l'Environnement.

[ii] Duclos, D. (1991), *Les industriels et les risques pour l'environnement.*

[iii] http://www.installationsclassees.developpement-durable.gouv.fr/.

[iv] The different themes arise from a qualitative study, early conducted on the Bouches-du-Rhône industrial area.

[v] Different types of scales were used: attitudinal scale (Likert), importance scale, periodicity scale, intensity and comparative scales. These scales of measure are scientifically validated; their statements were adapted to our survey and completed by the qualitative study.

[vi] Réseau des Observatoires Hommes-Milieux (website: www.ohm-inee.cnrs.fr) and Observatoire Hommes-Milieux Bassin Minier de Provence (www.ohm-provence.org/).

[vii] Statistical adjustment by weighting was used because we observed a total non-response bias which led a light over-representation and an under-representation of certain categories of respondents within the final sample.

[viii] This method aims to bring together the closest observations. This criterion nearest neighbors means that each case is assigned to a class if it is very close to its center of gravity. It is recommended when the number of observations is greater than 100 and variables are quantitative, which is our case. In addition, the preparation step of the data was facilitated due to the absence of missing values and extreme points, and the use of comparable scale (Likert scales) to measure the variables used for classification. The high value of Cronbach's alpha (0.77) also indicates that the explanatory variables are highly correlated. Finally, to increase the validity of the classification, we first used the method of hierarchical cluster analysis to get an idea of the number and composition of classes. Then, we refined this classification with a non-hierarchical analysis following the recommendations of Punj and Steward (1983). It appears that the latter has a higher discriminant power (0.35) than the ascending hierarchical method (0.32).