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**VOLUNTARY ENVIRONMENTAL INITIATIVES:  
AN ANALYSIS ON THEIR EFFECTS ON THE  
CORPORATE BEHAVIOUR**

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## *Premise*

Along the last twenty years, Voluntary Environmental Initiatives (VEIs) and their capability to address proactive corporate behaviours have captured the interests of many researchers, politicians and executives. VEIs are environmental commitments whose main purpose is to encourage companies to achieve environmental performance that go beyond existing legal requirements. Their large application in most of OECD countries in the last years mainly obeys to the favourable attitude of both industry and public authorities towards these instruments. VEIs would allow, indeed, achieving superior environmental goals at lower costs.

VEIs have emerged so, as an innovative tool for business self-regulation, leaving important responsibility to firms. Companies can decide to undertake initiatives by subscribing agreements with other governmental and non-governmental organizations, while, at the same time, they can implement unilateral initiatives without the intervention of external actors. The adoption of VEIs should help companies to get involved into a more proactive attitude towards the environmental problems. It is expected that the participation in VEIs give way to an *actual* change in the corporate behaviour, leading to greener products and /or processes.

Since recent studies shed doubts of the effective capacity of VEIs to lead the companies to more proactive environmental behaviours, it is the main objective of this thesis to understand if the companies, participating in VEIs, take on more

proactive environmental behaviour and which type of strategy they adopt in order to do so. For this purpose, this work offers an empirical analysis on the European automobile sector. Since historically this sector has been always strongly regulated, I aspect that when companies participate in VEIs, then they are able to anticipate environmental regulation (euro standards). I measure the participation of these companies in VEIs considering the European Union “Framework Programmes” and, I assess their proactive behaviour measuring the degree with which they anticipate euro standard IV, in the years before its entry into force.

As firms participate in EU programmes, they propose several projects to the European Commission. If these projects are accepted, the companies receive funds to develop them. These projects can have as objective the promotion of product or process innovations or both types of innovation. The idea of this study is to understand what type of strategy, inside the programme, the companies adopt to anticipate regulation. For this analysis the data are collected from CORDIS (Community Research and Development Information Service) and VCA (Vehicle Certification Agency).

The results show that more proactive behaviours come from companies that participate in more projects whose purpose is to innovate in the product. The companies participating in projects, whose objective is to develop process innovations, show a positive attitude toward the anticipation of regulation but not in significant way. This effect is moreover reduced when the companies participate in projects whose objective is to develop both types of innovation.

# CHAPTER 1

## INTRODUCTION

### 1.1 PROBLEM DEFINITION

VEIs are environmental commitments whose main purpose is to encourage companies to achieve environmental performance beyond existing legal requirements. At the beginning of the 1990s, the use of VEIs is strongly increased in most OECD countries. In the European Union, significant examples of VEIs are the German and the French agreements on GHG emission reduction, the European ecolabelling scheme, the EcoManagement and Auditing Scheme (EMAS) and the Eurelectricunipe's energy wisdom programme (Kollman and Prakash 2002). In USA, famous examples of VEIs concern the Responsible Care, EPA 33/50, the Common Sense Initiatives (CSI), WasteWise, Project XL and Green Lights (Arora and Cason 1995; Arora and Cason 1996; Khanna and Damon 1999; Videras and Alberini 2000; Welch, Mazur et al. 2000; Carmin, Darnall et al. 2003; Vidovic and Khanna 2007). In Japan, there are examples like the Yokohama Environmental Agreements, the Keidanren Voluntary Action Plan (the case of the steel Industry) and the JAMA agreements. Furthermore, at the global level, other examples of VEIs are ISO 14001, the OECD Guidelines for Multinational Interprice, the United Nation global compact and the Business Charter for sustainable Develop (Cristmann and Taylor 2002).

This large use of VEIs, it is mainly due to the favourable attitude of both industry and public authorities. Industry believes VEIs to be flexible instruments to achieve superior environmental goals at lower costs. Public authorities consider VEIs as a means of regulatory reform. Nowadays, many policymakers believe that additional environmental improvement can be achieved at a reasonable cost, only if firms adopt a more proactive attitude. The importance of VEIs, however, goes beyond efficiency motivations. There are also strategic reasons to participate in VEIs. Firms can acquire competitive advantages. The globalization forces the companies to pay attention to not only the environmental scrutiny by national governments and other multiplicity of non-governmental organizations, but also to satisfy the international requirements. These increased stakeholder pressures lead the firms to use VEIs as an instrument to balance their own interest with the broader public interest (Cristmann & Taylor, 2002).

Thus, VEIs have emerged as an innovative tool for business self-regulation, leaving important responsibility to firms. Companies can decide to undertake initiatives by subscribing agreements with other governmental and non-governmental organizations, while, at the same time, they can implement unilateral initiatives without the intervention of external actors. The decision to adopt VEIs should help companies to get involved into a more proactive attitude towards the environmental problem. It is expected that the participation in VEIs gives way to an *actual* change in the corporate behaviour, leading to greener products and /or processes.

Most of empirical evidences analyse the processes of adoption of VEIs, studying the pressures companies receive from their own stakeholders (Arora and Cason 1995; Henriques and Sadorsky 1999; Buysse and Verbeke 2003). These studies, however, do not reply to an emerging and more interesting question about VEIs: what is their actual effect on the corporate behaviour? A growing body of empirical works underlines that these initiatives have generally little impact on the behaviour of their participants. In many cases, it is verified that firms adopt or participate in a program because several stakeholders pressure them, but then they do not implement any practice actually. In these cases companies behave as *free riders*, because they benefit of VEI participation but they do not contribute to the achievement of its objectives.

Only recent studies try to understand the circumstances that can lead the companies to have no proactive behaviours. This lack of studies, it is principally due to the difficulty of measuring corporate proactive behaviours. Several studies identify and measure proactive corporate behaviours with the simple adoption of VEIs. But, this procedure does not provide sufficient information about the effective implementation of a programme. In other studies, VEI implementation is often associated to the improvement of pollution emissions. The problem in this case, it is the accuracy of the environmental performance measures. It is well-known the complexity of measuring pollution emissions. Many factors can influence the level of emissions of a corporation. In many cases, then, the same firms declare their emissions, with the risk that they are not the real emissions.



## **1.2 OBJECTIVES**

A first objective of the following thesis is to argue that the only adoption of VEIs is not an adequate measure to study the corporate behaviour. The firms adopting VEIs not always implement the practices that the initiatives encompass. In many cases, companies use their participation in VEIs only to improve their green image, as they do not have a real commitment to change their behaviour. For this reason, I suggest the need to split the concept of proactive corporate behaviour, in VEI participation and proactive environmental behaviour. For proactive environmental behaviour, I intend that the firms not only adopt a VEI, but they also implement strategies to achieve the objectives of the VEI wherein they participate. This distinction allows proposing a theoretical model. In this model, I defend the idea that the proactive corporate behaviours are moderated by the interactions that the company has with particular category of stakeholders which are involved in the design of the program. I suggest that the likelihood that a firm develops a proactive environmental behaviour depends on the intensity of these interactions.

A second objective of the thesis is to give much more importance to the actors that participate in the design of an initiative. In the literature there is little attention to program design. Few researches investigate how the firms are involved in the program development and who stakeholders participate in the design. Some recent contribution sheds light on who are the stakeholders that participate in the program design and what is the intensity of their participation

(Carmin, Darnall et al. 2003). However, this type of studies does not clarify how VEIs can orientate proactive corporate behaviours. It is important to note that VEIs offer a context of multiple stakeholder interactions. When the firms adopt VEIs, they interact with several stakeholders. In this work, therefore, I defend the idea that more proactive environmental behaviour can occur whether determined interactions happen.

Finally, I test empirically, if the companies that participate in VEIs have proactive environmental behaviours and which strategies they adopt. The empirical study is focused in the European Automobile industry.

### **1.3 CONTRIBUTIONS AND DISTINCTIVE CHARACTERISTICS OF THE WORK**

From a theoretical point of view, this work contributes to the literature in three. It provides a more comprehensive understanding of VEIs phenomenon. In this study, these are identified the principal drivers that define different types of VEIs and, according to these drivers, several examples of VEIs present in the literature are classified. This work offers, indeed, a broad assess of the most significant VEI experiences systematizing many economic, managerial and political studies. Second, the theoretical model suggests which strategic relationships among stakeholder in VEI design, encourage more proactive corporate behaviours. This idea has as objective to address future researches toward the study on which successful partnership in a VEI are. Third, this work puts forward the idea to test the effective behaviour of companies when they participate in the initiative, providing an empirical study with this idea in mind.

Besides, from an empirical point of view, this study contributes significantly to European literature. Many evidences based on longitudinal data about VEIs are, indeed, focused on US initiatives. The few studies that analyse European initiatives are case studied. This study is the first real effort to collect data also for EU VEIs. Final, the most important contribution of this work is to try to recognize validity to the use of VEI, as alternative instrument to traditional command-and-control regulations in solving environmental problems. If the corporate behaviour effectively changes when VEIs are adopted, then their promotion takes importance. On the contrary, it can be preferable to continue managing environmental problems by regulation.

#### **1.4 STRUCTURE AND ORGANIZATION OF WORK**

The following chapters of thesis are structured in the following way: the chapter 2 describes the different typologies of VEIs and the principal stakeholders that can be involved in VEIs. In this chapter the principal drivers to classify different types of VEIs are identified and several examples of VEIs are reported. The chapter 3 addresses theoretical arguments applying the descriptive stakeholder theory as the most appropriate theory for explaining VEIs phenomena. In this chapter, the theoretical model is presented and propositions are formulated. The chapter 4 offers an empirical evidence about VEIs in the European Automobile industry using data from CORDIS and VCA. Finally the chapter 5 present the conclusions of this work and future research opportunities.

## CHAPTER 2

### DESCRIPTION OF THE THEORETICAL FRAMEWORK OF VOLUNTARY ENVIRONMENTAL INITIATIVES

#### 2.1 INTRODUCTION

The objective of this chapter is to introduce the theoretical framework that will characterize the entire work. In this chapter these will be described the characteristics of Voluntary Environmental initiatives (VEIs), why they are promoted and adopted, who sponsor and design them, and which effects these have *actually* on corporate behaviour.

The first paragraph discusses the principal characteristics of VEIs, putting particular emphasis on role played by sponsors and designers. The study of who sponsors and designers a VEI is important because allows defining different types of VEIs. The literature provides many examples of VEIs. If these examples are categorized by sponsors and designers, then a better understanding on types of collaboration that VEIs try to promote, it is obtained. The second paragraph focuses on the motivations that lead governments to adopt VEIs as alternative environmental policy instruments. The initiatives are so analyzed considering specific institutional contexts like those of European Union, Japan and United States. Differences among a same type of initiatives are also analysed. In the third paragraph, the attention is then put on the motivations that lead the firms to adopt VEIs. Here, a detailed review of empirical evidences it is provided, in

order to understand the type of data used, the methodologies applied and the variables employed. The fourth paragraph, finally, underlines what are the contributions of recent works and what are the trends for future researches.

## **2.2 THE CHARACTERISTICS OF VOLUNTARY ENVIRONMENTAL INITIATIVES**

Voluntary environmental initiatives (VEIs) are private or public efforts directed to improve corporate environmental performance beyond existing legal requirements (Paton 2000). They consist of environmental management systems (EMS), guidelines, principles, codes, standards and programmes that address how to reduce environmental pollution. They are no mandatory. The firms decide to undertake a VEI to achieve higher green performance without coercion. Through this decision, they demonstrate of wanting to undertake efforts going beyond the compliance of regulative standards. For this reason, they are not burdened by monetary sanctions, if they do not accomplish to the established settings of VEIs (Lyon and Maxwell 1999; Khanna and Anton 2001; Alberini and Segerson 2002).

VEIs can be sponsored by several organizations such as firms, governmental agencies, trade associations, no governmental organizations (NGOs) and third parties. The sponsors develop and administrate VEIs and, in some case, finance them. The sponsors decide whether and which stakeholders to involve in the VEI design, as well as the intensity of their participation. Number and type of stakeholders involved in the initiative and the intensity of their involvement, define the final design of VEIs (Carmin, Darnall et al. 2003).

### **2.2.1 DRIVERS TO CLASSIFY DIFFERENT TYPES OF VEIS**

The literature classifies the VEIs in three broad categories: i) public voluntary programs, also called voluntary government programs, ii) negotiated or bilateral agreements and iii) self regulation or unilateral commitments (Maxwell, Lyon et al. 1998; Khanna and Anton 2001; Alberini and Segerson 2002; Glachant 2007).

This classification remarks the presence of initiatives sponsored and designed by government, wherein other actors do not participate in the design of the programme (public voluntary programmes); initiatives sponsored by government wherein other actors are called to define VEI goals and enforcement mechanisms (negotiated agreements), and initiatives that are not sponsored by government (unilateral initiatives). These latter are initiatives promoted by the industry or by third parties (no industry and no governmental organization (NGOs)), where the government participate almost always as external actor. Namely, it encourages the adoption of a programme after that it has been launched, providing, for example, financial support or tax releases to firms adopting it. Thus, in many cases, it does not participate in the design.

All VEIs are characterized by internal and external actors. An internal actor is who participates actively to the definition of VEI design. The organizations and subjects that participate to the definition of goals and enforcement mechanisms of a VEI can be, thereafter, defined as internal actors. On the other hand, all those organizations and subjects that encourage the diffusion of a VEI, after that it has been designed and launched by designers, can be defined as external actors.

Obviously, it can be argued that also the designers could encourage the diffusion of a VEI once that they have designed it and, this would lead to classify them contemporary as internal and external actors. Actually, the reasons that guide an internal actor to encourage the adoption of a VEI are strictly linked to the fact that they have designed the programme. Instead, the reasons that lead an external actor to encourage the adoption of a programme can be totally independent from its design. This explanation leads to suggest that the designers can be defined simply as internal actors.

These arguments are important to clarify different typologies of VEIs. The existing academic and practitioner literature provides many examples of VEIs, but they often lack of an ordered classification. For this purpose, in the figure 1, it is proposed a well-arranged framework to classify VEIs. Two principal drivers are identified to define a VEI type: 1) who sponsors the VEIs and 2) who designs VEIs:

**FIGURE 1 - DRIVER TO CLASSIFY VEIS**

		Program Sponsor actors		
		<b>Government</b>	<b>Industry</b>	<b>Third parts</b>
<b>Program design actors</b>	<b>Government</b>	1 Public Voluntary Programs	2 VAs	3 VAs
	<b>Industry</b>	4 NAs	5 Industry Code & EMS	6 VAs
	<b>Third parts</b>	7 NAs	8 VAs	9 Standards

*Source: My elaboration*

In the figure, the horizontal axis indicates the typical actors that sponsor VEIs, whereas the vertical axis shows the potential actors, which can be called to participate in the VEIs design. The quadrant 1, 5 and 9, (diagonal axis from left to right of the figure) represent the types of VEIs wherein the sponsor does not invite other organization to design the programme. The VEIs are, namely, sponsored and designed by unique actor, which can be the government, the industry or third parties. In the literature, these initiatives take, respectively, the name of public voluntary programs (Q1); industry code and Environmental Management System (EMS) (Q5) and standards (Q9). The rest of the quadrants, instead, represent types of VEIs, wherein the sponsors involve other actors in the design of the programme. In these cases, targets and enforcement mechanisms are negotiated between more parties. These VEIs take usually the name of Negotiated Agreements (NAs), when the sponsor is the government and of Voluntary Agreements (Vas), when the sponsor is the business or other parties.

In the following paragraphs, the objective will be to collect different typologies of VEIs met in the literature and to systematize them in the respective quadrants.

### **2.2.2 EXAMPLES OF VOLUNTARY ENVIRONMENTAL INITIATIVES ANALYSED IN THE LITERATURE**

Public voluntary programs and NAs sponsored by the government are defined as policy tools alternative to command-and-control regulations (Segersen and Miceli 1998). This definition comes from the fact that the government can decide to manage environmental problems by regulation or by VEIs. From this point of



view, VEIs are considered an innovative and flexible environmental policy instruments. These are innovative because encourage in particular the firms to collaborate with government. These are flexible because give firms the possibility of deciding the most efficient way of reducing the pollution. Differently from the regulation, VEIs does not impose to firms the adoption of specific abatement technologies in order to achieve the established standards (Maxwell, Lyon et al. 1998; Delmas and Terlaak 2001; Knanna 2001). Thus, VEIs allow firms of obtaining possible economical benefits from environmental management (Porter and Linde 1995).

In the public voluntary programs, the government establishes a set of environmental performance standards, and then invites firms to meet these targets. The companies and other organizations, therefore, do not participate to the stage of standard definition. These take part only to the stage of diffusion of the initiative. In voluntary program, besides, it can occur that the government, once designed the programme, invites specific firms to adopt it. This type of invitation is done, in many cases, by publishing the company's names on documents, which communicate the launch of the programme. This type of procedure generates strong pressures on the targeted firms, because affect directly the reputation of the firms. In other cases, the government only diffuses the program using marketing activities, which are supported by various external stakeholders. If the firms decide to take on the program, their participation is formalized through the sign of non-binding letters of agreements. In these letters,

companies commit to accomplish established environmental standards and to communicate the progresses by self-reporting (Khanna and Anton 2001).

Significant examples of public voluntary programs in US are 33/50 Program, Green light Program and Waste Wise Program, sponsored by EPA (Environmental Protection Agency) between 1991 and 1994. The 33/50 Program was targeted to reduce the transfer and chemical release of 17 high-priority pollutants by 33% in 1992 and by 50% in 1995. Green light Program encouraged U.S. corporations to install energy-efficient lighting technologies to reduce the emissions of CO<sub>2</sub>. Waste Wise Program challenged firms to find practical methods to reduce municipal solid wastes. These three programs had different objectives, target sectors and diffusers' stakeholders. In the case of 33/50 Program, EPA invited to specific firms to participate. The companies were selected on the basis on the toxicity concerns, high volumes of industrial use and potential for reduction through the pollution prevention (EPA 1995; EPA 1999). In the cases of Green light Program and Waste Wise Program, EPA did not launch a specific invitation. EPA encouraged the diffusion of the initiatives to charter endorsers such as professional associations, trade associations, academies, boards, institutes and societies (for a detailed analysis of public voluntary programs in US, see Mazurek (Mazurek 1998). In Europe Union, significant examples of public voluntary programs, which are met in the empirical literature, are EMAS (EcoManagement and Audit Scheme), which deals with the certification of environmental management practices, and the European Eco-labelling Scheme,

set up to label products with reduced advance environmental impact (Cristmann and Taylor 2002; Rennings, Ziegler et al. 2006). Both the programs are sponsored by the European Union and their aim is to promote an action of different actors to develop a more active and responsible participation of the firms towards environmental compatibility. In order to obtain EMAS, a “check up” of the environmental state of a firm is done. This checkup allows evaluating and testing the ecological performance of a firm through an objective and systematic method testing the constant and direct appliance of operational systems and of proceedings respecting the environment. Ecolabel is formed by an eco-label or a quality mark which is assigned to those products resulting in conformity with the criteria previously established and regarding the whole life cycle of the product (Cesaroni and Arduini 2001).

The second type of VEIs, are the NAs. NAs are initiatives wherein government and other parties design a programme. The government promotes the initiative such as in the public voluntary program, but invites firms and other organizations to participate in stage of the definition of the environmental goals of the VEI. The number and the type of participants can differ largely from an initiative to another and this can influence largely the content of a programme. NAs can differ for the processes adopted by government to reach agreements, for the implementation of agreements and for the level to which the negotiations are made. These can have a local or national level. The risk that is often associated by the literature to this type of initiatives, concerns the recognized chance for

firms of negotiating environmental standards, which really are below to the company's possibilities. In this way, the corporate efforts are reduced and the environmental goals are easily achieved (Segersen and Miceli 1998; Delmas and Terlaak 2001). This type of possibility generates a problem of credibility of NAs (Steelman and Rivera 2006).

Some significant examples of these VEIs in US are the Common Sense Initiatives (CSI) and the Project XL. CSI was launched in 1994 by EPA. It was part of the early Clinton administration's platform to reinvent the government. Its objectives were to make dramatic changes that they would result in "cleaner, cheaper and smarter" solutions to environmental problems (Coglianese and Allen 2004). CSI had two levels of structure – a council and specialized subcommittees.<sup>1</sup> The council's member were responsible for evaluating subcommittee proposal and deciding whether any recommended projects within each sector should be reported to the EPA administrator. The subcommittees<sup>2</sup> had the flexibility to do research, propose pilot projects, conduct preliminary information gathering, and recommend demonstration projects for consideration by the CSI Council. CSI's operating framework required the initiative's various committees to make decisions based on consensus. Participants interpreted consensus to mean strict unanimity. The difficulties to achieve a strict unanimity, determined long times for project selection and, hence, the scarce success of CSI (Coglianese and Allen 2004). Also the Project XL, launched by EPA in 1995,

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<sup>1</sup> The member of both groups included representatives of industry; national and local environmental organizations; environmental justice and community groups; labor unions; and state, local and federal governments.

<sup>2</sup> The subcommittees represent six industries: automobile manufacturing, computers and electronics, iron and steel, metal fishing, petroleum refining and printing.

had ambiguous results in the United State. It emerged as prototype for a new regulative regime. President Clinton called this type of agreements a “regulative blueprint” for the future regulation (Blackman and Mazurek 2001). Their objective was to grant companies relief from existing regulative procedures in exchange of environmental performance superior to status quo standards. In this case, the process of project selection was slimmer. First, applicants draft project proposals and submit them to EPA, and EPA regional office, state regulator and other local stakeholders supported this stage.<sup>3</sup> Next, a team of EPA and local regulators reviewed, according to eight criteria, the projects and decided if they must go on. If the projects met the criteria, the applicant, regulator, and direct participating stakeholders negotiate a final project (Blackman and Mazurek 2001). The scarce results of this experience were attributed to coordination problems among federal, regional, and local regulators and a lack of clarity in project guidelines (Blackman and Mazurek 2001). In Europe and Japan, NAs are the type of VEIs more diffused, because of the better relationships that characterize government and industry (Knanna 2001). Focusing the attention on Europe, interesting case studies are those promoted by the European Commission: the French agreements on the reprocessing of end-of-life-vehicles and the agreements on GHG emissions with aluminum industry, the German agreements on the reduction of GHG emissions and the covenants in Netherlands (CEC 1996b; Börkey, Glachant et al. 2000).

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<sup>3</sup> In the initiative the sponsor are responsible for seeking and enlist the support of stakeholders including communities near the project, local and stake government, businesses, and the environmental advocates.

The third type of VEIs are the unilateral commitments. The unilateral commitments or self-regulation initiatives are environmental programs sponsored by industry and third parties. VEIs promoted by the industry can have as sponsors, trade associations, individual companies and not affiliated company groups. VEIs promoted by third parties can have as sponsor standards-setting bodies, advisor groups, environmental advocacy organizations and, in general, a wide range of special interest groups which take the name of non-governmental organizations (NGOs) (Carmin, Darnall et al. 2003). As said before, in this type of initiatives, the government has in general a limited role in the stage of design of the program. Its intervention is more likely in the stage of diffusion of the program. It promotes incentives to the firms that adopt these programs.

Some famous examples of individual corporate initiatives are “Environmental Management Standards” by Volvo, “Toxic Use and Waste Reduction Program” by Polaroid (Maxwell, Rothenberg et al. 1997), “design manufacturing waste out” by Procter & Gamble (Berry and Rondinelli 1998) and “Comprehensive Waste Reduction Action Plan” by McDonalds (Lyon and Maxwell 1999). Other significant examples of initiatives sponsored by trade associations are the “Responsible Care”, undertaken by the Chemical Manufacturers Association (CMA) in 1989; the “Responsible Distribution Process” launched in 1991 by National Chemical Distribution; the “Encouraging Environmental Excellence” initiatives, promoted in 1992 by American Textile Manufacturers members; the “Sustainable Forestry Initiative” emitted in 1994 by the American Forest and

Paper Association and the “Sustainable Slopes Programs” established by U.S. National Ski Areas Association in 2000 (Lenox and Nash 2003; Rivera and Leon 2004). Still, a large number of unilateral initiatives undertaken by coalitions of firms are reported in UNEP (1998).

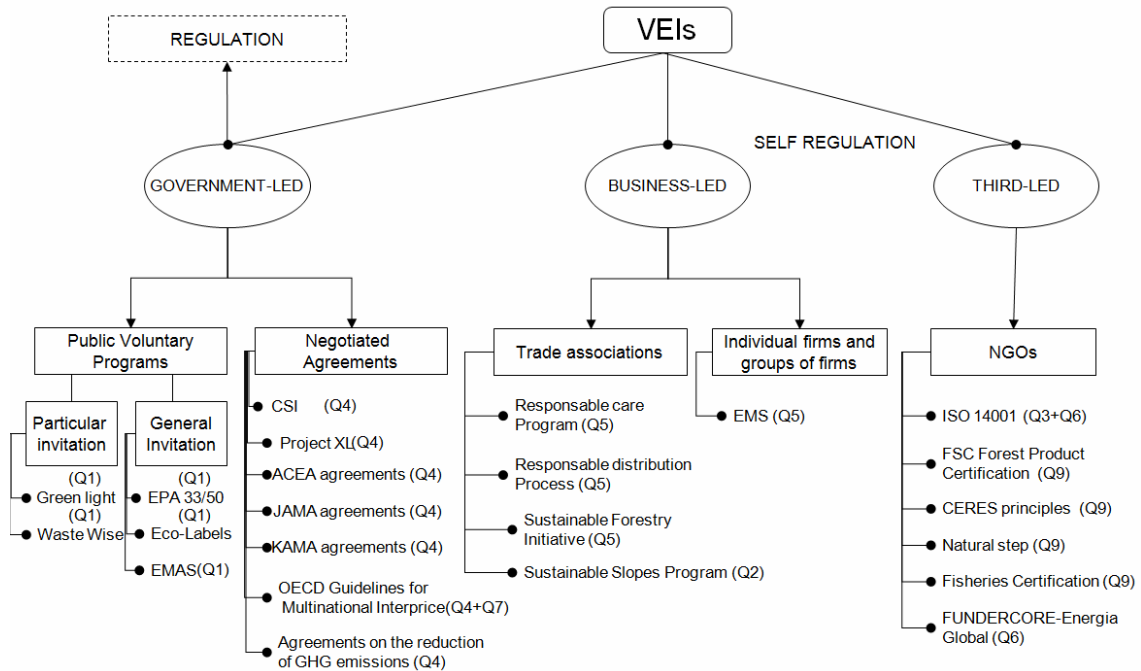
Finally, significant examples of initiatives sponsored by third-parties are the FSC Forest Product Certification, CERES principles and Fisher certifications, all sponsored by NGOs (Nash and Ehrenfeld 1997; Cristmann and Taylor 2002). The Natural step promoted by Dr Karl-Henrik Robert, the FUNDERCORE-Energia Global sponsored by Fundación para el desarrollo de la Cordillera Volcánica Central with the collaboration of private hydrogen firms and the famous ISO 14001, sponsored by the International Organization for Standardization with collaboration of industry, national governments, advisor groups and citizen (Christmann 2000; Kollman and Prakash 2002).<sup>4</sup>

The previous analysis about VEIs is summarized in the framework showed in figure 2 and in table 1. In the figure 2, it is possible to note that each example of VEIs is also classified according to the drivers indicated in the figure 1. This classification has been possible by a careful study of participants of VEIs as reported in the table 1.

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<sup>4</sup> A detailed description of ISO 14001 is provided in the chapter 3 of the thesis.

**FIGURE 2 - DESCRIPTIVE STRUCTURE OF VOLUNTARY ENVIRONMENTAL INITIATIVES**



Source: My elaboration

**TABLE 1 - SPECIFICATIONS ABOUT SPONSORS AND DESIGNERS**

VEIs	Sponsor and designer specifications
33/50 Program	US EPA
Green light (energy star)	US EPA
Waste Wise Program	US EPA - (Office of Solid Waste and Emergency response)
Eco-Management and Audit Scheme (EMAS)	Council of Ministers European Parliament and the Commission
Eco-Label	Council of Ministers European Parliament and the Commission
Common sense initiatives	Council and specialized subcommittees + industry
Project XL	EPA regional office + industry
ACEA Agreements	European commission's directorate-general Environment + European automotive industry association
JAMA Agreements	European commission & Japan Automobile Manufacturers Association
KAMA Agreements	European commission & Korean Automobile Manufacturers Association
OECD Guidelines for Multinational Interprice	OECD staff , business communities labor and other NGOs representatives
French agreement on GHG emissions	Ministry of the Environment and P�echiney + the largest aluminium company
Business charter for sustainable development	International Chamber of Commerce
Encouraging Environmental Excellence	American Textile Manufacturers members
Responsible Care	Chemical Manufacturers Association
Responsible Distribution Process	National Chemical Distribution Association
Sustainable Forestry Initiative	American Forest and Paper Association
Sustainable Slopes Program	National Ski Areas Association (NSAA) + Costa Rica government
FSC Forest Product Certification	Forest Stewardship Council (Environmental NGO)
CERES principles	Coalition for Environmentally Responsible Economies (Environmental NGO)
Natural step	Dr Karl-Henrik Robert (research oncologist)
Fisheries Certification	Marine Stewardship Council (Environmental NGO)
FUNDERCORE-Energia Global	Fundaci�n para el desarrollo de la Cordillera Volc�nica Central (FUNDERCORE - Environmental NGO) +private hydrogen firms
ISO 14001	International Organization for Standardization (Standard-setting NGO) industry + national governments + advisor groups and citizen

Sources: My elaboration based on several references



In the analysis of VEIs, no examples have been met that can be classified as Q3, where VEIs are sponsored by third parties and designed with the collaboration only of the government; as Q7 where VEIs are sponsored by government and designed with the collaboration only of third-parties; and as Q8 where VEIs are sponsored by industry and designed with the collaboration of third-parties. On the other hand, there are more frequent the cases where VEIs are sponsorees by government and designed with the collaboration of industry and third parties (Q4+Q7), as well as the case where the initiatives are sponsored by third parties and designed with the collaboration of industry and government (Q3+Q6).

From this analysis, the most evident result is the low frequency with which government and industry collaborate only with third parties in the design of a programme. It is much more probable that when third-parties are involved in the design of VEIs, also other actors are involved. This result is perfectly coherent with the idea that VEIs arise principally to increase forms of collaboration between government and industry. In a very few cases third parties are involved in the program design, and when they are involved, in many cases, they finish to have a marginal role in the decision making. In the following paragraphs, it will be better argued that just this lack of third party participation in the design, reduces the credibility of VEIs and the idea of VEIs as “greenwashing” schemes (Steelman and Rivera 2006).

### **2.3 WHY DO GOVERNMENTS USE VEIS AS ENVIRONMENTAL POLICY TOOL? AN ANALYSIS OF DIFFERENCES ACROSS COUNTRIES**

At the beginning of the 1990s, the use of VEIs is strongly increased in most OECD countries. The numbers of VEIs in force become impressive in Japan, with more than 30.000 local VEIs, in the European Union, with more than 300 VEIs, and in the US, with 42 initiatives. This increase is mainly due to the favourable attitude of both industry and public authorities towards these instruments.

Industry believes that VEIs in environmental policy help reduce both compliance and enforcement costs and can provide business with additional flexibility and motivation to tailor approaches to their specific needs. VEIs are believed to be flexible instruments, which can encourage companies to respond to environmental demands. They can help promote partnerships with public authorities, allow for quicker and smoother achievement of environmental objectives and reduce the administrative burden (Porter and Linde 1995; Videras and Alberini 2000).

Public authorities consider VEIs as a means of regulatory reform. Nowadays, many policymakers believe that additional environmental improvement can only be achieved at a reasonable cost, if firms adopt a more proactive attitude. VEIs have the advantage of leaving important responsibility to firms and to be conceivable only in a framework of public-private partnership. Public authorities also find other advantages when promoting VEIs. Firstly, VEIs enable more

rapid action compared to traditional instruments, as there are fewer formal requirements for their design and implementation. Secondly, for some levels of government (especially at the local level) VEIs may sometimes be the only way of taking environmental action, when those authorities officially lack any legal basis for action. Finally, VEIs are believed to be a more feasible option than, for example, taxes whenever industry opposition to more traditional instruments is particularly strong (Delmas and Terlaak 2001; Carmin, Darnall et al. 2003).

### **2.3.1 VEIS AS ENVIRONMENTAL POLICY INSTRUMENT IN EUROPEAN UNION**

In Europe, the idea to adopt VEIs as regulatory reform is applied in most Member states. Positive attitude towards these instruments are expressed by the European Commission (EC) in the 5<sup>th</sup> Environmental Plan of Action (1992). The overall objective of this plan is to set policy making in the EU within a sustainable framework of economic and social development (Börkey, Glachant et al. 2000). Thought this plan, the idea is to realize a new pattern of economic and social development through a greater investment of responsibilities from the interested parties. The strategy of the plan is based on the dialogue among the economic and social actors (consumers, managers, public administrators, non-governmental organizations). This is the origin of a new policy trend that highlights the need of enlarging the range of political instruments for environmental purposes (Cesaroni and Arduini 2001). “In order to bring about substantial changes in current trends and practices and to involve all sectors of

society, in a spirit of shared responsibility, a broader mix of instruments needs to be developed and applied. Environmental policy will rest on four main sets of instruments: regulatory instruments, market based instruments (including economic and fiscal instruments and voluntary agreements), horizontal supporting instruments (research, information, education, etc.) and financial support mechanisms”(Börkey, Glachant et al. 2000). In 1996, still, the European Commission suggests that environmental agreements “can offer cost effective solutions when implementing environmental objectives and can bring about effective measures in advance of and in supplement to legislation” (CEC 1996a).

Thus, the 5<sup>th</sup> Environmental Plan of Action determines a true conversion from a prohibition to a prevention trend. The orientation to prevention policies dominate the command and control approach, and relationships among firms, policy, law and controls result modified (Cesaroni and Arduini 2001). An important element of innovation introduced by this plan is the fact that the environmental matter is considered as a whole and not as a solution of single problems. Before the implementation of this new approach, all the measures adopted by the European Community were not sufficient to break down the pollution levels (Commission of European Community, 1993). The idea of facing the problem from a global prospective comes also from the cares of safeguarding the internal competition of the European Market (i.e., to avoid the unequal standards in the different member states) as well as from the need to support the Unique European Market (Cesaroni and Arduini 2001).

The promotion of public voluntary programs like EMAS and Eco-Labels sustain this idea. These are designed unilaterally by public authorities, and represent one item on a menu of regulations firms may choose from. The choice is either between a voluntary scheme and another instrument or between a voluntary scheme and the status quo. In the former case the programs are intended to facilitate the transition towards new regulation and avoiding a possible loss of competitiveness for the firms. In the second case, the aim is to provide incentives for going beyond existing regulation and eventually inducing technological or organizational innovation. These programs are thus conceived as a complement to other policy instruments (Börkey, Glachant et al. 2000).

However, NAs result more used than public voluntary programs. They are negotiated between public authorities and industry, and for the most part define collective pollution abatement target for branches of industry. Different partners then exist respect to the scope and the implementation of agreements. NAs can, indeed, deal with the production processes or the product, and have as object the definition of targets or the negotiation of timetables in order to achieve already established targets (implementation) (CEC 1996b). The most of the European NAs are made at the national level, even though there countries like Italy, France and Germany that count agreements between regional authorities and industries (Börkey, Glachant et al. 2000). A large number of NAs are founded by Member states in the most polluting industrial sectors such as the chemical and energy industry and used, in particular, for waste management (CEC 1996b; EEA 1997).

Finally, in Europe, NAs may be legally binding or nonbinding, depending on whether executive branches of government are empowered by national constitutions to sign such initiatives with organised interests. In Germany, for example, the Constitution does not allow the government to sign NAs, and these remain therefore nonbinding, despite the fact that public authorities participate in targets definition and subsequently recognise the agreement. Binding agreements are the exception rather than the rule in the EU. The only state where agreements are systematically binding is the Netherlands (Glachant 2007).

### **2.3.2 VEIs AS ENVIRONMENTAL POLICY INSTRUMENT IN JAPAN**

The types of VEIs in operation in Japan are the negotiated agreements, also named “pollution control agreements”, and the unilateral commitments by industrial organisations, also named “voluntary action plans”. Focusing the attention on the first type of approach, NAs are bargained between local governments or municipalities and individual industrial plants. These play a significant role in regulating industries at the local level because replace in many cases the traditional regulation. Their main difference with the European NAs lies, indeed, in their local character and the absence of a collective dimension as agreements are signed with individual industrial plants (Imura 1998a).

In Japan, two are the reasons that lead the government to promote local environmental agreements. First, the growing industrial pollution that comes from the concentration of activities in certain areas. Second, the particular legal setting preventing local governments from issuing their own environmental

regulations, more adapted to local conditions. With the high industrial concentration, the national environmental regulation is not able to manage the pollution problem. Since law precludes local governments to issue their own regulation, the only means for these authorities to tackle local environmental conditions is the direct negotiation with the plants (Börkey, Glachant et al. 2000). Thus, at the start in the 1960s and 1970s most agreements aimed at controlling pollution from manufacturing factories and electric power plants. More recently they also are extended to the service sector.

Nowadays, however, negotiated agreements are preferred not only when it is legally impossible to issue local regulation, but also when this would be possible (e.g. in the absence of national law). The reason lies in the institutional requirement on local ordinances, which must be approved by the local legislature. In contrast, negotiated agreements are exempted from such a procedure, so using NAs appears subject to less institutional obstacles, and constitutes a faster way for local authorities to establish environmental requirements (Imura 1998b).

Public parties to these agreements are in most cases prefectural governors or mayors of municipalities, but a growing number of agreements also involve the participation of NGOs. In 1988 about 13 per cent of the agreements concluded during that year involved an NGO and a company. In addition, an additional 10 per cent of the agreements between local authorities and companies involve the

participation of citizen associations either as a third party to the agreement or as witnesses (Börkey, Glachant et al. 2000).

### **2.3.3 VEIs AS ENVIRONMENTAL POLICY INSTRUMENT IN UNITED STATE**

In the United States, VEIs have become standard in the environmental policy tool kit since the 1990s. This development is at the confluence of several events, including more complex regulations, technical innovation and scientific discoveries, cuts in regulatory budgets and increased concern with the costs imposed by environmental regulations. In 1981, President Reagan called for regulatory impact analysis to weigh the potential benefits to society of a regulation with its potential costs. The emphasis on cost raised the profile of environmental economics both within and outside the EPA and in the 1990s helped broaden support for economic instruments, such as emissions trading markets, in lieu of traditional command and control regulation that was increasingly considered less efficient and more costly (Koehler 2007).

Thus, since 1990 42 VEIs are developed by the EPA and industrial trade organisations. The EPA, either independently or in tandem with other federal agencies, administers 33 of the 42 initiatives. In parallel, the international business community makes a concerted effort to be a proactive participant in debates on environmental protection with the formation of the World Business Council for Sustainable Development at the 1992 Rio Earth Summit. In 1996, the ISO 14001 standard is issued unleashing a global wave of voluntary certified



management systems targeted broadly at improving corporate environmental management (Börkey, Glachant et al. 2000; Koehler 2007).

As noted early, most VEIs are public voluntary programmes and unilateral commitments by industry organisations. Only two examples of negotiated agreements are present in the literature: the Common Sense Initiative and project XL. These initiatives are very different from the European or Japanese agreements. Both are an attempt by EPA to reform environmental regulation, and are devised in response to complaints from the business community regarding the growing detail and complexity of federal pollution laws.

Negotiations between firms and public authorities in project XL and CSI concentrate on two aspects: the environmental target to be met by companies and regulatory relief granted by EPA to participating firms. To this extent, these initiatives are similar to NAs in Europe or Japan. However, a major difference lies in their scope: while NAs substitute for traditional regulation in Europe and in Japan, the US initiatives are more designed to complement it. Their ultimate objective is not to provide a substitute for traditional regulation, but to improve upon it (Börkey, Glachant et al. 2000; Cesaroni and Arduini 2001).

On the other hand, Public voluntary programs account for the majority of VEIs in the US. The environmental focus of EPA voluntary programs is primarily on meeting the goals of the Clinton Administration's 1993 Climate Change Action Plan (CCAP) or to adopt voluntary goals established under the Pollution Prevention Act of 1990. Participation in public voluntary programs has steadily

risen since the introduction of the 33/50 programme in 1991. In 1996, about 7.000 corporations, small businesses, local governments and nongovernmental organisations participated in public voluntary and in negotiated programmes (EPA 1999). By and large, EPA's voluntary climate change programmes have the largest number of participants. In 1996, the Green Lights programme alone accounted for 2.338 participants. More than 500 organisations participated in the various Energy Star programmes (EPA 1998).

US voluntary programmes target individual companies in roughly nine major US sectors from extraction (mining) to manufacturing (chemicals electronics and computers). Unlike the European context, no national public scheme specifically seeks to reduce packaging waste. However, EPA's WasteWise programme encourages more than 400 organisations from 35 different business sectors to reduce waste generation and improve recycling. Like the WasteWise programme, several US public voluntary programmes target more than one sector (EPA 2006). In total, of the 31 voluntary programmes that EPA administers, 14 target the manufacturing and energy sectors, where chemical manufacturers and distributors are in the greatest number, followed by electronics and computer manufacturers. EPA's voluntary programmes are concluded between the agency and an individual firm. The voluntary climate change programmes (Green Lights, Energy Star) primarily provide participants with technical information in order to promote energy conservation. The Green Lights programme, for example, assists companies in defining company spaces where conversion of conventional lights

towards low energy equipment is economically feasible. In return, companies commit to convert at least 90 per cent (within 5 years) of the spaces that have been identified as such.

For most initiatives, participants sign nonbinding letters of agreement such as a Memorandum of Understanding (MOU), which imposes no sanctions for programme withdrawal. Failure to meet the MOU terms means that the company can no longer claim the benefits of participation, which are typically public recognition. The threshold for participation in 33/50 was even lower: potential participants were simply required to send EPA a letter indicating their willingness to cut emissions for the 17 targeted chemicals, leaving it open to firms to decide the percentage reduction involved.

#### **2.4 WHY DO FIRMS PARTICIPATE IN VOLUNTARY ENVIRONMENTAL INITIATIVES?**

Many studies in the literature try to comprehend why firms adopt VEIs. Understanding what really motivates corporate environmentalism is, indeed, important not only for policymakers, since the effectiveness of government environmental policies depends in large part on how corporations respond to them, but also for businesspeople, since the adoption of these initiatives can represent a source of competitive advantage for firms (Lyon and Maxwell 1999).

A variety of different motives can encourage the corporations to adopt VEIs. Such motivations can be classified in three groups of reasons: 1) improving process productivity, 2) marketing to “green” consumers willing to pay extra for

environmentally-friendly products, and 3) pre-empting government regulation (Arora and Cason 1995; Rugman and Verbeke 1998; Segersen and Miceli 1998; Lyon and Maxwell 1999; Knanna 2001). The first motivation refers to the case wherein companies by adopting VEIs improve their environmental performance by improving the efficiency of their manufacturer processes. One of the most famous examples in this terms, it is offered by 3M. This company in 1975 launched its “Pollution Prevention Pays” program with the objective to involve line workers to identify opportunities for waste reduction. In 1990, the firm not only had reduced its emissions of pollution by 50%, but also it had saved over \$500 million by cutting the cost of raw material, compliance, disposal and liability (Lyon and Maxwell 1999).

However, in many cases, productivity opportunities are related to firm-level capabilities already developed inside the company (Hart 1995). In his model “natural resource based view of the firm”, Hart (1995) embraces the idea that undertaking environmental management strategies is based, fundamentally, on starting conditions of the firm. These conditions refer to the availability of valuable resources and capabilities, and to the ability of firm to interact with the external environment. Resources and capabilities already present in the firm favour the early adoption of environmental strategies and so, the opportunity to achieve a sustained competitive advantage. These resources and competences, indeed, contribute over time to develop further corporate resources and capabilities necessary to satisfy subsequently external requirements (Hart 1995).

The “natural resource based view perspective” addresses the fit between what a firm has the ability to do and what it has the opportunity to do (Russo and Fouts 1997), and belong this idea, Rugman and Verbeke (1998) suggest two drivers needed to undertake “green success” strategies (like that by 3M): 1) strong leveling potential of resources commitments for environmental performance and 2) strong flexibility of resource commitments. Leveling potential of resource commitment refer to the opportunity for firms of achieving competitive advantage. This is possible as resources commitments to improve environmental performance also improve the industrial performance. On the other hand, the flexibility of the resources refers to the opportunity for the firms to apply environmental resources also for alternative use.

The achievement of a competitive advantage, it is also the driver that explains the second reason of why firms adopt VEIs. Today, indeed, firms have the need to reply to an increased demand come from “green” consumer and investors. Increasing numbers of consumers, at least in the developed nations of the world, have achieved income levels at which they, are willing to pay a premium for environmentally-friendly products (Arora and Cason 1995; Arora and Gangopadhyay 1995). This, companies want to appeal to these “green” consumers, and to do so are willing to go above and beyond the levels of care required by environmental regulations. Examples of environmentally friendly products include organic produce, tuna caught with dolphin-safe nets, biodegradable plastic bags, reformulated gasoline, and McDonalds Corporation's

substitution of paper wrapping for styrofoam “clamshell” sandwich containers. The idea here is that firms can differentiate their products by improving their environmental qualities, and thereby charge a higher price to high-income consumers. Relatively to “green” investors, in the last years, it has been increasingly the phenomenon of “socially responsible” mutual funds, which avoid investing in companies deemed irresponsible. Examples of stocks that may be avoided are tobacco, firms with high levels of certain types of pollution, nuclear power, etc. Green investors who participate in such funds reduce the supply of capital to the excluded firms, raising capital costs to these firms and shifting the supply curve for the industry upwards. There is some empirical evidence that stock prices do respond to unfavorable news about corporate pollution, so green investors may be an increasingly important factor determining corporate environmental activity (Hamilton 1995).

Finally, other motivations that lead firms to adopt VEIs are related to the influence that these latter can exercise on the government. The companies that participate in VEIs, can have as objective to preempt government regulations, weak forthcoming regulations (where full preemption is impossible), reduce the extent of monitoring by regulatory agencies, and signal regulators to persuade them to raise rivals' costs (Lyon and Maxwell 1999).

As environmental regulations become an established institution, in particular in some sector, corporations are increasingly able to predict the outcomes of future legislative and regulatory battles. Thus, sophisticated corporate strategists can

look ahead to the next wave of likely regulations, and attempt to take proactive steps to shape future laws, rather than passively waiting for regulations to be imposed upon them. If they are sharp enough, firms may be able to preempt future regulations altogether by adopting self regulating with just enough stringency to placate environmentalists and consumers, which demand for government regulation. Naturally, if environmentalists and consumers' costs of political action are too high, then they are blockaded from the political process and, self-regulation became an unnecessary expenditure for the firms. As a consequence, a strong threat of government become necessary condition to induce firms to voluntary adopt environmental initiatives (Segersen and Miceli 1998).

The cost of preemption might, however, be prohibitive if the threat of regulation is too high. In this case, it would be more convenient for companies to undertake voluntary actions to influence the regulation subsequently set by government. This is possible when the government does not establish detailed standards in the regulation (EPA 1995). In this case, the firms can be able to influences the standards that are actually set through their own action.

A third way in which corporate environmentalism can affect regulatory policy is by reducing the stringency with which the firm is treated by regulators. Maxwell and Decker (1998) argue that firm may engage in voluntary environmental investments in order to commit to higher levels of compliance with existing regulations, and may in return, win a lower monitoring rate or laxer

permitting scrutiny from regulators. They show that a firm can make an irreversible investment to lower its future costs of complying with environmental standards. If the regulator can observe this investment, then it can infer that the firm is less likely to violate the standards in the future, and will naturally pursue a laxer monitoring policy since the returns to monitoring will have been lowered (Lyon and Maxwell 1999).

Finally, a fourth form of corporate environmentalism as strategic response to regulation, are those actions expressly designed to reduce competition. Some researcher (Maloney and McCormick 1982; Pashigian 1985; Bartel and Thomas 1987) argues that firms may have incentives to encourage regulations that raise industry-wide rents or disadvantage competitors. Voluntary environmental protection may play a role in such strategies. For example, regulators are typically uncertain of the costs of a particular new regulation at the time it is imposed. If those costs turn out to be high, small firms may be forced to exit the industry. Conversely, large firms may benefit from the exit of rivals, and may try to convince regulators that industry-wide compliance costs are low, so stronger regulations might provide substantial benefits at fairly low cost. One way to help convince regulators of this point is for a large firm to make an investment in voluntary abatement, in an attempt to signal to regulators that the cost of abatement is low.



#### **2.4.1 THE EMPIRICAL EVIDENCES ON THE ADOPTION OF VEIS**

There is a broad literature that analyse why the firms adopt VEIs. In the table 2, it is offered a careful review of the most significant studies, including objectives, methodologies, variables and results. As it is possible to note from the table, different methodologies are used (standard poisson model, negative binomial models, Semi parametric models, multivariate and quartile regressions, ANOVA, cluster and factor analysis, logit, probit, tobin and structural equation models), diverse levels of analysis are applied (firms and plants) and dissimilar types of data are analysed (cross sectional and longitudinal).

The dependent variables measuring the corporate behaviour, in most of cases are dummy variables. These estimate the probability that a firm adopts or does not adopt a VEI. In other cases, dependent variables are represented by the number of environmental management practices implemented by the company or by the type of environmental strategies measuring by the number of VEIs adopted by firm. The determinants of corporate behaviour (the independent variables) can be divided in two principal categories: Characteristics of the firms (size, R&D investment, sector, profitability, emissions and etc.) and stakeholder pressures (primary and secondary stakeholder, internal and external pressures).

**TABLE 2: Analysing the internal and external driver of VEI adoption**

Reference	Objective	Sample/Level of analysis & Methodology	Variables	Principal results
(Anton, Deltas et al. 2004)*	To analyse what are the factors that affect the EMSs adoption and the extent to which EMSs quality has an impact on toxic release industry	<ul style="list-style-type: none"> <li>- S&amp;P 500 firms (level of analysis)</li> <li>- 1994 and 1995 (survey)</li> <li>- TRI data</li> <li>- Standard Poisson and negative binomial models</li> <li>- Semiparametric, quantile regression.</li> </ul>	<p><b>Dependent</b> Quality of EMSs – sum of the EMPSSs adopted</p> <hr/> <p><b>Explanatory</b> Regulation pressure: proxy– 1) inspections received by firms (INSPECTIONS), number of superfund sites for which a firm has been listed as potentially responsible (SUPERFUND SITES). Stakeholder pressure: <b>Customer pressure</b> (FINAL GOOD) dummy variable =1 if the firm is primarily selling products or services directly to consumers. <b>Investor pressure:</b> SALES-ASSET ratio. <b>Environmental performance:</b> TOTAL RELEASE. Industry influence - OTHER – the average number of EMSs adopted by all other firms within the 3-digit SIC code of firm. Competitive pressure- Number of local facility (U.S. FACILITY), Number of facility abroad (NONUS-FACILITY). Firm characteristics: <b>Innovation</b> -R&amp;D expenditure/SALES, <b>Age</b> – AGE.</p>	<p>The firm that more adopt EMPs are those that receive a strong customer and investor pressure. These are also firms that count for a high level of contamination.</p> <p>On the contrary, the firms do not adopt EMS in order to accomplish the existent regulation. No significant are the pressure from the market.</p>
(Arora and Cason 1995)	Evaluating the factors leading firms to participate in a voluntary program (EPA’s 33/50).	<ul style="list-style-type: none"> <li>- 302 firms (level) of seven two digit industries</li> <li>- Cross-sectional (for the year 1990)</li> <li>- Bivariate probit model</li> </ul>	<p><b>Dependent</b> Dichotomous (adopt or not)</p> <hr/> <p><b>Explanatory</b> 1) R&amp;D intensity, 2) Advertising intensity, 3) Industry concentration, 4) Firm size, 5) Profitability, 6) Debt ratio, 7) Emissions (three measures)</p>	<p>The companies with more probability participate to voluntary programs count a greater amount of toxic release, have large dimension, operate in un-concentrated industry and are more closeness with customers.</p>
(Arora and Cason 1996)	Understanding if firms try to benefit from positive recognition as consequence of the participation in a voluntary program (EPA’s 33/50). Understanding if the firms that participate in a voluntary program also comply the mandatory environment regulations. Understanding the type of firms that participate.	<ul style="list-style-type: none"> <li>- 6265 firms (level) of seven two digit industries</li> <li>- Cross-sectional (for the year 1990)</li> <li>- Bivariate probit model</li> </ul>	<p><b>Dependent</b> Dichotomous (adopt or not)</p> <hr/> <p><b>Explanatory</b> 1) R&amp;D intensity, 2) Advertising intensity, 3) Industry concentration (herfandahl index) , 4) Firm size, 5) Profitability, 6) Debt ratio, 7) Emissions (three measures) 8) Previous emission reduction (computed in several way) 9) Adoption of other programs (green light program) 10) adoption of the normative</p>	<p>The firm with the greatest toxic releases are more probably to adopt voluntary program. As well as, firms with high R&amp;D expenditure, advertising and with great dimension. There is not evidence about free-rider behaviours, or attempts to divert the attention of the regulator away from poor compliance.</p>
(Buyse and Verbeke 2003)	To evaluate the relationship between the level of proactiveness of the environment strategies and the importance attached to several stakeholders	<ul style="list-style-type: none"> <li>- 197 firms (level) of three sectors: chemical, food and textiles.</li> <li>- Cross sectional analysis</li> <li>- 1° step - Cluster analysis</li> <li>- 2° step – factor analysis</li> <li>- ANOVA analysis</li> </ul>	<p><b>Dependent</b> Custer mean of environmental strategy profiles: <b>reactive strategy, pollution prevention, environmental leadership</b></p>	<p>The highest three score among all indicated stakeholder are the regularity stakeholders and the international customers. The importance of each class of stakeholders according to the strategy profile is confused.</p>

(Continued)

		-	<p><b>Explanatory</b>  <b>External primary stakeholders:</b> domestic customers, international customers, domestic suppliers, international suppliers. <b>Secondary stakeholders:</b> domestic rivals, international rivals, international agreements, ENGOs.  <b>Internal primary stakeholder:</b> employees, shareholders, financial institutions. <b>Regulative stakeholders:</b> national governments and local public agencies.</p>	
(Henriques and Sadorsky 1996)	To understand what are the factors that influence the firm's decision to implement the environmental plan. To determine which are the pressures having the greatest impact on corporate behavior.	- 750 firms (level) - Cross-sectional (for the year 1990) - Logit model	<p><b>Dependent</b> Dichotomous (adopt or not)</p> <p><b>Explanatory</b>  <b>Environmental pressure source:</b> government regulations, cost of controls, employees, efficiency gains, customers, neighbourhood/community, shareholder, environmental organizations, suppliers and other lobby groups. <b>Financial position and size:</b> sales-to-assets. <b>Importance of environmental issues:</b> dummy variable. <b>Regulatory environment:</b> industry dummies</p>	The firm's formulation of an environmental plan is positively influenced by customer pressure, shareholder pressure, government regulatory pressure, and neighbourhood and community group pressure but negatively influenced by other lobby group pressure and a firm's sale to asset ratio.
(Henriques and Sadorsky 1999)	To measure the importance of stakeholders' pressure for each environmental firm profile.	- 750 firms (level) - Cross-sectional (for the year 1990) - Cross sectional analysis - 1° step - Cluster analysis - 2° step – Factor analysis - multivariate regression	<p><b>Dependent</b> Custer mean for firm profile: reactive, defensive accommodative and proactive.</p> <p><b>Explanatory</b>  <b>Regulatory stakeholders:</b> Government regulatory, Government information Trade association information, Informal network information, Competitor information.  <b>Community stakeholders:</b> Environmental organization, Environmental organization information, Community pressure. Other lobby group. <b>Organizational stakeholders:</b> Customer, Supplier, Shareholder, Employee. <b>Media:</b> Newspaper information, Television and radio information</p>	Manager of environmental proactive firms perceive all stakeholders as important, except the media. On the contrary the reactive firms are more sensible to media pressure. The highest score is for the regulative stakeholders and the community stakeholders.
(Khanna and Damon 1999)*	What are the determinants for the participation to EPA 33/50 program. To evaluate if voluntary and mandatory measures are complementary	- 123 firms - Cross-sectional analysis (year 1991-93) - Probit model	<p><b>Dependent</b> Dichotomous (adopt or not)</p> <p><b>Explanatory</b>  <b>Program feature:</b> final good, release-output ratio.  <b>Mandatory environmental regulations:</b> N. of superfund sites, HAP-33/50 release ratio. <b>Specific firm characteristics:</b> age of assets, CMA, R&amp;D/sales, n. facilities, 33/50 release, first invitation group, 33/50- TRI release ratio, %prior reductions in 33/50 releases.</p>	More likely to participate to the program are the firms that: desire public recognition (final goods), have larger release, are part of CMA, have older assets. It is also showed that the firms that participate have not lower costs of participation. Important it is also the design of program. Voluntary and mandatory measures are complementary. Regulatory threats increase the probability to adopt voluntary programs. No free ride behavior are present.

(Continued)

<b>(Khanna and Anton 2001)</b>	Analyzing the factors that motivate firms to adopt an EMS.	<ul style="list-style-type: none"><li>- 176 firms for 1995 and 159 firms for 1994</li><li>- Poisson model, ordered probit model</li></ul>	<b>Dependent</b> Number of environmental management practices adopted <b>Explanatory</b> <b>Regulatory pressure:</b> 1) number of penalty for non-compliance for one of 10 environmental statutes (1=yes; 0=no) 2) Number of inspections to investigate compliance with existing regulations 3) Accumulated number of Superfund sites for which the firm is listed as a potentially responsible party 4) Ratio of hazardous air pollutants targeted by NESHAP to onsite releases emitted by the firm. <b>Market pressure:</b> 1) Final good or service sold (1=yes; 0=no), 2) Herfindahl-Hirschman index. 3) Ratio of facilities in foreign countries to all facilities of a firm. 4) Sales-Asset. <b>Firm characteristics:</b> ( <i>pollution-output ratio</i> ) 1) Ratio of on-site toxic releases to net sales, 2) Ratio of off-site transfers to net sales. ( <i>technical knowledge</i> ) 3) R&D expenditure ( <i>cost of improving environmental management</i> ) 4) age of assets.	The firms adopting a greater number environmental management practices are those facing higher costs of compliance with mandatory regulations, higher potential liabilities and green preferences from consumers and investors. Moreover, firms that have larger levels of pollution per unit output and are more innovative are also those more likely to adopt a higher quality environmental management system
<b>(King and Lenox 2000)*</b>	To understand if the self-regulation (Responsible Care) without sanctions is effective.	<ul style="list-style-type: none"><li>- 3606 facility level, 1500 firm level</li><li>- Longitudinal data (1987-1996)</li><li>- Probit model</li></ul>	<b>Dependent</b> Dichotomous (participation or not) <b>Explanatory</b> Environmental improvement, Organization size, Focus within chemical industry, Firm visibility	Firms that are more likelihood to participate to the program have reputation, are dirtier firms, have weaker environmental performance relative to their sectors, and operate in dirtier sectors.
<b>(Sharma 2000)</b>	To understand how the managers' interpretations about the external context impacts on the environment strategies.	<ul style="list-style-type: none"><li>- 99 Canadian firm in the oil and gas industry</li><li>- Cross sectional</li><li>- Explorating factor analysis, confirmatory factor analysis,</li><li>- SEM</li></ul>	<b>Dependent</b> A seven point scale drawing on manager perceptions of the extent to which the companies' environmental actions went beyond conformance to regulatory compliance and common industry practices. <b>Explanatory</b> <b>Legitimation:</b> the managers provide an interpretation of their firm as "environmental leadership," "environmental responsibility," "environmental preservation," "alternative energy company," and "ecological footprint" with seven-point scale. <b>Discretionarily slack:</b> 2 items from literature. <b>Measurement of employee performance considering environmental concerns:</b> 3 items.	The analysis sustain the hypothesis that the greater is the manager's perception about environment as opportunity and firm centrality and the greater is the discretionary slack that he has, the greater is the likelihood that a company exhibiting a conformance environmental strategy.

(Continued)

<b>(Vidovic and Khanna 2007)</b>	To understand what are the determinants of participation of EPA 33/50 program. This is a reply of the study of Knanna and Damon (1999)	<ul style="list-style-type: none"> <li>- 365 firms of SIC-code 35 and 28. (154 participate in the program and 211 do not participate)</li> <li>- Cross-sectional analysis (year 1991-95)</li> <li>- Probit model</li> </ul>	<p><b>Dependent</b> Dichotomous (adopt or not)</p> <hr/> <p><b>Explanatory</b> <b>Program feature:</b> final good (dummy variable and advertising expenditure), release-output ratio. <b>Mandatory environmental regulations:</b> N. of superfund sites, HAP-33/50 release ratio. <b>Specific firm characteristics:</b> age of assets, R&amp;D/sales, n. facilities, 33/50 release, first invitation group, 33/50- TRI release ratio, %prior reductions in 33/50 releases (free rider variables). Newness of assets</p>	The adoption of 33/50 program is positively related with the level of emissions, with the number of the facility, with the closeness of customers, measured considering the advertising expenditure and with the invitation of EPA. Besides, the firm is more probably to participate when can have free-rider behaviours. Negatively related are eventually newness in the asset and the R&D activity.
<b>(Videras and Alberini 2000)</b>	To understand what are the determinants of participation in voluntary programs factors. In particular the article is focused on the effect of the green consumer and compliance relief from the agency. The programs examined are: - 33/50 program, - Green light and - WasteWi\$e.	<ul style="list-style-type: none"> <li>- 255 firms</li> <li>- 1992-1998</li> <li>- Bivariate probit model</li> </ul>	<p><b>Dependent</b> Dichotomous (adopt or not) – for the WasteWi\$e, Green Lights and 33/50 programs</p> <hr/> <p><b>Explanatory</b> <b>Consumer pressure</b> (dummy variable that take value=1 if the firm produce consumer goods), <b>Firm size</b> (number of employees), <b>R&amp;D expenditure</b>, <b>competition</b>: Industry-specific characteristics (dummy variable), <b>corporate environmental culture</b> (dummy variables for publishers environmental reports, conducts environmental auditing, environmental performance, as factors for manager compensation, environments risk in selecting business partners, suppliers and customers), <b>environmental performance</b>, <b>environmental regulation</b> (PRP (potential responsible party) notification, superfund legislation, violations of the Resource Conservation and Recovery act (RCRA)).</p>	For the three programs that factors that more affect the adoption of a program are the size, the R&D expenditure (excluding green light) and the regulative legislation. Strong are the reputation factors such as practice of publishing of internal report and internal auditing directed to control the performance.
<b>(Welch, Mazur et al. 2000)</b>	To understand in what extent the regulatory influence theory predict voluntarism of firm (adoption of Climate challenge program), and in what extent the voluntarism predict emission changes.	<ul style="list-style-type: none"> <li>- 50 utilities</li> <li>- 1995 and 1997</li> <li>- logit model</li> <li>- tobin analysis</li> </ul>	<p><b>Dependent</b> Dichotomous (adopt or not)</p> <hr/> <p><b>Explanatory</b> Size, environmental effort, external environmental pressure, direct regulatory action, environmental condition of the firm.</p>	Firms adopt voluntary environmental program in order to influence existing regulatory system or pre-empting future CO2 regulation. The decision to adopt such program does not affect the emission level of CO2. This can depend by the external pressure (weak regulation and weak public concern), as well as, by the deregulation that characterizes the electric sector.

*\*First part of the study  
Source: My elaboration*

The results show that the firms adopting more VEIs, are companies that count a greater amount of toxic release, that have large dimension, that operate in un-concentrated industry, that have high R& and facing higher costs of compliance with mandatory regulations (Arora and Cason 1996; Arora and Cason 1996; Khanna and Damon 1999; King and Lenox 2000; Sharma 2000; Videras and Alberini 2000; Khanna and Anton 2001; Buysse and Verbeke 2003; Anton, Deltas et al. 2004).

The results about the effects of stakeholder pressures on corporate behaviours are less coherent than results about corporate characteristics. In some study, the pressure by customers on corporate behaviour appears to be significant (Arora and Cason 1995; Arora and Cason 1996; Khanna and Damon 1999; Vidovic and Khanna 2007) versus studies where it is not significant (Videras and Alberini 2000). The same it occurs for the pressure by the market and government. Anton, Deltas et al. (2004) for example suggest that the firms do not adopt EMS in order to accomplish the existent regulation and not significant are the pressures from the market. On the contrary, Khanna and Anton (2001), underline that a greater number EMS are adopted when the firms face higher costs of compliance with mandatory regulations. Finally, contradictory results are presented on the existence of free rider behaviours.

## **2.5 EFFECTIVENESS OF VEIS AND THE PROBLEM OF FREE RIDERS**

At the date, still many other works try to understand which motivations lead the firms to adopt VEIs (Khanna, Koss et al. 2007; Henriques and Sadorsky 2008),

what influences the diffusion of VEIs (Delmas and Montiel 2008) and under which conditions VEIs are a good alternative to regulation (Blackman 2008). The findings of these studies always indicate that the regulatory pressures are associated with firms' decisions to implement or adopt VEIs, even though differentiations among initiatives it can be done (Khanna, Koss et al. 2007). They also suggest that a higher corporate participation in VEIs in different countries is consequence of industry's previous experience with other self-regulatory initiatives, of local government's endorsement and of a larger number of international environmental organizations operating in the country of adoption (Delmas and Montiel 2008).

Notwithstanding, these studies contribute to increase empirical literature explaining the processes of adoption of VEIs, they do not reply to an emerging and more interesting question about VEIs: its actual effects on the corporate behaviour.

A growing body of empirical works suggests these initiatives generally have little impact on the behaviour of their participants. In many cases, it is verified that firms adopt or participate in a program because they are pressured by several stakeholders, but they do not implement any practice inside the company actually (King and Lenox 2000; Delmas and Montes-Sancho 2006). These firms behave as free rider since they enjoy VEI benefits without contributing to achieve their goals. They also behave as free rider when, participating to more than one

initiatives, accomplish the targets of one initiatives benefiting of effects also on other initiatives.

Measuring which effects can be attributed specifically to a VEI it is difficult. Some author suggest that new estimation approaches are needed (Lyon and Maxwell 2007). Indeed, different methodologies can garble results about the effectiveness of VEIs (Koehler 2007). A recent meta-analysis evaluates the environmental performance effect of participating in different VEIs implemented in United State (Darnall and Sides 2008). The authors use data from different programs with distinct certification requirements and their methodology rightly focuses exclusively by controlling for self-selection bias when determining the effects of VEIs participation. Their results suggest strong caution about the early enthusiasm for VEIs as alternative policy instruments to traditional command-and-control regulations. They found that, jointly considering some of the most well-known VEIs implemented in US, businesses participating in VEIs not only show a lack of superior rates than nonparticipants, but also they improve at the lower rates than nonparticipants. Their findings also suggest that this tendency of VEIs participants to perform worse than nonparticipants is significantly more pronounced for VEIs that not require certification (Darnall and Sides 2008).

On the basis of these recent evaluations, in the following chapters, the idea is first, to argue how the participation of determinate stakeholders in the VEI design influences the corporate behaviour. It is possible to hypothesise that different types of relationships among stakeholders can have a different effect on the



corporate behaviour. Second, to estimates how the participation in VEIs encourage the adoption of specific environmental practices. For this analysis, empirical evidence on the automobile sector it is proposed.

# **CHAPTER 3**

## **VOLUNTARY ENVIRONMENTAL INITIATIVES CONTEMPLATED FROM THE PERSPECTIVE OF STAKEHOLDER THEORY**

### **3.1 INTRODUCTION**

One of the most relevant issues discussed in the literature about VEIs, is their effective capacity to change the corporate behaviour. The objective of this chapter is to introduce a theoretical model that argues how the participation of determinate stakeholders in the VEI design, can induce companies to proactive behaviours. For proactive corporate behaviour, it is intended that firms not only adopt an initiative, but also plan and realize concrete projects to improve the environmental impact of its products and production processes.

For this purpose, this chapter introduces the stakeholder theory as the most appropriate approach to study the effectiveness of voluntary environmental initiatives. This theory offers three different perspectives of analysis: descriptive, instrumental and normative. Any perspective is carefully reviewed in the chapter. The analysis of the three approaches it allows of understanding the characteristics of each one of them and the importance of choosing the most appropriate view in empirical and theoretical studies.

This work centres on the application of descriptive stakeholder theory. According to environmental management literature analysed in the previous

chapter, the companies adopt VEIs because they are pressured by several stakeholders. The corporate behaviour is so described as a consequence of these stakeholder pressures. The idea is to predict proactive corporate behaviours as certain types stakeholders intervene in the design of the programme.

Based on this idea, the second part of chapter introduces a theoretical model and propositions that describe how the participation of some stakeholder in the VEI design can affect corporate behaviour. The model is justified by putting forward argumentations shaped by the study of environmental management literature. For each type of initiative, then, theoretical propositions are formulated to describe the conditions under which stakeholders can encourage proactive corporate behaviors. The methodology used also in this case, it is a careful analysis of empirical evidences and case studies. Hence, the formulation of theoretical propositions contributes to a systematization of VEI literature.

### **3.2 VOLUNTARY ENVIRONMENTAL INITIATIVES AND STAKEHOLDER THEORY**

As described in the previous chapter, VEIs can be sponsored by firms, third parties and government. These sponsors can be the alone VEIs' designer, or they can collaborate with other organizations to design a programme. In many cases, the sponsors invite other parties to participate in the program design. The purpose of this invitation is to use greater competences and experiences to make more effective the VEIs' goals. The literature argues that the more parties participate in the VEI design, the more the program acquires legitimacy. As a consequence, the

legitimacy increases the probability that firms adopt the programme (Steelman and Rivera 2006).

These argumentations seem to stress the fact that, who participates in the program design, at least in a first stage, can affect its diffusion. For diffusion of a program, it is intended the adoption by firms.<sup>5</sup> In other words, in a first stage, it is possible to hypothesize that the firms adopt a VEI because of who designs it. Who collaborate in the design and the type of collaboration among designers could, namely, be a determinant of programme adoption by firms. For example, if who designs the program it is a client of some firm, it is likely that this firm perceives more pressures than the other ones, and adopts the program earlier than other firms. Still, the collaboration between parties in the program design can be more or less intense. It is possible that more intense collaborations in the program design produce stronger pressures on the target companies.<sup>6</sup>

Carmin, Darnall et al. (2003) underline that the type and the number of actors, which participate in the program design, as well as the intensity of the collaboration between designers, depend on who sponsors the program. They observe that if a VEI is sponsored by government, the number and the diversity of actors involved in the design are greater. In government sponsored

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<sup>5</sup> In the literature, the term diffusion is used with two different meanings. In a first case, the diffusion can be intended as the degree of adoption of a program by firms. In a second case, it can mean the degree of information that the market has about a program.

<sup>6</sup> It is to highlight that who designs a program, not only it could influence the first stage of program diffusion but also the following stages. After that the program is designed, others organizations can intervene to promote its diffusion. However, it is probable that this participation depends on the type of relationship between designers and external actors. The relationships could be more or less conflicting. If during the stage of design, there are many conflicts between designers and external parties, then it will be low probable that these latter encourage the diffusion of the program. At the final, this type of relationships could determine a reduction of pressures perceived by firms.

programme, the collaboration between sponsor and industry is more intense than in other initiatives and, the degree of adoption is higher.

However, the most of empirical studies about VEIs analyse their diffusion, but without giving importance to program design. They analyse the stakeholder pressures as determinant of program diffusion, but without considering if these stakeholders have a role in the program design. These do not control if stakeholders are sponsor, designer or external actors, as well as these do not measure if designers have contractual relationships with firms. The most of studies analyse which stakeholders do more pressures on firms and if these pressures lead to the adoption of VEIs. These measure all the possible pressures that a firm can receive from its stakeholders for then, explain why firms adopt VEIs. So doing, they assume stakeholder pressures are independent from who intervenes in the program design (Buysse et al., 2003; Henriques & Sadosky, 1996; Henriques et al., 1999), with the implication that a same type of VEI can have different processes of diffusion across firms.

Even though, the results of these studies almost always show that the greatest pressures come from the sponsor of the program, the objective of this work is not to argue which pressures lead a company to adopt VEIs, but which stakeholders, which intervene in the programme design, can encourage proactive corporate behaviours. The idea is that, the number and the type of stakeholders intervening in the program design can be drivers of different pressures and lead to different corporate behaviours. It is believed that to study who participates in the program design and how participates, it is fundamental to understand the corporate

behaviour. If certain types of relationships between sponsor and other stakeholders occur during the design process, then the participation of firms in the VEIs can be more or less proactive.

For this purpose, it is proposed an application of the descriptive stakeholder theory. The descriptive stakeholder theory is one of three related perspectives of stakeholder theory. This identifies who the stakeholders are, how the firms respond to stakeholder pressures and why the pressures are perceived differently by firms. The theoretical focus of this approach it is considered as the best perspective to explain how VEI design can influence the corporate behaviour.

To follow, it is presented a careful analysis of the three stakeholder theory perspectives with a subsequently focus on the descriptive view.

### **3.3 STAKEHOLDER THEORY PERSPECTIVES**

Donaldson and Preston (1995) advocate the importance to distinguish three different aspects of stakeholder theory. Reviewing the literature that contributes to its evolution, they argue the need to put order in the way in which it is used. They explain that stakeholder theory can be presented and applied in a number of ways that are quite distinct. It can involve very different methodologies, types of evidence and criteria of appraisal. The problem is that in the literature, many studies use this theory for very different purposes without distinguishing stakeholder theory perspectives. These do not choose the most appropriate approach to the purpose of their study and create confusion in its utilization. This confusion makes important to differentiate stakeholder theory perspectives.

In the Donaldson and Preston (1995)'s view, the stakeholder theory counts three fundamental aspects: descriptive, instrumental and normative. These three approaches are nested within each other. The external shell of the theory is its descriptive aspect. This aspect presents relationships that a corporate possesses in the external world, and explains how these relationships are managed by the firm. At the second level, the instrumental or predictive perspective provides accuracy and support to descriptive approach. It analyzes the effects of certain relationship practices on the corporate performance. Finally, the central core of the theory is normative. The normative aspect suggests how the firms should manage its relationships. More specifically, it proposes an assorted ethical framework as the best way to manage relationships.

### **3.3.1 DESCRIPTIVE STAKEHOLDER THEORY**

The descriptive stakeholder theory presents a model describing what the corporation is and how it manages its relationships (Donaldson and Preston 1995). It defines the corporation as an organizational entity characterized by a plurality of relationships with several groups and individuals: the stakeholders. The stakeholders like stockholders, creditors, employees, customers, suppliers, local communities, governments and general public, are affected by the achievement of the organization's objectives (Freeman 1984). So they put forward valuable and not always congruent requests to corporation in order to protect their interests. The company prioritizes stakeholders' requests and reply only to those which are more important for the corporate survival (Mitchell, Agle et al. 1997; Jawahar and McLaughlin 2001).

The corporation, therefore, affects and is affected by stakeholders' demands. It influences the stakeholder's demands because it decides the corporate objectives and, it is affected by stakeholders' demands, because in deciding the stakeholder's interests to satisfy, it also defines which company goals to achieve. Hence, the principal research area of descriptive stakeholder theory scholars is to understand which stakeholder influences matter to companies and to which stakeholders firms are likely to respond (Harrison and Freeman 1999). Descriptive stakeholder studies analyse, indeed, how corporations manage stakeholder relationships or how stakeholder relationships affect the decision making process of corporations.

The challenge for understanding which stakeholder influences matter to companies, starts with the broad stakeholder definition by Freeman (1984). He provides a first stakeholder classification, identifying a stakeholder as "any group or individual who can affect or be affected by the achievement of the organization's objectives". To this broad categorization, other classifications follow, which define the stakeholders as "fiduciary and non-fiduciary" stakeholders (Goodpaster 1991) or, still, as "primary" and "secondary" stakeholders (Clarkson 1995).<sup>7</sup> These stakeholder categorizations, however, do

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<sup>7</sup> A primary stakeholder group is one without whose continuing participation the corporation cannot survive as a going concern. Primary stakeholder groups typically are shareholders and investors, employees, customers and suppliers, as well as the public stakeholder groups, like governments and communities, which are fundamental for the corporate survival. Secondary stakeholder groups are defined as those who are not engaged in transactions with the corporation and are not essential for its survival. They do not have a formal contractual bond with the firm (as is the case with employees and customers) or direct legal authority over the firm (as is the case with government regulators). Secondary or outside stakeholders typically are community activists, advocacy groups, religious organizations and other nongovernmental organizations.



not help understanding which stakeholder influences matter to companies and to which stakeholders firms are likely to respond.

Mitchell, Agle et al. (1997)'s framework is one of the first theoretical models to provide a guidance to the conditions under which firms are likely to positively respond to stakeholders' requests. These authors introduce the concept of stakeholder salience. They define the salience of a group of stakeholders by the number and type of attributes that a stakeholder group holds. The greater the power, legitimacy, and urgency of a stakeholder group, the greater the stakeholder group's saliency will be in the eyes of company. According to this model, therefore, the companies are likely to reply to stakeholders who possess the largest number of attributes.<sup>8</sup>

Mitchell et al.'s predictions meet empirical support. The evidence confirms that the stakeholders who possess more attributes are even those perceived as more salient to firms (Agle, Mitchell et al. 1999). Their framework, however, offers a general and static stakeholder identification model because, in defining the stakeholders' salience, they do not specify how the corporate context can influence the perception of stakeholder attributes. Over time, the stakeholders' attributes can change in the eyes of the company, simply because the context wherein the corporation operates changes. If the corporate frame changes, then the way in which the company perceives the stakeholder influences can vary (Jawahar and McLaughlin 2001).

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<sup>8</sup> The power is defined as "the ability of those who possess power to bring about the outcomes they desire" (Salancik & Pfeffer, 1974). The legitimacy is defined as "a generalized 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). Finally, the urgency is defined as the degree to which stakeholder claims call for immediate attention. This definition captures contemporary two attributes: the time sensitivity and the criticality of the stakeholders' claims.

The idea is that, the definition of stakeholder importance should be also contextual to particular situations that firm faces. For example, if a firm operates in context of increasing innovation, it is likely that the importance that this firms recognize to the stakeholders, it will depend on the role that these will play in the innovation project (Vos and Achterkamp 2006). Jawahar et al. (2001), for instance, explain that firms give different importance to stakeholders' influences in relation to the cycle of life companies are living. The cycle of life can affect the corporate behaviour because affects the way in which firms perceive a given context. They explain that it is likely that mature firms frame resource dependence as a context of gain. As a consequence they undertake more risk-averse strategies satisfying almost all stakeholders' interests. On the other hand, it is likely that young companies frame resource dependence as a context of loss. Hence, these undertake more risk strategies, satisfying only some of stakeholders' requests.

A more dynamic descriptive stakeholder model, therefore, needs to identify the situations that can affect corporate decisions. Under certain circumstances a firm can change the way of perceiving and replying to stakeholders' demands. The cycle of life of a corporation or contexts of strong innovation, can be an example of these circumstances. Hence, descriptive stakeholder theory studies how firms actually deal with stakeholders' requirements, how companies prioritize stakeholders' interests and under which circumstances.

### **3.3.2 INSTRUMENTAL STAKEHOLDER THEORY**

Researches in instrumental stakeholder theory verify whether firms, who are responsive to stakeholders, are more successful (Wood 1991; Jones 1995). This approach establishes a framework for examining the connections between corporate practices of stakeholder management and the achievement of various performance goals (Donaldson and Preston 1995). Instrumental theory is, in fact, also defined as a contingent theory, because it predicts outcomes which are contingent on corporate behavior of a certain type. This theoretical approach does not require the theorist to make assumptions about corporate behaviour, but simply to measure the effects of corporate practices on performance (Jones and Wicks 1999).

One of the most significant study in this research area is that by Jones (1995). Jones' framework remands to the nature of contracts as determinant of corporate success. According to this model, firms that stipulate contracts with their own stakeholders based on mutual trust and cooperation, perform better than firms that do not it. The nature of contracts is instrumental to reduce the probability of conflicts between firm and stakeholders. Less conflicts imply superior corporate performance (Jones 1995). If a company adopts contracts which reflect an abuse of trust or a lack of cooperation with their stakeholders, agency costs can arise. Increasing agency costs reduce opportunities of greater performance for a company. Hence, the ethic nature of contracts can assure instead more efficient governance structures, acting as mechanism to achieve superior corporate performance (Hill and Jones 1992).

Similar arguments are met in a more comprehensive model proposed by Barnett (2007). The author describes a framework explaining how acts of Corporate Social Responsibility (CSR) affect the Corporate Financial Performance (CFP). The basic premise of the model is that, CSR acts increase CFP because improve firm's relationships with relevant stakeholder groups. If the relationships improve and trust builds, transaction costs decline and certain risks reduce or are eliminated. Lower costs increase income and so the CFP. In the framework, therefore, the CSR – CFP link would be mediated by stakeholder relations. Still, Barnett (2007) suggests that the effects of the CSR on stakeholder relations are moderated by “stakeholder influence capacity”<sup>9</sup> and by “social welfare”. The author defines the acts of CSR as those activities involving efforts directed to improve the social welfare and the stakeholder relationships. If a company realizes these efforts over time, it can benefit of amplified positive effects of future acts of CSR on stakeholder relationships. Previous acts of CSR would lead so a firm to learn how to improve the stakeholder relationships, as well as to benefit of an increased social welfare.

Barnett (2007)'s framework focus on the role that a firm's unique history plays in transforming an act of CSR into CFP. The path-dependence nature of the firm stakeholder relations helps to explain why the financial returns from CSR differ across firms and time. This model, however, does not distinguish between types of CSR. It does not predict, for example, what type of CSR acts can produce superior performance or better relations with specific groups of stakeholders. In

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<sup>9</sup> The stakeholder influence capacity is defined as “the ability of a firm to identify, act on, and profit from opportunities to improve the stakeholders relationships through CRS (Barnett, 2007 p. 803).

these terms, Berman, Wicks et al. (1999) offer an explorative study on how key stakeholder relationships affect CFP. They define as key stakeholder relationships, the relations that a firm has with its own employees, with diverse workforces, with the natural environmental and with customers. These relationships do not have the same effect on CFP. The authors, indeed, verify that if firm's employee and customer relationships are positively related to CFP, firm's community and natural environmental relations are unrelated to CFP.

Still, Hillman and Keim (2001) analyse the effects of increasing CSR on the shareholder value. They distinguish two dimensions of CSR: the stakeholder management and the social issue participation. The stakeholder management involves all the firm's primary stakeholder relationships. Whereas, the social issue participation considers all the social issues which are outside of the primary stakeholder domain of CSR. The results suggest that acts of stakeholder management accomplished by company increase the shareholder value, whereas the participation of the firm in social issues does not increase the shareholder value.

A fundamental assumption of instrumental stakeholder theory approach is that the ultimate objective of corporate decisions is the marketplace success. Firms view their stakeholders as part of an environment that must be managed in order to assure revenues, profits and, ultimately, returns to shareholders. Attention to stakeholder concerns may help a firm avoid decisions that might prompt stakeholders to undercut or thwart its objectives.

### **3.3.3 NORMATIVE STAKEHOLDER THEORY**

The normative stakeholder theory is used to interpret the function of corporations and to identify moral or philosophical guidelines for the operation and the management of corporations (Donaldson and Preston 1995). In this approach the stakeholders are identified by their legitimate interests in procedural and/or substantive aspects of corporate activity. All stakeholders' interests are considered to have intrinsic value when they are related to corporate activity and, the satisfaction of these interests is treated as a moral commitment of the corporation. According to normative perspective, indeed, the companies should establish a set of fundamental moral principles to reply simultaneous to all legitimate stakeholders' interests. Only "principled moral reason ought to lead management decisions" (Quinn and Jones 1995).

The normative stakeholder theory emphasizes the role that moral and ethical principles should have in leading the stakeholder management decision making of a corporation. A company should reply to legitimate stakeholders' requirements using morally principles. Morality is considered an end in itself for the corporation. A company would reply, namely, to stakeholders' interests without considering necessarily possibilities of wealth from this behavior. Wealth considerations could not be precluded from analysis of the corporation, but these should not trump moral principles when wealth and principles conflict (Quinn and Jones 1995)

Thus, in the normative view, to manage stakeholders' interests according to a "good ethics" could not always be a "good business" for the corporation. This

manner to reply to stakeholder claims, however, would contribute to shape the ethical identity of corporation as a part of the overall corporate identity (Scott and Lane 2000). In the process of definition of the ethical stance of the firm, the stakeholders would play a substantial role. As argued by Ferrell and colleagues (2000) “whether a specific required behavior is right or wrong, ethical or unethical, is often determined by stakeholders..” (Ferrell, Fraedrich et al. 2000). The ethical stance of a firm is, therefore, constructed basing on the expectation of society, that is, on the legitimate claims made by the constituencies with which the firm interacts (Wood 1991; Logsdon and Yuthas 1997).

In the literature, normative and descriptive stakeholder theories trigger a strong academic debate, whereas normative and instrumental stakeholder theories raise conflicting strands. The sustainers of descriptive stakeholder theory argue that this theoretical perspective offers a more effective management and a more useful, comprehensive theory of the firm in society (Mitchell, Agle et al. 1997). The reason is that descriptive approach, differently of normative approach, does not suggest that the company should respond “simultaneous” to all legitimate stakeholders’ interests. The company replies to those interests that consider relevant. In the realty, indeed, the firms are not able to satisfy all legitimate stakeholders. The companies just respond how they “can”, not how they “ought”. In these terms, descriptive approach, more adequately represents the complex social, economic and organizational realities that the corporations face. In other words, the descriptive view provides more practical implications to stakeholder theory than normative view (Gioia 1999).

The conflicting point between normative and instrumental stakeholder theory then, concerns the role of business ethics. The normative view, it is defined as “noninstrumental ethics” because the stakeholder orientation and satisfaction should be the final goal of a corporation (Quinn and Jones 1995). The corporation should reply stakeholders’ interests independently from the effects on its performance. Namely, the normative approach would not admit instrumental justifications.<sup>10</sup>

Recently, however, some scholars have made an attempt to integrate normative and instrumental strands (Berman, Wicks et al. 1999; Jones and Wicks 1999; Gibson 2000). The underlying rationale of all these studies is that ethical behaviors can result in a significant competitive advantage. Ethical principles and behaviors allow trusting and cooperative relationships among stakeholders, which lead to a reduction in opportunism, as well as in contracting costs. The final effect, it would be an improvement in a firm’s competitive advantage over those firms that don’t reply on ethical principles.

### **3.4 DESCRIPTIVE APPROACH: THEORETICAL JUSTIFICATIONS FOR ITS ADOPTION**

The objective of this work is to predict how the participation of some stakeholders in the programme design can influence the corporate behaviour of those firms having adopted the initiative. For such aim, the descriptive stakeholder theory appears be the most appropriate approach to proposition formulation.

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<sup>10</sup> Another important difference between descriptive and normative approach is that, the descriptive approach is instrumental.



The normative stakeholder theory is not the most adequate perspective, since this study does not suggest how a firm should behave when it participates in a VEI. No argument is presented about the moral principles that a firm should follow when it adopts an initiative. In general, however, this theoretical perspective is not the most suitable in the study of VEIs. This is because the empirical evidences that analyse the motivations that lead a firm to adopt a VEIs, do not support the idea that firms answer to their stakeholders' following moral or ethical principles. On the contrary, these suggest that firms reply to stakeholder pressures according to their own opportunistic interests. If ethical and moral principles are not the principal reason of VEI adoption by firms, then it is low probable that the companies will behave in socially responsible way after having adopted the initiative. Besides, the instrumental perspective is the most adequate approach for this study because the objective is not to analyse how the stakeholder management by firms affect the corporate performance. The analysis will be focused on how the stakeholder participation in the programme design could affect the corporate behaviour.

The descriptive stakeholder theory, instead, predicts a probable corporate behaviour as consequence of stakeholder pressures. Besides, inside this approach there are other important theoretical studies that deep the analysis of determinants of the strength or the importance of stakeholder pressures. These contributions enrich the perspective by Mitchell, Agle et al. (1997) and Jawahar and McLaughlin (2001). Rowley (1997) integrate the stakeholder theory with the social network theory (Granovetter 1973; Granovetter 1985), suggesting that the

strength of stakeholder pressures on firms depend contemporary on the density of stakeholder network and on the centrality of firm respect to the network.<sup>11</sup> The density of network increases the strength of stakeholders, whereas the centrality increases the strength of the companies. The combination of these two factors influences the way in which the companies reply to stakeholder requirements. Frooman (1999), like Jawahar and McLaughlin (2001) integrates the stakeholder theory with the resource dependence theory (Pfeffer and Salancik 1978), and explains that the type of strategy (direct or indirect)<sup>12</sup> that the stakeholders adopt to affect the corporate behaviour depends on the level of interdependence and power that exists between stakeholders and firms. When the stakeholders exercise a strong power on the firms or when the companies are strictly dependent on stakeholders, then the stakeholders can adopt more direct strategies exercising more pressures on the companies. On the contrary their stakeholder pressure would be lower. Finally, recent studies analyse the conditions under which the stakeholder action is more likely that occurs (Rowley and Moldoveanu 2003) and how this action defines the salience of stakeholder pressure (Eesley and Lenox 2006). Eesley and Lenox (2006) extend the concept of salience by Mitchell, Agle et al. (1997). They sustain that saliency is dependent on the specific interaction between the stakeholder group and the targeted firm. Stakeholder groups interact with targeted firms by making requests to change

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<sup>11</sup> The density measures the relative number of ties in the network that link actors together and is calculated as a ratio of the number of relationships that exist in the network (stakeholder environment), compared with the total number of possible ties if each network member were tied to every other member. The centrality refers to an individual actor's position in the network relative to others.

<sup>12</sup> The author defines the direct strategy simply as those in which the stakeholder itself manipulates the flow of resources to the firm. The indirect strategies are those in which the stakeholder works through an ally, by having the ally manipulate the flow of resources to the firm.

their activities consistent with some issue of concern. The saliency of these requests depends not only on stakeholder attributes but also on the nature of the request and the attributes of the targeted firm. Thus, they assert that saliency arises out of the stakeholder– request–firm triplet. With such conceptualization, they measure saliency by action rather than company preference<sup>13</sup> and determine the saliency by the degree to which a firm positively responds to specific stakeholders’ requests. By ‘positively’, they intend that the firm acts in ways consistent with the stakeholders’ requests.

### **3.5 THEORETICAL FRAMEWORK AND PROPOSITIONS**

A fundamental concept that emerges from the study of descriptive stakeholder theory is the “interaction” between firms and stakeholders. Continuous interactions between stakeholders and firms contribute to shape an organizational identity. In this process, both the way in which the stakeholders pressure firms and the way in which companies reply to these pressures play a key role (Scott and Lane 2000).

The concept of interaction and its role in defining the corporate identity, it is fundamental to understand significant empirical evidences in environmental management literature that apply descriptive stakeholder theory. In many studies, the companies are classified for their environmental commitment, represented by the number of VEIs adopted. The degree of adoption of these initiatives determines a sort of environmental identity of the corporation. The companies

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<sup>13</sup> For a better clarification you compare the study of Agle, Mitchell et al. (1999) with the study by Eesley and Lenox (2006). An important difference between these two studies is that in the first case it is used a survey, in the second these are used secondary data.

that adopt many initiatives are, indeed, categorized as proactive. The firms that adopt less initiatives are classified as defensive (Henriques and Sadorsky 1999). In general four are the levels of corporate behaviour identified: proactive, reactive, accommodative and defensive (Carroll 1979; Hunt and Auster 1990). Firms are, also, categorized according to their environmental strategies. The degree with which companies develop key resources or capabilities, which are necessary to implement determined environmental strategies (Buysse and Verbeke 2003), defines them as adopters of reactive, pollution prevention or environmental leadership strategies (Hart 1995).

The studies, after having clustered the companies, analyse the type of pressures that they receive and the group of stakeholders that they prioritize. It is, for example, noted that the companies defined as proactive are also those that pay more attention to almost all stakeholders, primary and secondary. This result remarks the idea that a strong environmental orientation leads the firms to consider as important almost all the stakeholders. On the contrary, reactive firms seem do not pay attention to stakeholders, while it is not still clear the difference between defensive and accommodative firms (Buysse et al., 2003; Henriques et al., 1999).

The idea underling these studies is that, the firms defined as more proactive for their environmental initiatives, are those that undertake more risk-averse strategies. These companies adopt environmental practices or develop environmental capabilities in order to reply to a greater number of stakeholder pressures. The extent with which firms reply to stakeholder pressures contributes

to shape their green identity. The green identity, therefore, summarize the way in which firms prioritize stakeholders' requirements.

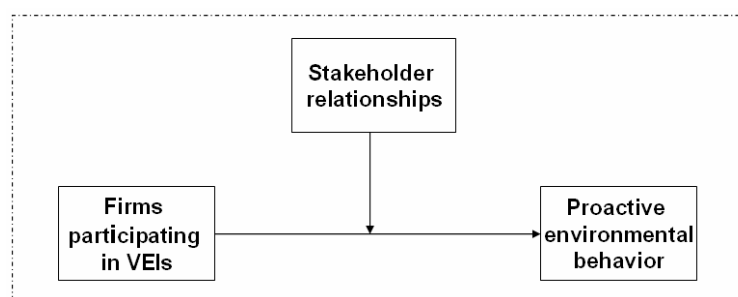
On the bases o this analysis, the argument of this study is that, if a company responds to many stakeholder demands, then a greater number of interactions between this firm and its stakeholders are expected. Increasing interactions would lead the firm to a more proactive environmental behaviour. Thus, the firms defined as proactive respect to environmental issues, should be those that present more interactions with their stakeholders. The empirical evidences, however, assume the role of the interactions. They do not analyse how the interactions between firm and its stakeholders influence the corporate behaviour. The objective of this study is just shed light on how the stakeholder relationships can influence the corporate behaviour. In particular, we wish to examine how the interactions between a firm participating in a VEI and stakeholders involved in the program design influence the likelihood that the firm will undertake a proactive environmental behaviour.

Hence, it is argued that the adoption of VEI cannot be considered as an adequate measure to classify the corporate behaviour, since it does not guarantee that firms will undertake actions to improve the environmental performance. In this work, it proposes to distinguish the concept of VEI participation from that of proactive environmental behaviour. We believe that in order to favour proactive environmental behaviour, interactions between firms, which participate in a program, and certain categories of stakeholders, which promote and diffuse the program, have to occur.

When firms adopt VEIs, they establish a relationship with the sponsor of the program and with other stakeholders that are involved in the program design. In these terms, VEIs offer a context of multiple relationships that could orientate the firms to undertake a proactive environmental behaviour. In other words, the firms adopting an initiative should increase or strengthen their relationships with their stakeholders more than non-adopter firms. As a consequence, the greater interactions with their stakeholders should increase the likelihood that firms develop a proactive environmental behaviour.

This logic leads to define a theoretical model wherein a direct relationship between VEIs participation and proactive environmental behaviour exists. The firms that adopt VEIs would be, thereafter, oriented to undertake proactive environmental behaviours. However, the likelihood that these behaviours occur, it will depend on the category of stakeholders that intervene in the program design. Hence, it is proposed a linkage between the VEI adoption and proactive environmental behaviour moderated by relationships that firms have with the stakeholders involving in the program design.

**FIGURE 3 - Descriptive stakeholder model with moderation effects**



In the model the variables that measure the adoption of VEIs interact with the variables that measure stakeholder participation in the program design. The type

of interaction and its intensity can strengthen or weaken the likelihood that a firm that adopts VEIs develops a proactive environmental behaviour:

**General proposition:** *In VEIs, the greater the interactions between firms and stakeholders involved in the program design, the greater the likelihood that the firms develop a proactive environmental behaviour.*

In the following sections these will be distinguished the different typologies of VEIs. For each type of programs there will be indicated the important stakeholders that can influence the corporate behaviour.

### **3.5.1 GOVERNMENT-LED INITIATIVES AND THEORETICAL PROPOSITIONS**

Government-led initiatives include two types of programs: public voluntary programs and negotiated agreements. They differ in the type of participation of stakeholders in the program design. Public voluntary programs are initiatives wherein the environmental goals and enforcement mechanisms are defined exclusively by government. The firms are invited to participate and other stakeholders only contribute in the diffusion of the program. Negotiated agreements are, instead, initiatives that count with a large participation of several stakeholders in the program design. In this type of VEIs, firms and government negotiate jointly environmental goals and enforcement mechanisms of the initiative.

These programs are considered alternative mechanisms to command-and-control regulations (Segersen and Miceli 1998). The government can achieve environmental goals through establishing regulation or promoting VEIs. Even thought, the traditional regulation counts with several contributions in terms of

environmental innovations (Porter et al., 1995), it suffers for a variety of problems. These include fragmentation among multiple agencies and jurisdictions, inflexibility, complexity, high administrative costs and high compliance costs. Environmental regulation imposes emissions standards and specific abatement technology to firms, preventing them to choose their own low cost method to reduce and control their pollutions. As a consequence, some company does not accomplish to all environmental regulations because of the high costs that they should bear (Rugman and Verbeke 1998).

When there are high risk of not conformity to regulation, government's administrative and enforcement costs increases. In order to reduce these costs, the governments consider VEIs as a more efficient alternative to the traditional environmental policies. The governments can constitute partnerships with industry, research institutions and environmental groups to develop technological solutions to specific environmental challenges (Delmas and Terlaak 2001). In general, they encourage different categories of stakeholders to participate in processes of the program design. A greater heterogeneity of the involved parts it should increase the likelihood of developing initiatives replying a greater social interest. Besides, a broader stakeholder involvement it should minimize the conflicts, increase the thrust that the governments are acting in the public goodwill and enhance program legitimacy and acceptability by NGOs and industry (Carmin, Darnall et al. 2003).

When the firms adopt the governmental sponsored initiatives, they have the opportunities of reaching better environmental performance at lower costs.



Taking on VEIs, they can obtain better competitive positions than non-adopters. Empirical evidences show that the participants of these programs have large sizes, great investments in R&D projects and high levels of pollution emissions. Researches also show that these firms are pressured by several stakeholders such as government, customers (Arora and Cason 1995; Arora and Cason 1996; Khanna and Damon 1999; Videras and Alberini 2000; Welch, Mazur et al. 2000; Vidovic and Khanna 2007) managers (Khanna and Damon 1999; Vidovic and Khanna 2007), competitors and investors (Videras and Alberini 2000). In these studies, in particular, the pressures by government are measured by the level of corporate compliance with certain environmental regulations. In the case of EPA 33/50 Program, for example, the variables used are the levels of violation of the Clean Air Act (Arora and Cason 1995; Arora and Cason 1996; Khanna and Damon 1999; Videras and Alberini 2000; Vidovic and Khanna 2007). In the case of the Waste Wise and Green Light Programs, the variables consider the number of potential resource parties under the superfund legislation and the number of violations of the Resource Conservation and Recovery Act by firms (Videras and Alberini 2000).

These variables result highly significant, suggesting that firms adopt governmental sponsored initiatives to avoid or pre-empt future regulations (Lyon and Maxwell 1999; Khanna and Anton 2001). This means that, the firms would participate to these programs to avoid that the government introduces new environmental regulations. However, in general the assumption so that this corporate behaviour occurs is that, the regulative threat is credible (Segersen and

Miceli 1998). Credible regulative threats needs of strong regulative contexts (Lyon and Maxwell 2003). A strong regulative context is determined by the government's ability of producing and enforcing environmental regulations in the short term (Glachant 2007).

The analyses of the circumstances under which governmental initiatives emerge seem, however, contradict the assumption of strong regulative contexts. Most of the studies examining the historical events that lead to the introduction of VEIs, do not confirm the presence of a strong regulative context. These studies often narrate that when, in 1992, the Clinton's Administration decided to introduce emission taxations; its action was lobbied by manufacturing industry (Lyon and Maxwell 2003; Glachant 2007) and, the result of these political pressures, produced the launch of some initiatives such as the Green Light Programs.

As lobby groups exist, they create political distortions. They are able to influence the legislative process by blocking or dealing the introduction of laws. The result of a lobbying action is, thereafter, to weak the regulative system (Glachant, 2007). In a similar context, the hypothesis that the firms adopt VEIs because of regulative threats cannot work. The presence of lobby groups automatically should reduce the credibility of government's threats. The fact that the industry is able to affect the legislative process it would exclude the possibility of regulative reforms in the short term.

The study of Henriques and Sadorsky (1996; 1999) is the only that show the effect of lobby groups on the corporate behaviour. They verify that when

companies decide to adopt VEIs, the presence of lobby groups has negative effect on this decision. This result in the analysis of government-led initiatives induces to believe that, when the firms adopt governmental initiatives and have participated in lobby groups, then, it is low likely that they will exhibit proactive behaviours after to the adoption. It is possible to think that the lobby groups, in indirectly way, intervene in the programme design with the government and, this distortion makes more likely subsequent free rider behaviours by companies. These adopt the initiative, but then they do not implement it effectively inside the company. In other words, it is expected that the government's initiatives in general induce the firms to have a proactive environmental behaviour, which it will be moderated negatively by relationships that the firm has with industry lobby groups:

**Proposition 1a:** *In government-led initiatives, the greater the interactions between firms, government and industry lobby groups, the lower the likelihood that the firms develop a proactive environmental behaviour.*

In the public voluntary programs, researches have found some empirical evidences which support the presence and the importance of government's pressures on the corporate behaviours. These studies show that the companies adopting public voluntary programs receive stronger pressures by government. In the U.S. the public voluntary programs have obtained a greater success in terms of adoption and diffusion than negotiated agreements. In the literature, EPA 33/50 Program and the EMAS standards are often cited as winner experiences. On the contrary, studies devote to negotiated agreements underline the scarce success of these initiatives. A significant example of failure is represented by the

Project XL (Potoski and Prakash 2004). The lack of their success is often brought back to several inefficiencies that characterized the project management (Blackman and Mazurek 2001; Coglianese and Allen 2004). Moreover, the governmental agencies had limited the participation to facilities with good compliance histories. This procedure had excluded high-polluting firms in the programs reducing drastically the possibility of having high superior environmental performance since the initial levels of compliance were already good (Potoski and Prakash 2004).

The high success of public voluntary programs in terms of adoption and the strong government's pressures associated with these types of initiatives it seems to support the idea that the government can manipulate its pressures. When the industry lobby groups influence the legislative system, then, the government could increase its pressures on firms, deciding of sponsoring public voluntary programs instead of negotiated agreements. By excluding the firms from the development of the program design, the government may show a stronger intention of limiting the noise produced by the lobby groups. In other words, government might increase the credibility of its environmental commitment and, consequently, its pressure on firms.

Thus, this argument proposes to differentiate the negative moderation effects by lobby groups between the two types of initiatives that can be sponsored by government:

**Proposition 1b:** *The negative effects of interactions among firms, government and industry lobby groups will be greater in negotiated agreements than in public voluntary programs.*

In the literature, researches also mention another salient stakeholder group that intervenes when government start to sponsor VEIs. This category of stakeholder is represented by the environmentalist. In the US, these groups develop a central role between 1983 and 1988, when it raises possibilities of collaboration between government and industry. In this period, they start a strong legal opposition against the government and the industry (Hoffman 1999). Since hostile relationships between the US government and the industry, the environmentalists are totally sceptics about the possibility that responsible forms of environmental protection can be achieve by collaborations. As a consequence, environmental groups start considering VEIs only a buffer to avoid regulation (Potoski and Prakash 2004).

According to the literature, indeed, environmentalists do not define the participation of government and industry in VEI processes as responsible. This lack of liability it is often brought back to the fact that they tend to satisfy their own interests and not the common interest of all involved stakeholders in the program (Steelman and Rivera 2006). This aspect explains why in the most of cases the literature describes the environmentalists as groups of subjects particularly favourable to the production of new regulation rather than to the promotion of VEIs, in order to manage environmental problems. In some case, they are not inclined to participate in VEIs negotiated between government and industry, because they consider these initiatives as “green-washing” schemes (Steelman and Rivera 2006).

The scepticisms of environmentalists, about the capability of the government-led initiatives in addressing environmental questions, and their ability to activate strong lawful actions against industry and government, it induces to think that strong interactions between environmentalists and firms in the program design, it could produce a positive moderation effects on the corporate behaviour:

**Proposition 1c:** *In government-led initiatives, the greater the interactions between firms, government and environmental groups, the greater the likelihood that the firms develop a proactive environmental behaviour.*

The environmental groups might have a lower moderation effect when the government sponsors public voluntary programs. In this type of initiatives only the government defines the characteristics of the programs, so that the possible interactions between firms and environmentalists can occur only after the design of programme. In the case of negotiated agreements, instead, not only the environmentalists have the opportunity of monitoring the firms from inside, but also they can manage the relationships between industry and government:

**Proposition 1d:** *The positive effects of interactions between firms, government and environmental groups will be greater in negotiated agreements than in public voluntary programs.*

In general, the idea is that the greater conflicts among stakeholders that participate in the programme design, the lower the probability of a proactive environmental behaviour by firms. When the industry exerts political pressures on government, the promotion of public voluntary programs can result the best way to reinforce and increase the governmental pressures on firms. If the industry is not included in the program design, the conflicts between government

and environmental groups may be reduced. As a consequence, firms may perceive stronger levels of pressures from the government. On the other hand, when negotiated agreements are promoted by the government, a broader participation of the environmental groups in the program design could increase the level of pressures perceived by firms.

### **3.5.2 INDUSTRY-LED INITIATIVES AND THEORETICAL PROPOSITIONS**

The business-led voluntary initiatives include either programs sponsored by trade associations or individual initiatives sponsored by single companies to improve environmental performance.<sup>14</sup>

According to the empirical evidences, trade associations develop voluntary initiatives to address public concerns about environmental issues. Business-led initiatives allow firms of increasing flexibility in the achievement of environmental goals. VEIs consent of avoiding, affecting, or delaing new regulations, as well as promoting consistency and industry-specific environmental solutions (Carmin, Darnall et al. 2003). Companies undertake these initiatives for several reasons. The adoption of the initiative can be a condition to be member of the trade association. Thus, the firms associated or that wish to entry in the trade association, are forced to adopt such initiatives. Besides, the companies can take on these initiatives to reduce the costs of compliance with existing regulations, to improve their reputation and/or the relationships with the stakeholders and benefit of a competitive advantage in the market (Anton, Deltas et al. 2004).

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<sup>14</sup> The analysis of individual initiative does not entry in this analysis.

However, there are several criticisms that concern VEIs sponsored by trade associations. In particular, NGOs describe these VEIs as statements of good intentions, but with little impact on actual firm's behaviour. According to the U.S. Institute for Agriculture and Trade Policy, "those voluntary initiatives are insufficient to alter corporate behaviour significantly ... governmental regulation is the most effective means of directing corporate behaviour" (Barber 1998). In the most of the cases, these affirmations have their origins in the analysis of the design of the program. The industry tends to establish vague performance requirements and insufficient enforcement with these requirements. The final objective it is just to make difficult subsequent verification of the compliance. Joshua Karliner, one of Greenpeace's representatives at the Earth Summit sustain that "Corporate self-audits and environmental reports, for instance, effectively serve to pre-empt pressure on companies to open their facilities and books to independent inspectors who could more objectively assess the environmental impacts of their operations" (Barber 1998).

Nevertheless, there are many initiatives launched by trade associations, and the most relevant in the literature are the Responsible Care Program and the Sustainable Slopes Program. Responsible Care Program is a voluntary code of conduct developed, monitored and enforced by US Chemical Manufactures Association (CMA) (Prakash 2000). It is introduced after the massive chemical accident occurred at the Union Carbide's Bhopal Indian facility in 1984. The main objective was to recover the good public opinion (Nash and Ehrenfeld 1997; Prakash 2000). It was defined as one of most sophisticated and far-



reaching regime of self-regulation in the world (Nash and Ehrenfeld 1997). Responsible Care Program contains ten-guidelines of responsibilities for the CMA members and six-codes of conduct including more than 100 specific management practices. It requires firms of evaluating progresses in the implementation of six codes and of sharing this information with the CMA. The executive leaderships groups have the obligation to share their implementation experiences and to identify the areas where CMA assistants should help (Prakash 2000).

A critical aspect of Responsible Care Program is its information system. Before 1996, one of the agreements between CMA and their members was that firms' progress information was strictly confidential. Only consultants hired by the CMA can check it to prepare its annual Responsible Care progress report (Nash and Ehrenfeld 1997). As a consequence, such agreement did not allow the NGOs to track firms' environmental performance by themselves. Many NGOs applauded the industry's motto "Don't trust us, track us," but they criticized the fact that they do not have sufficient information to track them. This fact increased their suspicious that Responsible Care Program was only a "green-washing" scheme.

Similar problems were presented in Sustainable Slopes Program. This initiative was launched by National Ski Areas Association (NSAA) in 2000. The ski industry decided to create this voluntary program due to increase of the scrutiny and critics. The media and environmental groups strongly criticized the plans of expansion and operation practices, highlighting landscape destruction,

deforestation, water and air pollution, and damage to wildlife habitats (Rivera and Leon 2004). The main goal of Sustainable Slopes Program was to demonstrate that the ski industry could “commitment to good environmental stewardship” and “provide a framework for resorts across the country to implement best practices, assess environmental performance, and set goals for improvement in the future”. Sustainable Slopes Program involves 21 general categories of environmental protection for ski area planning, operations, and outreach for participants resorts (Steelman and Rivera 2006).

Some of the critics triggered to this program refer to the fact that it only requires to participants to implement an annual self-assessment tool for checking their performance (Rivera and Leon 2004). These simple requirements were strongly criticised by environmentalists that, in stage of design, have tried to introduce third party evaluations. Indeed, multiple stakeholders, such as ski companies, federal and state agencies and environmental groups, had participated in the definition of the program. The final design, however, responded only to the interests of companies and the governmental organizations. Thus, after the launch of the program, only the federal and state agencies become official partners of the program. None of the major environmental organizations, such as the Sierra Club, the Nature Conservancy, and the Natural Resources Defence Council decided to become official partners of the program (Rivera & Leon, 2004).<sup>15</sup>

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<sup>15</sup> The Director of the Ski Areas Citizens Coalition, an umbrella coalition of western environmental groups, sustain that the ski industry uses the “consultation process” to gain symbolic legitimacy for the program without incorporating the suggestions and inputs provided by environmentalists and local communities (Steelman et al., 2006).

Some of the researches that have analyzed these two programs show their concerns about the presence of free-riding behaviours. Firms or areas with lower environmental performance were more likely to participate in the programs and, once they enrolled, they did not improve their environmental performance more than non-participants (King and Lenox 2000; Rivera, Leon et al. 2006). Some of the researches consider the Sustainable Slopes Program just an example of “regulatory capture”. This means that the government becomes accomplice of the industry in avoiding environmental regulations. Furthermore, it helps the companies to appear more environmentally proactive, when their real corporate behaviour about environmental issues does not change (Steelman and Rivera 2006). Responsible Care Program also presents strong contradictions. Before of 1996, the CMA’s required, in the 104<sup>th</sup> Congress, of removing more that 90% of the chemical companies from TRI list. These appeals deteriorated the objective of the program, making clearer that the only intention of the association was to weaken environmental laws and regulations (Prakash 2000).

These two experiences support the idea that increasing interactions between industry and governmental organizations in initiatives sponsored by industry may reduce the likelihood of proactive corporate behaviour. It is noted that, in the case of cooperation between government and industry, third parties prefer do not participate in the programme design. Hence, it is possible believe that more proactive corporate behaviour are possible when dyadic relationships between third parties and industry in the programme design occur. On the contrary, when

the government participates in the programme, the only expected effects are free rider behaviours by firms:

**Proposition 2a:** *In business-lead initiatives, the greater the interactions between firms, trade association and government, the lower the likelihood that the firm develops a proactive environmental behaviour.*

**Proposition 2b:** *In business-lead initiatives, the greater the interactions between firms, trade association, and third parties, the greater the likelihood that the firm develops a proactive environmental behaviour.*

The two propositions are supported in the reality. There are, indeed, very few initiatives where only the industry and third parties collaborate in the VEI design. On the contrary, there are many examples where all the three parties or only government and industry participate in the design of the programme. Besides, in many cases, if third parties are involved in the design of the initiative, in presence of government as a partner, they finish to have a marginal role.

The second proposition is also coherent with the historical events that characterized the Responsible care during 1996. In this year, the CMA decided to launch a program to improve the transparency of Responsible Care implementation: a third-party Management Systems Verification (MSV). It is noted that the introduction of this new verification system produces changes in the firms' behaviour (Howard, Nash et al. 1999). Specifically, Howard et al. (1999) examine the free-ride behaviour problem in the Responsible Care Program before and after the introduction of this new control system. On a sample of 16 chemical companies, they note that before the introduction of MSV, the companies can be classified substantially in two groups. A first group involves firms that, after having adopted responsible care, undertake practices of

Responsible Care that are more visible to external stakeholders. A second group includes companies that after the adoption of the programme, implement codes of Responsible Care which imply changes also in internal practices. Hence, free-ride companies are those that implementation very few internal practices.

When MSV is introduced in 1996, the authors note that both groups of companies adopt it. This evidence seems to be against the intuition. If a third party verification it is introduced in the program, then, the expected behaviour of those firms classified as free-riders, is do not adopt MSV. A possible explanation of why these firms adopt MSV, it is that they change actually their behaviour. With the new control system, these firms start implement also internal practices and hence, they are disposed to be submitted to a greater public scrutiny. Hence, the proposition that when the firms interact with third parties, whose possibility of intervention it is dependent only on trade association's decisions then, it will be more likely that firms undertake proactive environmental behaviour.

### **3.5.3 THIRD-LED INITIATIVES AND THEORETICAL PROPOSITIONS**

The third-led voluntary initiatives are programs sponsored by third parties such as non-governmental organizations (NGOs). They are a set of codes of conduct, environmental management standards and environmental product certifications that represent a broad range of social and environmental interests. Non-governmental actors are advisor groups, environmental NGOs and standard setting NGOs representing the interests of various other stakeholders, such as customers and investors. They promote VEI in order to protect these interests (Cristmann and Taylor 2002). In some case, NGOs involve in the VEI design

individual companies or trade association. The objective of this involvement is to ensure that VEIs be responsive of firms' needs. The involvement of the government takes more an indirect or informal role, instead (Cristmann and Taylor 2002; Carmin, Darnall et al. 2003).

Differently of government and business led initiatives, third-led programs are characterized by a high stakeholder's credibility. This greater credibility is due to the fact that NGOs are unaffiliated either with the regulatory system or with the industry. Moreover, their initiatives count almost all with specific standard and independent monitoring systems. The motivations of why NGOs promote can be different. Environmental NGOs, such as the Forest Stewardship Council and the Coalition for Environmentally Responsible Economies (CERES) are, for instance, primarily interested to raise companies' environmental responsibility and to increase the transparency of corporate environmental conduct. Standard-setting NGOs, such as the International Organization for Standardization (ISO), are primary interested in designing standards to facilitate international trade of goods and services and make easier for customers the evaluation of the environmental performance of foreign suppliers (Nash and Ehrenfeld 1997; Cristmann and Taylor 2002; Steelman and Rivera 2006).

The empirical evidences show that stakeholders that more pressure companies to adopt this type of initiatives are customers and investors. The government does not seem to exercise pressures on firms (Khanna and Anton 2001; Anton, Deltas et al. 2004). The Customer and investor's pressures are directly encouraged by NGOs. These take advantage of new market preferences by diffusing information

about the promoted initiatives. The diffusion of information it makes stakeholders aware about their existence and this awareness it is translated in greater pressures for the firms. If the information about standards it is widely disseminated, it garbles the cost/benefits evaluations of about VEI adoption. It leads companies to consider the VEI adoption as the lowest cost alternative face the risk to go out the market, in the case of not adoption (Kollman and Prakash 2002; Darnall and Edwards 2006). In other words, NGOs would create strong market pressures by diffusing information about their sponsored programs. These market forces would lead firms to adopt the initiative.

Some of the significant examples of the NGOs' initiatives are the ISO 14001, which is launched in 1996 by the International Organization for Standardization (ISO), and the voluntary agreements promoted by FUNDERCOR between the 1990 and 2003. The ISO 14001 consists of environmental management standards direct to certify existing EMS of companies. Its main objective is to harmonize the different standardization approaches present over the world, in order to facilitate the international changes of goods and services. It requires the firms improve their environmental management systems in terms of internal communication, auditing, training and documentation. Using procedures in place, the firms must document and respond to public inquires, with the opportunity to hire a third-party registrar to ensure their compliance with ISO requirements (Nash and Ehrenfeld 1997). The ISO 14001 characteristics are developed with a large participation from a broad sector of interests, including industry, governments and citizen and environmental advocacy groups. However, the

participation of each stakeholder differs from country to country. In the United-  
State, for example, the representatives of environmental advocacy groups were  
invited to the negotiations only when the major issues have already been largely  
discussed (Nash et al., 1997).

The ISO 14001 obtains a great success in Germany and UK. This result is due  
to a broad intervention of institutional organizations in the stage of diffusion of  
the initiative (Kollman and Prakash 2002). In these countries, the institutional  
organizations favour the diffusion of information about firm-level  
implementation, creating standard demand from market. In Germany, most of the  
state-level chambers publish detailed information packets about the  
implementation, financial reports and case studies of companies who have  
implemented the standards, as well as intensive lists of contact points for further  
information. Besides, many third party auditors offer to EMAS certified firms,  
the ISO 14001 certification for very little extra cost and without changes in the  
management system (Kollman and Prakash 2002). In U.K, the British Standards  
Institute (BSI)<sup>16</sup> offers a wide range of services that help disseminate information  
on standards to firms. Like the chambers of commerce in Germany, BSI realizes  
a number of seminars and conferences for firms who are interested to implement  
ISO and offers training courses for environmental managers and internal auditing  
company (Kollman and Prakash 2002). Besides, British government provides to  
firms that adopt EMAS and ISO 14001 regulatory relief (Kollman et al., 2002).

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<sup>16</sup> The IBS is a local standard organization, sponsor in 1992 also of the environmental management standards BS 7750.



Contrarily to the experience of Germany and U.K., in the U.S., the ISO 14001 does not have the same success. EPA puts some effort to promote ISO standards by offering limited regulatory relief. However, there are not other organizations like British Standards Institute or chambers of commerce that they are in charge in promoting the initiative. As a consequence, the lack of information about standards does not allow creating those market pressures necessary to push the firms to implement ISO 14001.

Hence, the presence of institutional organizations in the promotion process of third-led initiatives it seems to have an important role. The experience of voluntary agreements promoted by FUNDERCOR – a very prestigious environmental NGOs- furthermore supports this idea (Miranda, Dieperink et al. 2007). At the end of the 1990s, the concerns about the necessity to face watershed problems become significant. A watershed is understood as a planning unit that is defined as a variable piece of land where water goes to a common drain. In that area several mutually related social, biological and economic processes take place. Hence, many activities can threat watershed protection, whether no integrated water policy is implemented.

In Costa Rica, this awareness becomes still greater when the energy production is converted into a private activity. In this context, the risk is that the free competition can encourage the firms to produce energy without caution for the natural resources. Hence, FUNDERCOR invites the private energy sector to invest in watershed protection and, between the 1990 and 2003, achieve voluntary agreements with the private power companies of sector. The aim of

these agreements was to protect watershed by avoiding deforestation and by implementing reforestation programs following the national Environmental Services Payment program.<sup>17</sup>

Almost all agreements are concluded between separate energy firms and NGOs. The central state finishes having a more limited role. The principal actors of the program are the public organizations, environmental NGOs, and private hydropower firms. The Costa Rica landholders have, however, a special position. They are not direct partners to the agreement, but without them the goals of agreements cannot be reached as they are receptors of the EPS that have to implement the forest activities.

The success of these agreements is due to the creation of strong interactions among stakeholders. NGOs commit to negotiate with state environmental services payments on behalf of landowners. The landowners have the incentives to obtain these payments since the financial compensations depend on the level of protection of the landing case of sale. Finally, if the private firms want to increase their profits, the production of energy is limited by the protection of watersheds actuated by the same landowners. This mechanism creates dependence relationships among private sector, farmers and the Costa Rica state, wherein the farmers play the role of moderator between the first two, assuring the actual implementation of voluntary agreements (Miranda, Dieperink et al. 2007).

From these experiences, the idea is that:

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<sup>17</sup> ESP is created in 1996 by government as an innovative financial instrument to develop the forestry sector together with the protection of remnants of natural forest. The instrument rewards forest owners for the environmental services their forests offer to society.

**Proposition 3:** *In third-led initiatives, the greater the interactions between firms, NGOs and governmental organizations, the greater the likelihood that the firm develops a proactive environmental behaviour.*

In the analysed experiences, the government and the other institutional organizations intervene after the design of the VEIs, with the purpose to increase the information about the initiative and create market forces. The idea, here, is that this effect could be much greater if institutional organizations were part in the design of the initiative. Differently from the case of business-led initiatives and similarly to government-led initiatives, the government participation in the program design it would be desirable.

# CHAPTER 4

## VOLUNTARY ENVIRONMENTAL INITIATIVES IN THE AUTOMOBILE INDUSTRY: AN EMPIRICAL ANALYSIS

### 4.1 INTRODUCTION

The objective of the following chapter is to verify empirically if companies, participating in VEIs, have actual proactive behaviours and, which strategies they adopt for behaving proactively.

The study is focused on the European automobile sector. Automobile industry is associated with a variety of negative influence related to manufacturing processes and the use of vehicles. It counts for 30 percent of CO<sub>2</sub> emissions in the industrialized economies of the OECD countries, and about 20 percent worldwide (Kuik 2006).

Today, several studies, however, show that more fuel efficient cars these are possible. Technological improvement these are feasible and cost-effective for the companies. In order to assure such improvements there are several policy options:

- Regulating the fuel efficiency of the new cars (euro standards). This can be elaborated per car (all the cars must comply with e.g. 120 g CO<sub>2</sub>/km), per manufacturer ( the average fuel consumption of all cars sold by the manufacturer must comply) or for industry as a whole (the average car marketed must comply).

- Alternatively, individual manufacturers or the industry could be obligated to achieve a certain percentage improvement in fuel efficiency, with each manufacturing having to improve the average fuel efficiency of cars marked by 30%, for example.
- A third option is to relate the required fuel efficiency to the utility of a car. For example, the people carriers or very luxurious cars would have to improve fuel efficiency by the same percentage as a small car.

Historically, the automobile industry has been always a sector strongly regulated. Nonetheless, nowadays governments believe that one of the most efficient ways to promote eco-efficiency technology is to meet agreements with the industry. A problem of automobile market is that it does not work in an efficient way. Some European Commission's study shows that customers do not pressure manufacturers for more environmental vehicles. Buyer of the new cars generally considers the first three years of the fuel savings, and does not the savings over the whole vehicle lifetime. As vehicle prices fall owing to new technologies or car manufacturing cost reductions, consumers may be encouraged to adopt for large and comfortable vehicles, cancelling out the potential CO2 reductions.

For these reasons, in the last ten years, European efforts in this area have been based on voluntary agreements with industry and, on vehicle taxation incentives for the customers. One of the most famous agreements between the European

Commission and the Automobile Industry in Europe are the ACEA<sup>18</sup> Agreements. In such agreements, ACEA members committed themselves collectively to achieving a CO<sub>2</sub> emission target of 140 g/km CO<sub>2</sub> by 2008. These targets can be achieved mainly through technological innovations geared to a variety of car and engine characteristics and through market changes related to such developments (Kampman and Boon 2005).

Other important initiatives promoted by the European Commission to encourage environmental innovations are the European Union (EU) “Framework Programmes”. These are multiannual programmes, launched by the European Parliament and the Council of the European Union through documented decisions, for encouraging Community research, technological development and demonstration activities. These programmes contribute to the creation of the European Research Area and to innovation.

In this study the participation of companies in VEIs, it will be measured considering these last programmes. In particular, my interest will be focused on the environmental programmes: “Energy, environment and sustainable development (EESD)” of the Fifth Framework Programme (from 1998 to 2002), and the “Sustainable development, global change and ecosystems (SUSTDEV)” of the Sixth Framework programme (from 2002-2006). These two programmes represent on continuous of European Research in Environmental issues from 1998 to 2006.

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<sup>18</sup> ACEA – European Automobile Manufacturer Associations

Firms participating in such programmes propose several projects to the European Commission. These projects can have as objective to promote product or process innovations or both types of innovation. The aim of this analysis it is to verify if the strategies adopted in these programmes encourage the companies to take on proactive behaviours. Since the automobile sector is strongly regulated, I aspect that those companies that participate in EU programme then adopt behaviours that go beyond environmental regulation. In other words, these companies should be able to anticipate environmental regulation (euro standard regulation).

This idea is fully supported also by the fact that Automobile Industry participates in the last euro standards definition (Euro 3 and Euro4). Euro Standard regulation is, indeed, the result of negotiations between Automobile, Oil industry and European Commission. The idea is so using the participation of companies in EU frameworks as proxy of the “innovation intention” of the car companies and, to assess the proactive behaviours of companies by measuring the degree of anticipation of Euro IV standards in the years wherein it is not still into force in the Member States. For this aim, I construct a longitudinal database from 2000 to 2006 using VCA data and CORDIS data.

The contribution of this analysis is to discover if the participation in VEIs encourage *actual* proactive corporate behaviours and which are the strategies that lead these behaviours. Besides, this study clarifies which type of innovation the firms are adopting to accomplish regulation. Some study argues that the firms are

promoting process innovations but they do not test it (Triebswetter and Wackerbauer 2004).

The work is structured in six paragraphs. The first paragraph discusses the historical events that have characterized the introduction of Euro Standard Regulation. The second paragraph argues on some VEIs undertaken by car companies in the last years and some innovation approaches. The third paragraph presents the methodologies and the measures used in the empirical evidences. The fourth paragraph introduces the model specifications and the assumptions. Finally, the sixth paragraph shows and discusses the results.

#### **4.2 EURO STANDARD REGULATION, AUTO OIL PROGRAM I-II AND VOLUNTARY ENVIRONMENTAL INITIATIVES IN THE AUTOMOBILE SECTOR**

The first step of the European legislation, relating to measures to be taken against air pollution by gases from positive-ignition engines of motor vehicles, is the Council directive 70/220/EEC of 20 March 1970. It recommends that all member states adopt the same requirements for the EEC<sup>19</sup> type approval procedures for the proper functioning of the common market. It lays down permissible levels for CO and HCs, which are then amended several times in the following years. In particular, in 1988, the Council decides to make European standards equivalent to standards for vehicle emissions in force in the United States. In 1989, it adds CO in the list of pollutants and, finally, in 1991,

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<sup>19</sup> European Environmental Commission (EEC)



publicizes the directive 91/441/EEC which sets mandatory car emission limits (Euro 1 standards).

The directive 91/441/EEC is the start point of more stringent emission standards for passenger cars. These came into force in 1996, with the directives 94/12/EEC and 96/69/EEC (Euro 2 standards), in 2000 with the directives 98/69/EEC and 1999/96/EEC (Euro 3 standards) and, in 2005 with the directives 98/69/EEC B and 1999/96/EEC B (Euro 4 standards). Euro 2 introduces more stringent exhaust gas pollutants limits than Euro 1 for CO (Carbon Monoxide), HC+NO<sub>x</sub> (Hydrocarbons + Oxides of Nitrogen) and PM (Particles). Euro 2 also distinguishes exhaust gas pollutants limits for gasoline and diesel vehicles. Euro 3 and Euro 4 determine a further on 30% reduction over the earlier Euro 2 limits and introduce more severe standard tests. If with Euro 2, the pollution measurement commences after the engine starts and idles for 40 seconds; with Euro 3 and Euro 4, the pollution measurement commences from the moment the engine starts (VCA 2008). Euro 3 and 4, besides, distinguish between NO<sub>x</sub> and HC+NO<sub>x</sub> exhaust gas pollutants and, modify the vehicle classification by weight, introduced by Euro 2.

As Euro standard directives are applied, they discern two limit times. The time within which vehicles can be validly approved or homologated, and the time within which the vehicles can be validly matriculated.<sup>20</sup> A new directive comes

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<sup>20</sup> The type-approval is a procedure whereby Member States certify that a vehicle type satisfies the technical requirements of the standard established in the directive in force at that time. The matriculation is a procedure whereby Member States authorize the circulation or the sale of vehicles that possess a valid certification.

into force as the Member States can homologate the new vehicles only according to the standards of the new directive. This means that starting from 1/1/1996 (directive 94/441/EEC, art. 2.2), the Member States can homologate the new vehicles only accomplishing Euro 2 or superior standards. Starting from 1/1/2000 or 2001 (2000 for passenger cars  $\leq$  2500 kg and 2001 for passenger cars  $>$  2500 kg (directive 98/69/EEC, art. 2.2)), the Member States can homologate the new vehicles only accomplishing Euro 3 or superior standards, and from 1/1/2005 or 2006 (2005 for passenger cars  $\leq$  2500 kg and 2006 for passenger cars  $>$  2500 kg (directive 98/69/EEC B, art. 4)) the Member States can homologate the new vehicles only accomplishing Euro 4 or superior standards. For the companies, these dates mean to produce vehicles, which respect the standards in force or future standards. Otherwise, they cannot obtain the homologation by Member States.<sup>21</sup>

To regulate the vehicles matriculation, then, Euro standard directive articles recall the directive 70/156/EEC of the 6 of February 1970. This directive disciplines exemptions and alternative procedures for the sale of end-of-series vehicles. If the companies have complete end-of-series vehicles type approved according to a not more valid standard, they can obtain the authorization for the matriculation by Member State in the limit of twelve months after the come into force of the new directive. If the vehicles are not complete, the maximum time to

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<sup>21</sup> Almost all types of new passenger cars have to accomplish euro standards. However, certain types of vehicles are excluded from the fuel consumption testing scheme. These are cars manufactured in low volume, cars adapted to carry more than eight passengers (excluding the driver), three-wheelers, invalid carriages, van-derived passenger cars and cars built specially for export (VCA, 2008).

obtain the authorization for matriculation is eighteen months. This means that, if companies possess stock at 1/1/2000, of complete and euro 2 homologated vehicles, with a weigh lower or equal to 2500 kg, they can obtain the authorization for matriculation until to 1/1/2001. If the vehicles are uncompleted, they can obtain the authorization for matriculation until to 1/7/2001 (Directive 70/156/EEC art. 8 (par.2b)). A careful study on valid matriculation limits is presented in the table 3.

**TABLE 3 - Euro Standard Regulation: terms for valid homologationS and matriculations**

Euro standard	Valid homologation	Valid Matriculation only for end-series vehicle	
		passenger cars ≤ 2500 kg	passenger cars > 2500 kg
Euro 2	<b>From 1/1/1996 to 1/1/2000</b> (passenger cars ≤ 2500 kg)	<b>From 1/1/2000 to 1/1/2001</b> (compl. end-of-series vehicles)	<b>From 1/1/2001 - 1/1/2002</b> (compl. end-of-series vehicl.)
	<b>From 1/1/1996 to 1/1/2001</b> (passenger cars > 2500 kg)	<b>From 1/1/2000 to 1/7/2001</b> (uncompl. End-of-series ve.)	<b>From 1/1/2001 1/07/2002</b> (uncompl. End-of-series veh.)
Euro 3	<b>From 1/1/2000 – 1/1/2005</b> (passenger cars ≤ 2500 kg)	<b>From 1/1/2005 to 1/1/2006</b> (compl. end of series vehicles)	<b>From 1/1/2006 to 1/1/2007</b> (compl. end of series veh.s)
	<b>From 1/1/2001 – 1/1/2006</b> (passenger cars > 2500 kg)	<b>From 1/1/2005 to 1/07/2006</b> (uncompl. End-of-series veh.)	<b>From 1/1/2006 to 1/07/2007</b> (uncompl. End-of-series veh.)
Euro 4	<b>From 1/1/2005 to 1/1/2008</b> (passenger cars ≤ 2500 kg)	<b>From 1/1/2008 to 1/1/2009</b> (compl. end of series vehicles)	<b>From 1/1/2008 to 1/1/2009</b> (compl. end of series vehicle.)
	<b>From 1/1/2006 to 1/1/2009</b> (passenger cars > 2500 kg)	<b>From 1/1/2008 to 1/07/2009</b> (uncompl. End-of-series veh.)	<b>From 1/1/2008 to 1/07/2009</b> (uncompl. End-of-series veh.)

*My elaboration on the cited European Directives*

According to the information reported in the table, starting from 2003, no vehicle homologated as Euro 2 can be matriculated or sold as new vehicle. Starting from 2008, no vehicle homologated as Euro 3, can be matriculated or sold as new vehicle and, starting from 2010, no vehicle homologated as Euro 4, can be matriculated or sold as new vehicles.

#### **4.2.1 THE ROLE OF AUTO OIL PROGRAMME I AND II IN THE EURO STANDARD REGULATION**

The evolution of euro standard legislation is characterized by several contrasts. Between 1970 and 1983, the European Union merely transposed into optional directives car emission limits. Member States, like Germany and others, instead, wished to adopt more stringent car emission limits. These countries pushed for the adoption of standards based on the introduction of three-way catalytic converter, a device that was already been fitted to new cars in America and Japan. On the other hand, countries like Britain, France, Italy and Spain wished to take on standards based on lean-burn engine. In 1983, Germany, Denmark, Greece and Netherlands withdrew from ECE<sup>22</sup> regulation and adopted more stringent American car emission limits. In 1990, then, these countries won the political controversy, because the Council based the directive 91/441/EEC (Euro 1), on three-way catalytic converter (Friedrich, Tappe et al. 2000).

Before introducing the directive 94/12/EEC (Euro 2), the European Commission set up the Auto Oil I Programme to define future and more stringent standards for 2000 (euro 3) and 2005 (euro 4). This constituted one of the most important policy initiatives directed to change the traditional EU car emission policy-making processes. It involved an intense series of studies and negotiations carried out by Commission, to put forward standards, which were derived from an objective assessment of the most cost effective package of measures to reduce emissions from the road transport (Friedrich, Tappe et al. 2000). The

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<sup>22</sup> ECE - European Commission for Europe

Commission's intention was also to demonstrate that, despite the introduction of catalytic convertors, further significant reductions in the emissions of cars, light goods vehicles and heavy duty vehicles, were needed if air quality targets were to be achieved (Higman 1996).

Until 1990, EU car emission standards were been tightened incrementally in line with the advancement of the best available technology (BAT) and, member states and automobile industry were been the principal actors of EU policy-making processes. With the Auto Oil I Programme, the political setting changes. For the formulation of the legislative proposal, the Commission invites to collaborate in the programme only several of its Directorate-Generals<sup>23</sup> and representatives from the European umbrella groups of the automobile (ACEA) and oil (CONCAWE and EUROPIA)<sup>24</sup> industries. The Commission, thereafter, excludes the participation in the programme of Member States, no-governmental organizations (NGOs) and the European Parliament.

In the early 1990s, after interrelated studies, DG XI abandons the BAT-derivate car emission limits, in favour of the adoption of the Environmental quality objectives derived cost effective standards. In 1993, EUROPIA and ACEA sign a joint research programme for two years with the Commission, known as the European Programme on Emission, Fuel and Engine technologies (EPEFE).<sup>25</sup>

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<sup>23</sup> The Directorate-Generals (DG) that participated in the program were: DG III (industry), DG XI (Environment) and DG XVII (Energy).

<sup>24</sup> CONCAWE – The Oil Companies' European association for the environment, health in refining and distribution.

EUROPIA – European petroleum industry association.

<sup>25</sup> European Programme on Emission, Fuel and Engine technologies served to collect new data on the comparative emissions of different formulations of petrol and diesel cars.

Finally, in June 1996, through a communication (COM (96) 248 final), the Commission reports the results of Auto Oil Programme to the European Parliament and Council of Ministers. This communication includes two proposed directives - one on the quality of petrol and diesel fuels and one relating to measures to be taken against air pollution by emissions from cars for 2000 and 2005 (Higman 1996; Friedrich, Tappe et al. 2000).

The Commission's proposals generate strong critics by European Parliament and Environmental Council. They evaluate as unambitious the Commission's standards. These standards fall short of the complete protection for Europe's health and environment. The Commission's Auto Oil programme shows several weaknesses, and the source of these weaknesses is recognized in lacks of transparency in the policy procedures.<sup>26</sup> As said before, no member state governments, environmental and consumer NGOs and the supply industry are involved in the programme by the Commission. Moreover, DG XI overestimates its own expertise and ability to act as a policy entrepreneur and underestimates the automobile and oil industries' knowledge and power resources. The result is a proposal that only increases costs of automobile and oil industries. These, indeed, if a first moment welcome the Auto Oil Programme, later, they become hostile to what it is perceived as an unfair sharing of the costs burned between the two industries (Friedrich, Tappe et al. 2000).

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<sup>26</sup> The main substantive weaknesses of the Commission's Auto-Oil I Programme were fourfold. First, the Auto-Oil I Programme took into account only human health issues and excluded environmental problems; second, it failed to focus on severe local health problems; third, the 2010 target date downplayed immediate beneficial effects and ignored the importance of reformulated fuels for the development of future abatement technology; and fourth, the narrow cost-effectiveness approach failed to take into account social costs and environmental damage.

However, in 1997, after the first reading of Commission's proposal by Council and European Parliament, the Commission presents an article reviewing the standards applicable for 2000 and 2005. In this article, it launches the Auto Oil II Programme and abandons the tripartite dialogue, in favour of a wider and more transparent consultation process. In the working group, the Commission involves not just the original three partners, but also other relevant industries, local authorities, Member States and NGO experts, as well as staff from the European Environmental Agency (Goodwin 1997).

This new partnership arises, in the second reading of Commission's proposal, frantic lobbying by the automobile and oil industries, as well as NGOs. Individual automobile manufacturers (such as Renault) and the European umbrella organizations of the member states' Automobile Association form a temporary alliance with their long standing opponents, the Brussels-based environmental and consumer NGOs. They want to convince the members of European Parliament that more stringent fuel standards are needed to further reduce car emissions. On the other hand, EUROPIA is in contrast with these arguments and run an aggressive campaign that causes ill feeling among several members of European Parliament (Friedrich, Tappe et al. 2000).<sup>27</sup>

In June 1998, the Environmental Council and the European Parliament, after a period of conciliation committee negotiations, adopted standards which are

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<sup>27</sup> EUROPIA warned that the adoption of the European Parliament would 'improve air quality by just 1% but would cost five times as much as the Commission's original proposals'. It also threatened the closure of refineries, especially in Southern Europe (where outmoded refineries rely heavily on crude oil with a high sulphur content).

scientifically more stringent than those proposed by the Commission. Hence, lobbies by automobile industry won on lobbies by oil industry. If during the dialogues of Auto Oil I Programme, ACEA had not been able to influence the Commission to propose more stringent standards (Higman 1996, table 2). In the Auto Oil II Programme, the alliance with NGOs had given to ACEA a greater power. On the contrary, the oil industry, which had had power in the Auto Oil I Programme, lost its authority in the Auto Oil II Programme.

The victory of automobile industry, it is also due to key role played by the British representatives, in both the Parliament and the Council. In the European Parliament, Britain is represented by directly elected (and directly “lobbyable”) members, many of whom play prominent roles in the key Parliamentary Committees that consider the directives. Furthermore, the European Parliament is dominated by the Socialist group, and British Labour Members of European Parliament form the largest bloc within the Socialists. As a consequence, the position taken by the British group of Labour Members of European Parliament becomes extremely important in determining the eventual outcome of the Parliament's debates (Higman 1996).

#### **4.3 VOLUNTARY ENVIRONMENTAL INITIATIVES IN THE AUTOMOBILE SECTOR**

Since 1992, automobile manufacturers have made considerable progresses in their efforts to promote sustainable development. Advanced technological solutions have been implemented on processes and products. These companies



have minimised energy and water consumption, emissions and waste in manufacturing plants, as well as, these have reduced fuel consumption and widespread in the use of catalytic converters.

Many companies have signed the international environmental charter, adopted the proposals and objectives of Agenda 21,<sup>28</sup> and incorporated them into their own environmental guidelines. Car manufacturers have also participated in global initiatives like the United Nations Global Compact,<sup>29</sup> and set new environmental and social standards wherever they operate.<sup>30</sup> Still, automobile manufacturers have also acknowledged their responsibility in the World Business Council for Sustainable Development (WBCSD). Many car makers are currently involved in this coalition of 150 international companies united by a shared commitment to sustainable development. The mission of the WBCSD is to encourage business leadership, to act as a catalyst for change towards sustainable development, and to promote eco-efficiency, innovation and corporate social responsibility.

Besides, many car manufacturers have responded to an increasing demand for corporate transparency by publishing environmental reports. Some companies are now following the Global Reporting Initiative (GRI) guidelines for sustainability reports. These guidelines provide a common framework for environmental and

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<sup>28</sup> ONU Programme direct to encourage the sustainable develop.

<sup>29</sup> The UN Global Compact is a strategic policy initiative for businesses that are committed to aligning their operations and strategies with ten universally accepted principles in the areas of human rights, labour, environment and anti-corruption.

<sup>30</sup> There are numerous examples of partnerships between companies and environmental NGOs creating global or regional corporate citizenship models.

social reporting and are supported by UNEP and the Coalition of Environmentally Responsible Economies (CERES) (UNEP 1998).

Future promising solutions consists of intensive co-operation with governments, institutions and private companies in the form of public-private or private-private partnerships. In particular, one key factor in the success of the automobile manufacturers is seen in increasing co-operation with suppliers. The reason for this is the trend towards ever greater specialisation in conjunction with growing model line-ups, niche offerings and the increasing number of feature and equipment variants (UNEP 1998).

#### **4.3.1 INNOVATION APPROACHES IN THE AUTOMOBILE INDUSTRY**

There are many other best practice examples on how automobile manufacturers commitment to the environment through the development of alternative drive systems, the efficient use of fuels and changes in production processes (UNEP 1998). In particular five types of approaches the practitioners distinguish to face the sustainability:

1. The system approach (EMAS, ISO 14001 and product assessment).
2. The technological approach (hybrid and hydrogen technology, alternative energies and conventional fuel technologies).
3. The behavior approach (Environmental education and safety measure).
4. Employee approach (Incentive and benefits).
5. The global approach (partnership and know-how transfer).

In this study the attention will be focused only on the first two approaches. These approaches will be needed to identify the types of strategy that the firms are adopting in EU framework programmes.

The system approach includes Environmental Management systems and Product assessment. Management systems include EMAS and the worldwide ISO 14001 standards. These systems represent an important step forward since 1992. They effectively minimize negative environmental impact with regard to water and energy use, emissions and waste associated with the production process. Inherent to the system approach is the target to continuously improve environmental performance.

Life Cycle Assessments (LCA) is a method of quantitatively evaluating the environmental impact of a product throughout its life cycle. They are an increasingly important feature within the system of defining a product's ecological benefits. Life-Cycle Inventories are a key element in Life-Cycle Assessment. The inventory is a detailed and complete balance sheet of all the materials and the energy used for a specific car model.

The technological approaches are the result of the need to find answers based on the future availability of natural resources to power engines and the requirements of climate protection and low-emission standards. These technologies are multiple approaches towards better fuels and different propulsion systems. While a number of companies are focusing on improving current fossil fuel technologies, other car manufacturers are looking toward a

future based on hydrogen, methanol, natural gas or a combination of petrol and electric motors.

Hybrid electric vehicles (HEVs) have drive trains that combine an electric drive (consisting of an electric motor and some form of electricity storage, typically a battery) with a fuel-based engine (e.g., an internal combustion engine). HEVs may use onboard electrical power to varying degrees. “Full hybrids” permit some actual propulsion using electric power, whereas “mild hybrids” may limit use of the electric motor to regenerative braking or vehicle idling. HEVs have the potential to reduce well-to-wheel CO<sub>2</sub> emissions by 50 percent compared to today’s diesel and gasoline engines.

Hydrogen technology is based on hydrogen that can be produced with renewable energy resources like solar power. This technology, also known as fuel cell technology, is an electrochemical device that converts a fuel’s energy directly into electrical energy. They represent the long-term goal for the industry. The prospect of highly efficient vehicles consuming hydrogen and emitting only water constitutes a major advance in vehicle technology that could greatly shrink the environmental footprint of the automobile. For this technology three levels can be distinguished: Fuel Cell (gasoline), Fuel Cell (hydrogen from natural gas) and Fuel Cell (hydrogen from renewables) (Duncan, Rosinski et al. 2004). Finally, the conventional fuel technology, also called vehicles technology, include Engine technologies (such as direct fuel injection, variable valve timing and cylinder, deactivation), transmission technologies (such as improved

automatic and continuously variable transmissions) and vehicle technologies, such as drag reduction, integrated starter-generators and weight reduction.

#### **4.4 METHODOLOGY**

The objective of this study is to understand which type of strategies the companies are adopting in order to anticipate regulation. For this purpose, it is necessary to distinguish the innovation approaches, cited above, in process and product innovations. In the literature, it is often argued that in many cases what actually constitute process or product innovation it is a confused issue (Bhoovaraghavan, Vasudevan et al. 1996). I try to solve this problem by applying Oslo Manual Guidelines (OECD and EUROSTAT 2005). This methodology is used also in other studies (Triebswetter and Wackerbauer 2004) and it is coherent with the data that will be described in the following paragraph.

The third edition of the Oslo-manual defines the innovation as “the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organisational method in business practices, workplace organisation or external relations (OECD/EUROSTAT, 2005 p. 46). This is a broad definition of innovation, which encompasses a wide range of possible innovations. In this work, the focus will be only on the product and process innovations. I don’t take in consideration marketing and organizational innovations.

According to this definition, the minimum requirement for an innovation is that the product and the process must be *new* or *significantly improved* to the firm.

Oslo-manual also defines the innovation activities as all scientific, technological, organizational, financial and commercial steps which actually lead to the implementation of innovations. Some innovation activities are themselves innovative; others are not novel activities but are necessary for the implementation of innovations.

The FP5 and FP6 macrostructure refers to these distinctions. These are structured in thematic and horizontal programmes. The activities concerning the thematic programmes are directly oriented to increase knowledge, implement research, technological development and demonstration. So, they are the activities that inside each research area are themselves innovative. The activities concerning the horizontal programmes, as well as the general research activities and the support activities, complement, coordinate, and support the thematic programmes. So, they are activities need to implement innovations.<sup>31</sup>

#### **4.4.1 DEFINITION OF PRODUCT INNOVATION**

Oslo manual defines a product innovation as the introduction of a good or service that is new or significantly improved with respect to its characteristics or intended uses. Product innovations can utilize new knowledge or technologies, or can be based on new uses or combinations of existing knowledge of technologies.<sup>32</sup> Hence, key terms to identify product innovation are “product”, “new product” and “significant improved product”. The term product is used to

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<sup>31</sup> In the appendix A figure 1, it is showed an example about the macrostructure of the FP5 programme.

<sup>32</sup> Differently of the second edition, the concept of innovation in the third edition is further amplified. In the second edition the innovation refers only to technological innovation.

cover both product and services. Product innovations include both the introduction of new goods and services and significant improvements in the functional or users characteristics of existing good and services.

New products are goods and services that differ significantly in their characteristics or intended uses from products previously produced by the firm. The development of a new use for a product with only minor changes to its technical specifications is also a product innovation.<sup>33</sup> These minor changes, however, have to be “significant”, that is they have to notably enhance or upgrade the existing product performance. A simple product may be improved (in terms of better performance or lower cost) through use of higher-performance components or materials, or a complex product which consists of a number of integrated technical sub-systems may be improved by partial changes to one of the sub-systems.<sup>34</sup> In the specific case of services, instead, significant improvements concern the ways in which a service is provided. Significant improvements of existing services can consist in their increased efficiency or speed.<sup>35</sup> Finally, design is an integral part of the development and implementation of product innovations. However, design changes that do not

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<sup>33</sup> In the first case, examples of product innovation are the microprocessors and digital cameras by 3M. In the second case, an example of process innovation is the introduction of a new detergent using an existing chemical composition that was previously used as an intermediary for coating production only.

<sup>34</sup> An example of a product innovation consisting of partial changes or additions to one of a number of integrated technical subsystems is the introduction of ABS braking, GPS (Global Positioning System) navigational systems, or other subsystem improvements in cars. The use of breathable fabrics in clothing is, instead, an example of a product innovation involving the use of new materials that improves the performance of the product.

<sup>35</sup> Examples are significant improvements in Internet banking services, such as greatly improved speed and ease of use, or the addition of home pick-up and drop-off services that improve customer access for rental cars. Providing on-site rather than remote management contact points for outsourced services is an example of an improvement in service quality.

involve a significant change in a product's functional characteristics or intended uses are not product innovations. Routine upgrades or regular seasonal changes are also not product innovations.

#### **4.4.2 DEFINITION OF PROCESS INNOVATION**

A process innovation is the implementation of a new or significantly improved production or delivery method. This includes significant changes in techniques, equipment and/or software. Key terms to identify process innovations are therefore “process”, “new and significant improved production and delivery methods”.

Process innovations can be intended to decrease unit costs of production or delivery, to increase quality, or to produce or deliver new or significantly improved products, which cannot be produced or delivered using conventional production methods. The methods can also be intended to increase the production or delivery efficiency of existing products. Improved methods can consist of changes in equipment, or production organization, or a combination of these changes.

Production methods involve the techniques, equipment and software used to produce goods or services. Examples of new production methods are the implementation of new automation equipment on a production line or the implementation of computer-assisted design for product development. Delivery methods concern the logistics of the firm and encompass equipment, software



and techniques to source inputs, allocate supplies within the firm, or deliver final products. An example of a new delivery method is the introduction of a bar-coded or active RFID (Radio Frequency Identification) goods-tracking system.

In the case specific of services, process innovations include new or significantly improved methods for the creation and provision of services. They can involve significant changes in the equipment and software used in services-oriented firms or in the procedures or techniques that are employed to deliver services. Examples are the introduction of GPS tracking devices for transport services, the implementation of a new reservation system in a travel agency, and the development of new techniques for managing projects in a consultancy firm.

Process innovations also cover new or significantly improved techniques, equipment and software in ancillary support activities, such as purchasing, accounting, computing and maintenance. The implementation of new or significantly improved information and communication technology (ICT) is a process innovation if it is intended to improve the efficiency and/or quality of an ancillary support activity.

#### **4.4.3 MISCELLANEOUS INNOVATIONS**

In borderline cases, it is important to be able to distinguish between innovation types. However, many innovations may have characteristics that span more than one type of innovation. It can be both difficult and misleading, in terms of types of innovation activities undertaken by firms, to categorize these innovations as a

single type. For example, if a firm introduces a new product which also requires the development of a new process, it is clear that the innovation is both of product and process.

In general, however, the distinction between product and process innovation in the case of goods is clear. More difficult it is to distinguish product and process innovation in the services. For this reason, Oslo Manual provides further guidelines to differentiate innovations. It suggests that if the innovation involves new or significantly improved characteristics of the service offered to customers, it is a product innovation. If the innovation involves new or significantly improved methods, equipment and/or skills used to perform the service, it is a process innovation. Finally, if the innovation involves significant improvements in both the characteristics of the service offered and in the methods, equipment and/or skills used to perform the service, it is both a product and a process innovation.

The argumentations presented in the paragraph 4.3.1 and in the paragraphs 4.4, these allow classifying the automobile innovation approaches in process and product innovations (see appendix B for summarizing tables).

#### **4.5 DATA DESCRIPTION**

For the empirical analysis, these are used principally three databases. In order to measure the concept of proactive corporate behaviour, it is used the Vehicle Certification Agency (VCA) database. VCA is part of the Driver, Vehicle and

Operator (DVO) group of agencies in the Department for Transport (DfT). It is the UK authority responsible for ensuring that vehicles and vehicle parts have been designed and constructed to meet internationally agreed standards of safety and environmental protection. The Agency operates in the global automotive industry and has a growing network of offices and representatives in established automotive industry locations.

VCA database provides full information about fuel consumption by vehicle. This information is obtained under specific test conditions they may not be achieved under 'real life' driving conditions. This information, however, serves as a means of comparing models of a similar type. VCA database is one of the most complete in Europe because it provides data at level of manufacturers, models and vehicles along 2000 to 2008. Each year the manufacturers count with several numbers of vehicle models or production lines, which include different types of vehicles. Each production line then, can count vehicles with different euro standard certifications, while a same vehicle along the time cannot count with different euro standard certifications. As a vehicle responds to superior euro standard certifications, that means its technology has been changed. From this moment, the modified vehicle it is considered as a new vehicle.

In each model, year by year, the number of vehicles that obtain superior euro standard certifications can vary. This variation can include certifications that can go beyond the accomplishment of the euro regulation in to full force in a given year. In the data, it is observed that even though companies can wait till to 2006

to obtain the EuroIV for their vehicles, some of them anticipate the adoption of EuroIV already in 2000 (e.g. SKODA). Even though, the degree of anticipation of Euro IV standards before 2006, it can be due to particular process and/or product characteristics by the company, it can be considered as a proactive behaviour of the company. It is possible that manufacturers have invested in previous years in their processes and products in the perspective to accomplish future regulation. But, the point is that they have done this before of their competitors. Even though, the companies are obligated to adapt their products to the regulation, why there are companies that anticipate and companies that do not anticipate or anticipate with less degree regulations? What are the determinants of this behaviour?

Thus, the idea is to analyse if this behaviour it is a possible consequence of the fact that manufacturers participate in VEIs. The participation of automobile companies in VEIs, it is measured considering the “Framework Programmes” launched by the European Parliament and by the Council of the European Union between 1998-2006. The term 'programme' includes EU programmes and initiatives under which individual projects or activities are carried out. Such programmes are the major instrument through which the Commission pursues and finances European Union policy on Research and Technological Development (RTD). An important part of the European Commission's budget is devoted to encouraging R&D, and in particular the exploitation of new technology resulting from scientific research. Currently EU counts with four

framework programmes directed to support R&D activities covering almost all scientific disciplines: the fourth framework programme for the years 1994-1998, with a budget of ECU 13.215 million; the fifth programme for the years 1998-2002, with a budget of 14.960 million of euro; the sixth programme for the years 2002-2006 with a budget of 17.500 million of euro and the seventh programme for the period 2007-2013 with a budget of 53.2 billion of euro.

The EU framework programmes can be defined as “negotiated agreements”. They are sponsored by a governmental authority (the European Commissions) that, with the collaboration of research community, defines the work programme and invites several organizations to participate. Different organizations (universities, research institutes, companies, small or medium-size enterprises, public administration, institutions and persons) can submit their proposals to European Commissions (EC) following the guide lines defined in the work programme. The EC, with the collaboration of independent external experts, selects and evaluates the proposals (peer review). Then, for successful proposals, it enters into (financial and scientific-technical) contract negotiation leading, eventually, to the signature of a contract. The contract enters into force upon signature by the co-ordinator (who submit proposal) and the Commission only. All other contractors (others actors that participate in the project) have to sign within a delay specified in the contract.<sup>36</sup>

In this work, these are considered only the Fifth framework programme (FP5) and the Sixth Framework Programme (FP6). Both these programmes count with

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<sup>36</sup> In the appendix A, figure 2, it is showed the selection process of organizations' projects.

thematic programmes and cross cutting or horizontal programmes. The thematic programmes cover a series of well-defined research or sub-thematic areas. These research areas include innovation projects with different research domain. In particular, FP5 and FP6 count with four thematic programmes directed to improve the environmental quality, the economic growth, the communication systems and the community health.<sup>37</sup> The projects direct to improve the environmental quality are the principal interest of this work. These initiatives take the name of “Energy, environment and sustainable development (EESD)” in the FP5, and of “Sustainable development, global change and ecosystems (SUSTDEV)” in the FP6. These two programmes represent on continuous of European Research in Environmental problems. The project data of these two programmes are collected by the Community Research and Development Information Service (CORDIS). CORDIS is an information space, filled with a huge array of accurate data on European research and development (R&D) and innovation activities. It is the official source of information about EU programmes and initiatives under which individual projects or activities are carried out. CORDIS provides information about the objective, the participants, funds, costs, time and the objective of each project.

CORDIS information will be used to understand the type of strategy that the firms have been adopting to anticipate euro standard regulation. It is still low clear what is the type of innovation the firms adopt to accomplish euro standard regulations. The directives only fix emission limits, but do not impose the type of

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<sup>37</sup> In the appendix A, it is provided a detailed description of the structure of FP5 and FP6.

technology that the firms have to develop in order to achieve these standards. In CORDIS, there are two levels of analysis. The first is project-level and the second is the organizational-level. At level of project, there is information about the duration, the cost, the fund and the type of contract. At level of organization, there is information about the partners participating in the projects.

In this work, the data are reduced at level of automobile manufacturer. In a first step there is collected information on projects wherein automobile manufacturers participate. The sample of CORDIS is, therefore, shaped by all possible vehicle manufacturers that have applied in EU environmental programmes. The total organizations met in CORDIS are 49. At level of project, the name of these organizations is so repeated as much time as the number of projects where they participates. From these data, the panel is constructed considering the duration of the project and the information is reduced at level of organization by year. These data are matched with VCA data, excluding all those organizations that do not participate in CORDIS.

Final, the data obtained from the match between VCA and CORDIS are matched with Organization Internationale des Constructeurs d'Automobiles (OICA) production data. OICA is the International Organization of Motor Vehicle Manufacturers founded in Paris in 1919. The organization's membership comprises 43 national trade associations around the world, including all major automobile manufacturing countries, thereby covering virtually the entire motor vehicle industry all over the world. OICA provides a wide database on world

motor vehicle production statistics by manufacturer, country and year. This statistics are obtained from national trade organisations by survey. Each summer, national trade organisations are surveyed on their annual data. The unit used is the actual number of vehicles produced. The data are reported for several types of vehicles: passenger cars, light commercial vehicles; heavy commercial vehicles and buses. Only the data for passenger cars these will be considered.

The final panel data is constituted by 178 observations with 49 manufacturers for the time period 2000-2006.

## 4.5.2 MEASURE

### 4.5.2.1 DEPENDENT VARIABLES

The independent variable measures the degree of anticipation of euro IV standard regulation before 2006 by manufacturer and year:

$$Ant_{my} = \left[ \frac{\sum_i^n vehiclese_{ijmy}^{(euroIV)}}{\sum_i^n vehicles_{ijmy}} \right] / \left[ \sum_j^n models_{jmy} \right]$$

Where  $\frac{\sum_i^n vehiclese_{ijmy}^{(euroIV)}}{\sum_i^n vehicles_{ijmy}}$  is the number of vehicles by model  $j$  manufacturer  $m$

and year  $y$  that anticipate euro standard IV before 2006 on the total number of vehicles by model  $j$  manufacturer  $m$ , which are in the market in the year  $y$ .

$\sum_j^n models_{jmy}$  measures the total models in the market by manufacturer  $m$  and year



y. In the first part of the formula, I control for the number of models that a manufacturer possesses in each year. Thus, the ratio (number of vehicles that anticipate the regulation on the total vehicle in the market for each manufacturer and year), it is calculate inside each models. Such computation it is realized on an initial database of 29.875 observations at level of vehicles between 2000 and 2006. The sum of vehicles it allows to reduce the information at level of models, obtaining total observations equal to 3.675 at level of model (2000-2006).

In the second part of the formula, I assume that all the models by manufacturer have the same importance. Thus, I divide the vehicles that anticipate regulation respect to the total vehicles, for all the total models of a manufacturer by year. In this way, the variable *Ant* is an average of the number of vehicles that anticipate regulation respect to both the total vehicles of a model and the total number of models of a manufacturer.

#### **4.5.2.2 INDEPENDENT VARIABLE**

**Product and process innovation.** Product innovation is the sum of the projects, wherein automobile manufacturers participate in order to create new or significantly improved good (vehicles) or services (logistics). Process innovation is the sum of projects wherein automobile manufacturers participate in order to implement new or significantly improved production or delivery method. **PP innovation** is the sum of the projects, wherein automobile manufacturers participate in other to realize both process and product innovations. To classify Cordis projects as process or product innovations or both, there have been used

the guidelines laid out by Oslo Manual (OECD and EUROSTAT 2005). In CORDIS data, FP5 and FP6 are structured according to three levels of analysis. The first level is the research domain, the second level is the priority of the project and third level is the sub-priority. The sub-priority includes all projects having similar objectives. Thus, a careful study of the sub-priority targets it has allowed classifying projects according to specific environmental strategies. In particular, the process of classification it has been realized applied a key-words approach to the indicated sub-priority project targets in light of the previous automobile innovation classifications.<sup>38</sup>

#### **4.5.2.3 CONTROL VARIABLE**

**Participation.** With the variable participation I control for the weight with which a manufacturer participates in a project. This variable is computed dividing the sum of the projects wherein an automobile manufacturer participates, for the total partners involved in the project. In this way, the variable proxy eventual free rider effects inside the project when the number of partners increases. **World production.** It is possible that the degree of anticipation of standard regulation can be affected by the size of a corporation. For this reason, I control for the level of world production of a manufacturer, measured by the number of vehicles produced in a year in all the worldwide production sites. This variable is considered a better approximation of firm size than other measures,

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<sup>38</sup> See table in the appendix B.

like sales or the number of employees, because it provides a more correct measure of the manufacturer's production capacity per year. The data are obtained by OICA. By manufacturer, it is computed the sum of the production realized in different countries in the world. For some make like RENAULT, GENETAL MOTORS and FIAT, there are also considered the total productions realized by third parties. As it is well known, a part of production by Renault it is realized in France by Sovab, in Romania by Dacia and in Slovenia by Revoz. In Austria, France, Italy and United Kingdom, there are facilities like Magna Steyr, Sovab, Bertone Avtozaz and Proton that produce by GM, even if GM is not owner of these facilities. Finally, in India the production by Fiat it is realized by TOFAS (ACEA 2007). In this stage of data collection, some missing value is met. OICA did not report production data for example by MINI between 2001- 2003, Rolls-Royce between 2003- 2005, Aston Martin for 2007. The methodology followed to fill these missing values is to collect data from the company group annual reports. In this stage, I also check the data of OICA with data reported in the report, verifying the robustness of OICA survey. Finally, to the variable it is applied the logarithm in order to normalize the data with the rest of the database.

I also control for the **number of models** (Models) by year and manufacturer. A car model, in general, represents a production line of the corporation. Manufacturers with much more production lines it is likely to adopt early regulations, in order to re-arrange the rest of the production lines on time for the entry into full force of regulation. Besides, the number of models is a proxy of

the level of diversification of the company. **Mean of number of vehicles in the model (Vehicles)**. In this case, the idea it is to control for the size of the production line. It is possible that manufactures with production lines including a large number of vehicles, adopt early regulations in order to attain a competitive advantage on the sales in a given market segment. Therefore, this measure jointly with production measure control for another dimension of company size. Finally, I control for the **year** through dummy variables and for the total **fund** that the companies receive from EC. The funds are computed before at level of project. For each project, I calculate the ratio between the funds obtained by the project and the total funds of the programme. Thus, I establish a ranking of importance of projects. Then, I sum this ratio for all the projects wherein a manufacturer participates and I compute the logarithm to normalize the data.

#### 4.6 MODEL SPECIFICATION

The regression models for estimating the corporate behaviour of those companies that participate in VEIs adopting innovation strategies and interacting with several stakeholders is the following Tobit Model:

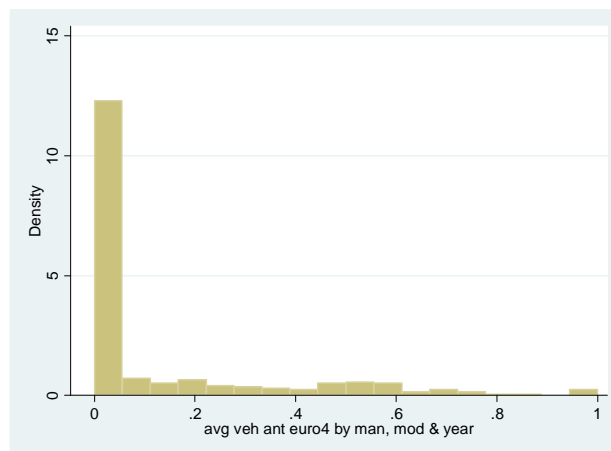
$$Ant_{i(y+1)} = a'C + b_1'Contr_{iy} + b_2'ES_{iy} + e_{iy} \quad (1)$$

It is preferable to use Tobit Model regression that OLS regressions because the dependent variable  $Ant_{y+1}$  is zero for a significant fraction of the observations (see figure). Conventional regression methods fail to account for the qualitative difference between *limit* (zero) observations and *nonlimit* (continuous)

observations (Greene 2005). Thus it is necessary to correct this concentration of data of the left of the dependent variable distribution. Tobit regression model allows doing so censoring the observations on the side where it is needed to correct the distribution.

In these terms, the tobit regression model is also better than truncated regression because with censored data I have all of the observations but I don't know the "true" values of some of them. With truncation some of the observations are not included in the analysis because of the value of the variable. It would be inappropriate to analyze the data in this example using a truncated regression model.

**FIGURE 4 -DISTRIBUTION ANALYSIS OF DEPENDENT VARIABLE “ANT”**



*From STATA computation*

In the above model, the only censored data are those to the left of the distribution. The subscript  $i$  indexes the firms ( $i=1, \dots, 49$ ), and  $y$  indexes the time period (year). For the dependent variable  $Ant_{y+1}$  the time period is lagged for one period ( $y = 2001, \dots, 2006$ ). In this way, in the model, it is assumed that

the companies participating in VEIs at the time  $y$  and they are able to behave proactively (anticipate euro standard IV before 2006) only in the following year. Thus, for the independent, the independent variables the time period starts from 2000.  $C$  is a constant.  $Contr_{iy}$  represents the vector of control variables and  $ES_{iy}$  the vector of the environmental strategy variables. Finally,  $e_{iy}$  is the error term associated with each firm-year.

#### 4.7 RESULTS AND DISCUSSION

The table 4 provides the descriptive statistics for the dependent variable, the environmental strategies and the control variables. The table 5 and 6 provide the results of various regression models.

**TABLE 4 - Descriptive statistics and Correlations<sup>a</sup>**

Variables	Mean	S.D.	1	2	3	4	5	6	7	8	9
1. Ant	.27	.30	1								
2. Product inn.	1.26	2.23	-0.12	1							
3. Process inn	1.39	2.30	-0.01	0.22*	1						
4. Prod-proc inn	.91	1.29	-0.20*	-0.01	0.05	1					
5. Production	13.22	2.21	-0.08	0.46*	0.56*	0.19	1				
6. Fund Captured	6.94	4.57	-0.11	0.30*	0.07	-0.17	0.19	1			
7. Vehicles	8.51	5.51	0.20*	-0.05	0.12	-0.20*	-0.12	0.24*	1		
8. Models	14.71	10.67	0.10	0.31*	0.16	0.07	0.28*	0.54*	0.34*	1	
9. Participation	.093	.098	-0.21*	0.07	-0.41*	0.09	-0.63*	-0.10	0.04	-0.16	1

<sup>a</sup> N=178

+ $p < 0.10$

\* $p < 0.05$

\*\* $p < 0.01$

In the table 4, the correlation between the environmental strategies and the dependent variable is negative but not significant. The relationship between anticipation and vehicles is positive and significant. Funds and models are positively related to the product innovation more than with the process innovation. On the other hand, the production results more positively related with

the process innovation than product innovation. It is possible to note that all the coefficients of the variables that I want to test are sufficiently low. This should be sure no problem of multicollinearity in the models.

**Tabla 5 - Results of Tobit regression on Ant lagged of one period: test of direct effects<sup>a</sup>**

	Model(1) Control variables	Model (2) Product innovation	Model (3) Process innovation	Model (4) Prod-proc innovation	Model (5) Total
	Ant <sub>t+1</sub>	Ant <sub>t+1</sub>	Ant <sub>t+1</sub>	Ant <sub>t+1</sub>	Ant <sub>t+1</sub>
<b>Environmental strategies</b>					
Product inn.		0.05** (0.02)			0.05** (0.02)
Process inn.			0.03 (0.02)		0.01 (0.03)
Prod-proc inn.				0.00 (0.02)	-0.02 (0.02)
<b>Control variables</b>					
year2001	0.13 (0.17)	0.13 (0.17)	0.13 (0.17)	0.13 (0.18)	0.14 (0.17)
year2002	0.21 (0.17)	0.18 (0.17)	0.20 (0.17)	0.20 (0.17)	0.19 (0.17)
year2003	0.21 (0.17)	0.17 (0.17)	0.19 (0.17)	0.20 (0.17)	0.19 (0.17)
year2004	0.31+ (0.17)	0.30+ (0.17)	0.29+ (0.17)	0.31+ (0.17)	0.31+ (0.17)
year2005	-0.33+ (0.18)	-0.36** (0.18)	-0.36** (0.18)	-0.33+ (0.18)	-0.35** (0.18)
year2006	-2.84 (0.00)	-2.77 (0.00)	-2.84 (0.00)	-2.85 (0.00)	-2.80 (0.00)
Production	-0.12* (0.02)	-0.12* (0.02)	-0.12* (0.02)	-0.12* (0.02)	-0.12* (0.02)
Fund captured	-0.03 (0.03)	-0.10** (0.04)	-0.06 (0.04)	-0.03 (0.03)	-0.10** (0.04)
Vehicles	0.02* (0.01)	0.02* (0.01)	0.02* (0.01)	0.02* (0.01)	0.02* (0.01)
Models	0.01* (0.00)	0.01* (0.00)	0.01* (0.00)	0.01* (0.00)	0.01* (0.00)
Participation	-1.40** (0.59)	-2.16* (0.67)	-1.59* (0.61)	-1.41** (0.60)	-2.16* (0.66)
Constant	1.12* (0.33)	0.76** (0.36)	0.95* (0.36)	1.11* (0.34)	0.75** (0.37)
<b>Observations</b>	<b>178</b>	<b>178</b>	<b>178</b>	<b>178</b>	<b>178</b>
<b>Pseudo R-squared</b>	<b>0.46</b>	<b>0.49</b>	<b>0.47</b>	<b>0.46</b>	<b>0.49</b>

Unstandardized regression coefficients are shown, with standard errors in parentheses

+ $p < 0.10$

\* $p < 0.05$

\*\* $p < 0.01$

In the table 5, in the model 1, these are regressed only the control variables.

The years capture the effect of the anticipation. The years 2000 is used as drop

variable to avoid multicollinearity problems. In the year 2004, the companies that anticipate the regulation are higher than in other years. In 2004, it is captured the greatest anticipation because the coefficient is positive and significant. In 2005, instead, there is a strong prevalence of companies that in mean do not anticipate the regulation. On the total of their vehicles, very few are euro IV standardized. The production affects negatively the adoption of the regulation. In all the models this variable is always negative and significant. This means that the largest companies are those that in mean anticipate later the regulation. In contradiction, vehicles and models present positive and significant coefficients. This result suggests that it is not as much the level of production that facilitates the anticipation of the regulation, as the level of diversification of the company in the market and the dimension of this diversification.

Interesting it is the result of the variable participation. This variable controls for the dimension with which a company participate in the projects. A negative coefficient suggests that when in a project there are many partners, the degree with which the companies can behave proactively it reduces. In other words, it is verified what Olson (1982) suggests: “unless the number of individuals in a group is quite small, or unless there is coercion or some other special device to make individuals in the common interest, *rational, self-interest individuals will not act to achieve their common or group interests.*”

The negative coefficient of fund captured indicates that the companies that participate in projects wherein much more money is designated respect to the



total anticipate in lower measure regulation. A possible explanation to this result it could be met by looking at the process of project funding. It is possible that European Commission prefers to assign much more funds to those projects that are presented by companies that have difficulties to anticipate regulation than to those projects where the partners largely accomplish regulation.

The model 2 tests the effect that product strategies have on the corporate behaviour. The coefficient is positive and significant. This result suggests that the companies, which are investing in projects directed to improve their own vehicles, early anticipate the regulation. Product innovation strategies encourage proactive behaviours. In the model 3, the effect of process innovations is tested. The coefficient is positive but not significant. This result contrasts the Kearney analysis (Kearney 2003). According this analysis, the companies that invest in process innovation build and sustain competitive advantage because they can rapidly and accurately respond to ever-changing market conditions. In this case, the flexibility of these companies should be translated in capability to anticipate regulation. However, I believe that in order to verify Kearney predictions, it is necessary to test a longer time period. A longitudinal database with much more years, it would allow of capturing in the long period the advantages to invest in process innovations. Process innovation goes much further of the product innovation and so its effects it is possible to be observable only after much more years the adoption of the strategy.

**TABLE 6**  
**Results of Tobit regression on Ant lagged of one period: test of direct effects with robust standard errors<sup>a</sup>**

	Model(1) Control variables	Model (2) Product innovation	Model (3) Process innovation	Model (4) Prod-proc innovation	Model (5) Total
	Ant <sub>t+1</sub>	Ant <sub>t+1</sub>	Ant <sub>t+1</sub>	Ant <sub>t+1</sub>	Ant <sub>t+1</sub>
<b>Environmental strategies</b>					
Product inn.		0.05* (0.02)			0.05** (0.02)
Process inn.			0.03 (0.03)		0.01 (0.02)
Prod-proc inn.				0.00 (0.02)	-0.01 (0.02)
<b>Control variables</b>					
year2001	0.13 (0.17)	0.13 (0.16)	0.13 (0.17)	0.13 (0.17)	0.15 (0.17)
year2002	0.21 (0.16)	0.18 (0.16)	0.20 (0.16)	0.20 (0.16)	0.21 (0.16)
year2003	0.21 (0.16)	0.17 (0.16)	0.19 (0.16)	0.20 (0.16)	0.19 (0.16)
year2004	0.31+ (0.16)	0.30+ (0.16)	0.29+ (0.16)	0.31+ (0.16)	0.32+ (0.17)
year2005	-0.33+ (0.18)	-0.36** (0.18)	-0.36+ (0.18)	-0.33+ (0.18)	-0.35+ (0.19)
year2006	-2.51* (0.30)	-2.43* (0.31)	-2.48* (0.31)	-2.51* (0.30)	-2.43* (0.31)
Production	-0.03 -0.12* (0.02)	-0.10** -0.12* (0.02)	-0.06 -0.12* (0.02)	-0.03 -0.12* (0.02)	-0.10** -0.13* (0.02)
Fund captured	0.02* (0.01)	0.02* (0.01)	0.02* (0.01)	0.02* (0.01)	0.02* (0.01)
Vehicles	0.01* (0.00)	0.01* (0.00)	0.01* (0.00)	0.01* (0.00)	0.01* (0.00)
Models	-1.40** (0.55)	-2.16* (0.63)	-1.59* (0.57)	-1.41** (0.56)	-2.16* (0.63)
Participation	1.12* (0.34)	0.76** (0.38)	0.95** (0.37)	1.11* (0.35)	0.83** (0.39)
Constant					
<b>Observations</b>	178	178	178	178	178

*Unstandardized regression coefficients are shown, with standard errors in parentheses*

*+p<0.10*

*\*p<0.05*

*\*\*p<0.01*

In the model 4, it is tested the case in which companies in a same projects decide to develop product and process innovations. The coefficient of prod-proc strategies is positive but not significant. In this case, the considerations are the same for the previous case. As the challenge of a project increases, the ability of a firm to have proactive behaviour reduces.

It is interesting to note that in the model 3 and 4, the coefficient of the variable fund lose significance, while it is highly significant in the model 2. In the model 2, we learn that the companies that develop product innovation are those that more anticipate regulation. At the same time, the negative coefficient of the fund indicates that the funds that these companies receive do not encourage the anticipation of regulation. On the other hand, the funds that are designed to project directed promote process or the both types of innovations do not have significant effects on the corporate behaviour. Finally, in the model 5, it is tested the entire model. In this model the product innovation continues to be positive and significant, the process innovation positive and not significant and the strategy of both innovation negative and no significant.

The results are confirmed in the table 6, where an analysis about robust errors of Tobin Model it is presented. In this analysis the data are reconfigured. Two values of the response variable for each observation are created. Since the response variable Ant is left censored, missing values are been created for the values to the left of the response variable. New regressions are run with the two values for the response variable created. The results of these regressions these are reported in the table 6. Comparing the two tables, it is possible to note that the point estimates are the same and all the predictors are still significant.

From the model, my conclusions are that if the manufacturers are investing in more projects whose objective is to produce product innovations, their capacity to anticipate regulation is greater. This ability is, however, significant in the short

period. If manufacturers are investing in more projects whose objective is to produce process or both innovations, their ability to anticipate regulation reduces.

# **CHAPTER 5**

## **DISCUSS AND CONCLUSIONS ON IMPLICATIONS AND CONTRIBUTIONS**

### **5.1 SUMMARIZING**

The challenge of my thesis has been to measure which effects the adoption of VEIs has on the corporate behaviour. VEIs are environmental commitments whose main purpose is to encourage companies to achieve environmental performance that go beyond existing legal requirements. As a consequence, it is expected that companies participating in a VEI, adopt environmental strategies to anticipate future environmental regulations.

In this work I argue that the only adoption of VEIs (Voluntary Environmental Initiatives) is not an adequate measure to study the corporate behaviour. The firms adopting VEIs not always implement the practices that the initiatives encompass. In many cases, companies use their participation in VEIs only to improve their green image, as they do not have a real commitment to change their behaviour. For this reason, I suggest the need to split the concept of proactive corporate behaviour in VEI participation and proactive environmental behaviour. For proactive environmental behaviour, I intend that the firms not only adopt a VEI, but they also implement strategies to achieve the objectives of the VEI wherein they participate. This distinction allows proposing a theoretical

model. In this model, I defend the idea that the proactive corporate behaviours are moderated by the interactions that the company has with particular category of stakeholders which are involved in the design of the program. I also suggest that the likelihood that a firm develops a proactive environmental behaviour depends on the intensity of these interactions.

In order to understand who stakeholders can increase or reduce proactive corporate behaviour, I have structured the analysis for types of VEIs. The type of initiative is defined by who sponsors the initiative and who participates in its design. Several actors, such as governments, single firms, trade associations, non-affiliated firm groups and non-governmental organizations, can sponsor VEIs. These actors cover an important role because they decide if and which stakeholders will participate in the program design.

The idea is that the relationship between the sponsor and other stakeholders involved in the program design can affect the corporate behaviour. The companies can recognize to stakeholders participating in the design, different importance in relation to the relationships that are established inside the VEIs. The degree of importance assigned it is defined by the number of interactions that occur between these stakeholders and the firms. The type and the intensity of interactions influence the likelihood that firms undertake a proactive environmental behaviour.

This work proposes the descriptive stakeholder theory as the most appropriate approach to study the corporate behaviour. The descriptive stakeholder theory

explains how the companies actually reply to stakeholder pressures by assigning them an order of importance that depends on specific circumstances faced by the firm. This perspective applied to the most significant VEI experiences, allows pinpointing, for each VEI, the stakeholders that are important to influence the corporate behaviour.

Finally, I propose an empirical analysis with the objective to test the effects that VEIs have on the behaviour of the companies adopting them. In the last years, automobile industry has been characterized by the promotion of several VEIs. Currently, the governments are strongly oriented to the adoption of such instruments to encourage the industry to improve that environmental quality of their products and processes. These facts justify the choice of studying this particular sector. The analysis takes into consideration the EU framework programmes. These are initiatives sponsored by the European Parliament and by the Council with the purpose to promote the innovation in Europe. Many automobile manufacturers participate in such initiatives with the aim to promote process and product innovation. The idea in this work was to see if the companies are anticipating the regulation as consequence of their participation in European voluntary initiatives and which type of strategy they are adopting. The results confirm that the firms have proactive behaviours because they anticipate regulation when they participate in VEIs. But, proactive corporations are only those that are promoting the developing of product innovations.

## **5.2 IMPLICATIONS FOR THE RESEARCH AND THE CORPORATION**

This type of study is particularly interesting because, until now, most of empirical evidences about VEIs have assumed that the success of a VEI places on its degree of adoption by companies (Arora and Cason 1995; Henriques and Sadorsky 1999; Buysse and Verbeke 2003; Khanna, Koss et al. 2007; Blackman 2008; Delmas and Montiel 2008; Henriques and Sadorsky 2008). I suggest that the success of a VEI is based on the degree with which the companies have proactive behaviours after that they adopt an initiative. This idea contributes to give validity to VEIs as alternative instrument to traditional command-and-control regulations in solving environmental problems. If the corporations do not behave proactively after that they adopt VEIs, then it can be preferable to continue managing environmental problems by regulation.

## **5.3 LIMITATIONS**

Some limitation characterizes the theoretical study. First, in the theoretical model, these are only considered individual actors that sponsor the programs. The model does not suggest how the corporate behaviours can change if more stakeholders are contemporary sponsor or leader of a programme. Second, it is not argued how variations over time in the stakeholder partnerships could influence the corporate behaviour. This analysis is only focused on the initial stage of VEI relationships, providing a static application of stakeholder theory. Third, no deepening of the social network theory is provided to better explain the



type of relationships that can exist among stakeholders. It is only assumed that the type of relationship changes when the sponsor of the initiative changes. Finally, the propositions are constructed by analysing only US case studies. This limitation can, however, be in part justified by the limited empirical evidences that consider EU VEIs.

Besides, other limitations can meet in the empirical part. First, it is not explicitly analysed the effect that stakeholder relationships have on the corporate behaviour. In the model, I control for the participation of the company. This variable summarizes the dimension with which a company participates in a programme in relation to the number of the partners involved in the same programme. The model, however, only tests direct effects. No moderation effects are tested. Second, I don't control for the importance that manufacturers assign to environmental projects respect to the total projects wherein they participate. In EU programme, almost all vehicle manufacturers participate in other type of programme. Finally, I don't control for potential information selection. It is possible that in the selection process the EC prefers determined type of projects to others. For these reason, it would be necessary to control for the total number of calls done by the companies respect to the total projects granted by EC to the company.

#### **5.4 FUTURE RESEARCHES**

The results of this study promote several lines of research that I believe to be particularly interesting. In a first place, at level of firm, I consider that a worth

area of research is to analyse if and how the type of partners involved in the VEI and the type of partnership, influence the environmental behaviours of firms. In this sense, it would be remarkable to construct measures that reflect the type and the intensity of participation of each partner in the initiative. This analysis would allow identifying which stakeholders are more important in a programme. The important stakeholders are, indeed, those which are able to affect the corporate behaviour. Then, in the automobile sector, it would be interesting to examine if supply chain relationships are established inside the VEIs. The idea is to construct vertical ties inside VEIs, with the purpose to analyse how these ties affect the corporate behaviour.

In second place, I consider necessary to study if and how isomorphism processes lead a firm to change its behaviour. The literature teaches that changes in the formal procedures of corporations follow a slow diffusion process. (Tolbert and Zucker 1983). In a first stage the firms adopt changes because they have substantially effectiveness and efficiency advantages. In a second stage, when the components of formal practices become widely accepted in the social context, the mechanisms that lead to adopt certain practices change. The later adopters are firms applying new practices not for obtaining cost advantages but because they need legitimacy. Hence, it would be interesting to deepen if and how institutional mechanisms work to stimulate isomorphism processes among the firms.

## REFERENCES

- ACEA (2007). Automotive Production & Assembly sites in Europe. E. A. M. Association.
- Agle, B. R., R. K. Mitchell, et al. (1999). "Who matters to CEOs? An investigation of stakeholder attributes and salience, corporate performance, and CEO value." Academy of Management Journal **42**(5): 507-525.
- Alberini, A. and K. Segerson (2002). "Assessing Voluntary Programs to improve Environmental Quality." Environmental and Resource Economics **22**: 157-184.
- Anton, W., G. Deltas, et al. (2004). "Incentives for environmental self-regulation and implications for environmental performance." Journal of Environmental economics and management(632-654).
- Arora, S. and T. Cason (1995). "An experiment in voluntary environment regulation: participation in EPA's 33/50 program." Journal of Environmental Economics and Management **28**: 271-286.
- Arora, S. and T. Cason (1996). "Why do firms volunteer to exceed environmental regulators? Understanding participation in EPA'S 33/50 program." Land Economics **72**(4): 413-432.
- Arora, S. and T. Cason (1996). "Why do firms volunteer to exceed environmental regulators? Understanding participation in EPA'S 33/50 program." Land Economics **72**(4): 413-432.
- Arora, S. and S. Gangopadhyay (1995). "Toward a theoretical model of voluntary compliance " Journal of Economic Behavior and Organization **28**: 289-309.
- Barber, J. (1998). "Responsible Action or Public Relations?" Industry and Environment **21**(1-2): 41-50.
- Barnett, M. L. (2007). "Stakeholder Influence Capacity and the Variability Of Financial Returns To Corporate Social Responsibility." academy of Management Review **32**(3): 794-816.
- Bartel, A. P. and L. G. Thomas (1987). "Predation through Regulation: The Wage and Profit Effects of the Occupational Safety and Health Administration and the Environmental Protection Agency." Journal of Law and Economics **30**: 239-264.
- Berman, S., A. C. Wicks, et al. (1999). "Does Stakeholder orientation matter? The relationship between stakeholder management models and firm financial performance." Academy of Management Journal **42**(5): 488-506.

- Berry, M. A. and D. A. Rondinelli (1998). "Proactive corporate environmental management: A new industrial revolution." Academy of Management Executive **12**(2): 38-50.
- Bhoovaraghavan, S., A. Vasudevan, et al. (1996). "Resolving the Process vs Product Innovation Dilemma: A consumer Choice Theoretic Approach. ." Management Science **42**(2): 232-246.
- Blackman, A. (2008). "Can Voluntary Environmental Regulation Work in Developing Countries? Lesson from Case Studies." The Policy Studies Journal **36**(1): 119-141.
- Blackman, A. and J. Mazurek (2001). "The Cost of Developing Site-Specific Environmental Regulations: Evidence from EPA's Project XL." Environmental Management **27**(1): 109-121.
- Börkey, P., M. Glachant, et al. (2000). Voluntary Approaches for Environmental Policy: An Assessment. Centre d'économie industrielle. CERNA.
- Buysse, k. and A. Verbeke (2003). "Proactive Environmental Strategies: A Stakeholder Management Perspective." Strategic Management Journal **24**(5): 453-470.
- Carmin, J., N. Darnall, et al. (2003). "Stakeholder involvement in the design of U.S. Voluntary Environmental Programs: Does Sponsorship Matter?" The Policy Studies Journal **31**: 527-543.
- Carroll, A. B. (1979). "A Three-Dimensional Conceptual Model of Corporate Performance." Academy of Management Review **4**(4): 497-505.
- CEC (1996a). Communication from the Commission to the Council and the European Parliament on Environmental Agreements. Commission of the European Communities. final.
- CEC (1996b). Study on Voluntary Agreements Concluded Between Industry and Public Authorities in the Field of the Environment. Commission of the European Communities. Enviroplan. Copenhagen.
- Cesaroni, F. and R. Arduini (2001). "Environmental Technologies in the European Chemical Industry." LEM Working paper, Laboratory of Economics and Management Sant'Anna School of Advanced Studies.
- Clarkson, M. B. E. (1995). "A stakeholder framework for analysing and evaluating corporate social performance." The Academy of Management Review, **20**(1): 92-117.
- Coglianesi, C. and L. K. Allen (2004). "Does Consensus. An Analysis of EPA's Common Sense Initiative." Environment **46**(1): 10-25.

Cristmann, P. and G. Taylor (2002). "Globalization and the environment: Strategies for international voluntary environmental initiatives." Academy of Management Executive **16**(3): 121.

Christmann, P. (2000). "Effects of "Best Practices" of Environmental Management on Cost Advantage: The Role of Complementary Assets." The Academy of Management Journal **43**(4): 663-680.

Darnall, N. and D. J. Edwards (2006). "Predicting the costs of environmental management system adoption: the role of capabilities, resources and ownership structure." Strategic Management Journal **27**: 301-320.

Darnall, N. and S. Sides (2008). "Assessing the Performance of Voluntary Environmental Programs: Does Certification Matter?" The Policy Studies Journal **36**(1): 95-117.

Delmas, M. and M. Montes-Sancho (2006). Collective corporate political activity: Are late joiners the free riders?, University of California-Santa Barbara, Bren School of Environmental Science of management.

Delmas, M. and I. Montiel (2008). "The Diffusion of Voluntary International Management Standards: Responsible Care, ISO 9000, ISO 14001 in the Chemical Industry." The Policy Studies Journal **36**(1): 65-93.

Delmas, M. A. and A. K. Terlaak (2001). "A framework for analysing Environmental Voluntary agreements." California Management Review **43**(3): 44-63.

Donaldson, T. and L. E. Preston (1995). "The Stakeholder Theory of the Corporation: Concepts, Evidence, and Implications." The Academy of Management Review **20**( 1): 65-91.

Duncan, A., N. Rosinski, et al. (2004). Changing Drivers. The impact of Climate Change on Competitiveness and Value Creation in the Automobile Industry. Sustainable Asset Management. W. R. Institute.

EEA (1997). Environmental Agreements, Environmental Effectiveness. S. N. V. 1. Copenhagen, European Environment Agency.

Eesley, C. and M. J. Lenox (2006). "Firm responses to secondary stakeholder action " Strategic Management Journal **27**: 765-781.

EPA (1995). EPA's 33/50 Program Company Profile Reduction Highlights. EPA745-K-95-010. United States, Office of Pollution Prevention and Toxics.

EPA (1998). Partners for the Environment. A catalogue of the Agency's Partnership Programs. EPA 100-B-97\_003. United States, Environmental Protection Agency.

- EPA (1999). 33/50 program. The final record. EPA-745-R-99-004. United States, Office of Pollution Prevention and Toxics.
- EPA (2006). Waste Wise 2006 Annual report: PARTNERING FOR SUCCESS AND SUSTAINABILITY. United State.
- Ferrell, O. C., J. Fraedrich, et al. (2000). Business Ethics (4th Edition ed.). Boston.
- Freeman, R. E. (1984). Strategic management. A stakeholder approach. London.
- Friedrich, A., M. Tappe, et al. (2000). "A new approach to EU environmental policy-making? The Auto-Oil I Programme." Journal of European Public Policy **7**: 593-612.
- Frooman, J. (1999). "Stakeholder Influence Strategies." The Academy of Management Review **24**(2): 191-205.
- Gibson, K. (2000). "The Moral Basis of Stakeholder Theory." Journal of Business Ethics **26**(3): 245-257.
- Gioia, D. A. (1999). "Practicability, Paradigms, and Problems in Stakeholder Theorizing." The Academy of Management Review **24**(2): 228-232.
- Glachant, M. (2007). "Non-Binding voluntary agreements." Journal of Environmental Economics and Management **54**: 32-48.
- Goodpaster, K. E. (1991). "Business ethics and stakeholder analysis." Business Ethics Quarterly **1**(1): 53-73.
- Goodwin, F. (1997). Update Response to the EU Auto Oil Proposals. T&E. E. F. f. T. a. Environment.
- Granovetter, M. (1973). "The strength of weak ties." American Journal of Sociology **78**: 1360-1380.
- Granovetter, M. (1985). "Economic Action and Social Structure: the problem of Embeddedness." American Journal of Sociology **91**(3): 481-510.
- Greene, W. H. (2005). Econometric Analysis. New Jersey 07458.
- Hamilton, J. T. (1995). "Pollution as news: Media and stock market reactions to the toxics release inventory data." Journal of Environmental Economics and Management **28**: 98-113.
- Harrison, J. S. and R. E. Freeman (1999). "Stakeholders, social responsibility and performance: Empirical Evidence and Theoretical Perspectives." Academy of Management Journal **42**(5): 479-485.

- Hart, S. L. (1995). "A Natural-Resource-Based View of the Firm " Academy of Management Review **20**(4): 986-1014.
- Henriques, I. and P. Sadosky (1996). "The determinant of an environmentally responsive firm: an empirical approach." Journal of Environmental Economics and Management **30**(3): 381-359.
- Henriques, I. and P. Sadosky (1999). "The Relationship between Environmental Commitment and Managerial Perceptions of Stakeholder Importance." The Academy of Management Journal **42**(1): 87-99.
- Henriques, I. and P. Sadosky (1999). "The relationship between environmental commitment and managerial perceptions of stakeholder importance." Academy of Management Journal **42**(1): 87-99.
- Henriques, I. and P. Sadosky (2008). "Voluntary Environmental Programs: A Canadian Perspective." The Policy Studies Journal **36**(1).
- Higman, R. (1996). The Auto Oil Programme. The need for cleaner cars and fuels. Friends of Earth.
- Hill, C. W. L. and T. M. Jones (1992). "Stakeholder-agency theory." Journal of Management Studies **29**: 131-154.
- Hillman, A. J. and G. D. Keim (2001). "Shareholder Value, Stakeholder Management, and Social Issues: What's the Bottom Line?" Strategic Management Journal **22**(2): 125-139.
- Hoffman, A. J. (1999). "Institutional Evolution and Change: Environmentalism and the U.S. Chemical Industry." The Academy of Management Journal **42**(4): 351-371.
- Howard, J., J. Nash, et al. (1999). "Industry codes as agents of change: responsible care adoption by us chemical companies." Business Strategy and the Environment **8**: 281-295.
- Hunt, C. B. and E. R. Auster (1990). "Proactive environmental management: Avoiding the toxic trap. ." Sloan Management Review **31**(2): 7-18.
- Imura, H. (1998a). The Use of Voluntary Approaches in Japan: An Initial Survey. ENV/EPOC/GEEI(98)28/Final, OECD, . O. E. Directorate. Paris.
- Imura, H. (1998b). The Use of Unilateral Agreements in Japan: Voluntary Action Plans of Industries against Global Warming. ENV/EPOC/GEEI(98)26/Final, OECD. O. E. Directorate. Paris.
- Jawahar, I. M. and G. L. McLaughlin (2001). "Toward a Descriptive Stakeholder Theory: An Organizational Life Cycle Approach." The Academy of Management Review, **26**(3): 397-414.

Jones, T. M. (1995). "Instrumental Stakeholder Theory: A Synthesis of Ethics and Economics." The Academy of Management Review **20** (2): 404-437.

Jones, T. M. and A. C. Wicks (1999). "Convergent Stakeholder Theory." The Academy of Management Review, **24**(2): 206-221.

Kampman, B. and B. Boon (2005). Cool cars, fancy fuels. A review of technical measures and policy options to reduce CO2 emissions from passenger cars. Solutions for environment, economy and technology. CE.

Kearney, A. T. (2003). "Beyond Product Innovation: An Auto Industry Perspective." EXECUTIVE AGENDA **4**(1): 45-50.

Khanna, M. and W. R. Anton (2001). Corporate environmental management: regulatory and market-based incentives, University of Illinois at Urbana-Champaign.

Khanna, M. and L. A. Damon (1999). "EPA's voluntary 33/50 Program: impact on toxic releases and economic performance of firms." Journal of Environmental Economics and Management **37**: 1-25.

Khanna, M., P. Koss, et al. (2007). "Motivations for Voluntary Environmental Management." The Policy Studies Journal **35**(4).

King, A. A. and M. J. Lenox (2000). "Industry Self-Regulation without Sanctions: The Chemical Industry's Responsible Care Program." The Academy of Management Journal **43**(4): 698-716.

Knanna, M. (2001). "Non-Mandatory Approaches to Environmental Protection." Journal of Economic Survey **15**(3): 291-324.

Koehler, D. A. (2007). "The Effectiveness of Voluntary Environmental Programs - A Policy." The Policy Studies Journal **35**(4): 689-722.

Kollman, K. and A. Prakash (2002). "EMS-based Environmental Regimes as Club Goods: Examining Variations in Firm-level adoption of ISO 14001 and EMAS in U.K., U.S. and Germany." Policy Sciences **35**: 43-67.

Kuik, O. (2006). Environmental Innovation Dynamics in the Automotive Industry. IVM. The Netherlands.

Lenox, M. J. and J. Nash (2003). "Industry self-regulation and adverse selection: a comparison across four trade association programs." Business Strategy and the Environment **12**: 343-356.

Logsdon, J. M. and K. Yuthas (1997). "Corporate Social Performance, Stakeholder Orientation, and Organizational Moral Development." Journal of Business Ethics **16**: 1213-1226.



Lyon, T. P. and J. W. Maxwell (1999). "Voluntary" Approaches to Environmental Regulation: A Survey, Kelley School of Business Indiana University.

Lyon, T. P. and J. W. Maxwell (2003). "Self-regulation, taxation and public voluntary agreements." Journal of Public Economics **87**: 1453-1486.

Lyon, T. P. and J. W. Maxwell (2007). "Environmental Public Voluntary Programs Reconsidered." The Policy Studies Journal **35**(4): 723-750.

Maloney, M. and R. McCormick (1982). "A Positive Theory of Environmental Quality." Journal of Law and Economics **25**: 99-124.

Maxwell, J., W. T. Lyon, et al. (1998). "Self-Regulation and Social Welfare: The Political Economy of Corporate Environmentalism", Indiana University School of Business, Bloomington.

Maxwell, J., S. Rothenberg, et al. (1997). "Green Schemes: Corporate Environmental Strategy and their implementation." California Management Review **39**(3): 118-134.

Maxwell, J. W. and C. Decker (1998). "Voluntary Environmental Investment and Regulatory Flexibility." Working paper, Department of Business Economics and Public Policy, Kelley School of Business, Indiana University.

Mazurek, J. (1998). The Use of Voluntary Agreements in the United States: An Initial Survey. ENV/EPOC/GEEI(98)27/Final. O. E. Directorate. Paris.

Miranda, M., C. Dieperink, et al. (2007). "Voluntary agreements in watershed protection experiences from Costa Rica." Environment, Development and Sustainability **9**: 1-19.

Mitchell, R. K., B. R. Agle, et al. (1997). "Toward a Theory of Stakeholder Identification and Salience: Defining the Principle of Who and What Really Counts. ." The Academy of Management Review **22** (4): 853-886.

Nash, J. and J. Ehrenfeld (1997). "Codes of Environmental Management Practice: Assessing Their Potential as a tool for change." Annual Review of Energy and Environment **22**(487-535).

OECD and EUROSTAT (2005). Oslo Manual. Proposed Guideline for Collecting and Interpreting Technological Innovation Data. E. Commission.

Pashigian, B. P. (1985). "Environmental Regulation: Whose Self-Interests Are Being Protected?" Economic Inquiry **23**: 551-584.

Paton, B. (2000). "Voluntary Environmental initiatives and sustainable industry." Business Strategy and the Environment **9**: 328-338.

- Pfeffer, J. and G. Salancik (1978). The external control of organizations: A resource dependence perspective.
- Porter, M. P. and C. v. d. Linde (1995). "Toward a New Conception of Environment-Competitiveness relationship." Journal of Economic Perspectives **9**(4): 97-118.
- Potoski, M. and A. Prakash (2004). "The Regulation Dilemma: Cooperation and Conflict in Environmental Governance." Public Administration Review **64**(2): 152-163.
- Prakash, A. (2000). "Responsible Care: An Assessment." Business and Society **39**(2): 183-209.
- Quinn, D. P. and T. M. Jones (1995). "An Agent Morality View of Business Policy." Academy of Management Review **20**(1): 22-42.
- Rennings, K., A. Ziegler, et al. (2006). "The influence of different characteristics of the EU environmental management and auditing scheme on technical environmental innovations and economic performance." Ecological Economics **57**: 45-59.
- Rivera, J. and P. d. Leon (2004). "Is Greener Whider? Voluntary Environmental Performance of Western Ski Area." The Policy Studies Journal **32**(3): 417-437.
- Rivera, J., P. d. Leon, et al. (2006). "Is greener whiter yet? The sustainable slopes program after five years." Policy Studies Journal **34**(2): 195-222.
- Rowley, T. J. (1997). "Moving beyond Dyadic Ties: A Network Theory of Stakeholder Influences " The Academy of Management Review **22**( 4): 887-910.
- Rowley, T. J. and M. Moldoveanu (2003). "When will stakeholder group act? An interest-and-identity based model of stakeholder group mobilization." Academy of Management Review **28**(2): 204-219.
- Rugman, A. M. and A. Verbeke (1998). "Corporate Strategies and Environment Regulations: An Organizing Framework." Strategic Management Journal **19**: 363-375.
- Russo, M. V. and P. A. Fouts (1997). "A Resource-Based Perspective on Corporate Environmental Performance and Profitability." Academy of Management Journal **40**(3): 534-559.
- Scott, S. G. and V. R. Lane (2000). "A Stakeholder Approach to Organizational Identity " The Academy of Management Review **25**( 1 ): 43-62.
- Segersen, K. and T. Miceli (1998). "Voluntary approaches to environmental protection: the role of legislative threats." Journal of Environmental Economics and Management **36**: 109-130.

Sharma, S. (2000). "Managerial Interpretations and Organizational Context as Predictors of Corporate Choice of Environmental Strategy." The Academy of Management Journal **43**(4): 681-697.

Steelman, T. A. and J. Rivera (2006). "Voluntary Environmental Programs in the United States: Whose Interests Are Served?" Organization & Environment **19**(4): 505-526.

Tolbert, P. S. and L. G. Zucker (1983). "Institutional sources of change in the formal structures of organizations: The diffusion of civil service reform 1880-1935." Administrative Science Quarterly **28**: 22-39.

Triebswetter, U. and J. Wackerbauer (2004). Integrated Environmental Innovation in the German Automotive Industry: Policy Driver and Consequences for Competitiveness. Human Dimension of Global Environmental Change: Greening of Policies - Policy Integration and Interlinkages, Berlin Conference.

UNEP (1998). "Voluntary Industry Codes of Conduct for the Environment". I. Technical report Nr.40.

VCA (2008). Car Fuel Data Booklet. UK.

Videras, J. and A. Alberini (2000). "The appeal of voluntary environmental programs: Which firms participate and why." Contemporary Economic Policy **18**(4): 449-461.

Vidovic, M. and N. Khanna (2007). "Can voluntary pollution prevention programs fulfil their promises? Further evidence from the EPA's 33/50 Program." Journal of Environmental Economics and Management **53**: 180-195.

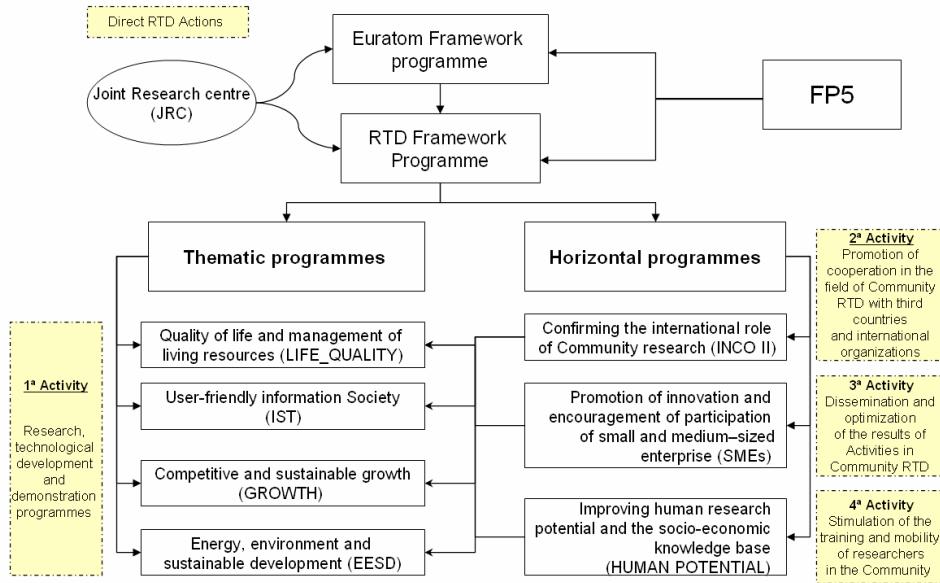
Vos, J. F. J. and M. C. Achterkamp (2006). "Stakeholder identification in innovation projects. Going beyond classification-." European Journal of Innovation Management **9**(2): 161-178.

Welch, E., A. Mazur, et al. (2000). "Voluntary behaviour by electric utilities: Levels of adoption and contribution of the climate challenge program to the reduction of carbon dioxide." Journal of Policy Analysis and Management **19**(3): 407.

Wood, D. (1991). "Corporate social performance revisited." Academy of Management Review **16**: 691-718.

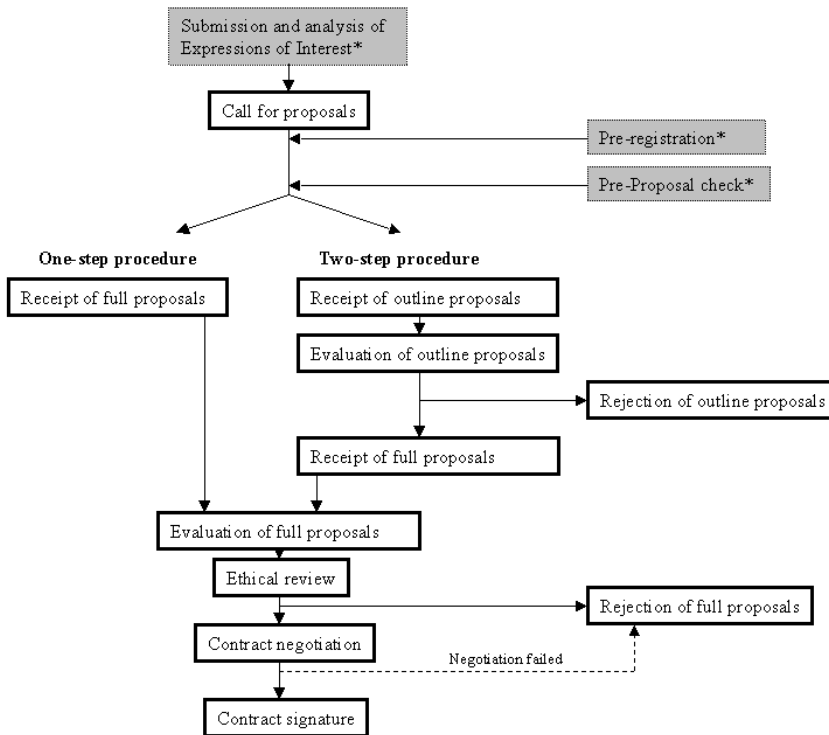
## APPENDIX A

**Figure 1: Macrostructure of the Fifth Framework Programme**



*Source: My elaboration*

**Figure 2: The submission and evaluation process in EU Framework programme**



\* Option not applied for all activities/thematic priorities/calls

*Source: Brochures of European Community Framework Programme*

**Table 1: Structure of FP5 Programme (1998-2002)**

Thematic Programme	Research domain	Objectives
Energy, Environment and Sustainable Development	<p>1. Energy Key actions</p> <ul style="list-style-type: none"> <li>- Cleaner energy systems, including renewables</li> <li>- Economic and efficient energy for a competitive Europe</li> </ul> <p>2. Environment and Sustainable Development Key actions</p> <ul style="list-style-type: none"> <li>- Sustainable management and quality of water</li> <li>- Global change, climate and biodiversity</li> <li>- Sustainable marine ecosystems</li> <li>- The city of tomorrow and cultural heritage</li> </ul>	<p>It focuses directly on a number of pressing environmental and energy concerns:</p> <ul style="list-style-type: none"> <li>• Quality and sustainability of natural resources and ecosystems,</li> <li>• Threats of global change,</li> <li>• quality of life in the cities,</li> <li>• Impact of the production and use of the energy</li> <li>• Climate change.</li> </ul>
Competitive and Sustainable Growth	<p>1. Develop critical technologies, concepts and policies to solve clearly identified problems</p> <ol style="list-style-type: none"> <li>1. Innovative products, processes and organisation</li> <li>2. Sustainable mobility and inter-modality</li> <li>3. Land transport and marine technologies</li> <li>4. New perspectives in aeronautics</li> </ol>	<p>It is conceived to help solve problems and to respond to the major socio-economic challenges facing Europe:</p> <ul style="list-style-type: none"> <li>• To produce, disseminate and use the knowledge and technologies needed to design and develop processes and produce high quality, environment and consumer-friendly products which will be competitive on tomorrow's market;</li> <li>• To help increase economic growth, maintain and/or create new jobs in Europe;</li> <li>• To sustain the continuing innovation and modernisation efforts of manufacturing, processing and services enterprises (including SMEs) so as to improve their competitiveness;</li> <li>• To support the development and implementation of Community policies that enable competitive and sustainable development.</li> </ul>
User-friendly information society	<ol style="list-style-type: none"> <li>1. Systems and services for the citizen</li> <li>2. New methods of work and electronic commerce</li> <li>3. Multimedia content and tools</li> <li>4. Essential technologies and infrastructures</li> </ol>	<p>To realise the benefits of the information society for Europe both by accelerating its emergence and by ensuring that the needs of individuals and enterprises are met. The programme's inter-related research objectives focus both the technology developments of the information society and enable the close articulation between research and policy needed for a coherent and inclusive information society.</p>
Life Quality	<ol style="list-style-type: none"> <li>1. Food, nutrition and health</li> <li>2. Control of infectious diseases</li> <li>3. The "cell factory"</li> <li>4. Environment and health</li> <li>5. Sustainable agriculture, fisheries and forestry and integrated development of rural areas including</li> </ol>	<p>To link the ability to discover with the ability to produce, in order to address the needs of society and to meet consumer requirements. This will lead to future wealth and job creation and improvements in the state of the environment. Activities under the programme focus on specific areas where growing knowledge potentially contains technical answers to some of the pressing questions posed by</p>

	mountain areas 6. The ageing population and disabilities	European citizens, whilst respecting fundamental ethical values.
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Sources: information taken from the web sites: <http://cordis.europa.eu/fp5/src/t-1.htm>

**Table 2: Structure of FP6 Programme (2002-2006)**

Thematic Programme	Research domain	Objectives
Aeronautics and space	<p>Aeronautics</p> <ol style="list-style-type: none"> <li>1. Strengthening competitiveness by reducing development costs, aircraft direct operating costs and improving passenger comfort</li> <li>2. Improving the environmental impact with regard to emissions and noise</li> <li>3. Improving aircraft safety and security</li> <li>4. Increasing operational capacity and safety of the air transport system</li> </ol> <p>Space</p> <ol style="list-style-type: none"> <li>1. Galileo: development of multisectorial systems, equipment and tools</li> <li>2. GMES: stimulate evolution of satellite-based information services by development of technologies (e.g. sensors, data and information models, services for global environment, land-use, desertification, disaster management)</li> <li>3. Satellite Telecommunications: to be integrated with the wider area of telecommunications, notably terrestrial systems</li> </ol>	Striving towards higher levels of technological excellence by consolidating and concentrating RTD efforts in the context of the Advisory Council for Aeronautics Research in Europe and the European Strategy for Space
Information society technologies	<p>Applied IST research addressing major societal and economic challenges</p> <ol style="list-style-type: none"> <li>1. Towards a global dependability and security framework</li> <li>2. Networked businesses and governments</li> <li>3. eSafety for road and air transports</li> <li>4. eHealth</li> <li>5. Technology-enhanced learning and access to cultural heritage</li> <li>6. Applications and services for the mobile user and worker</li> </ol>	Direct contribution to European policies for the knowledge society and the e-Europe Action Plan; medium and long term RTD on the future generation of technologies integrating computers and networks into everyday environment; placing the individual at the centre.

	<ol style="list-style-type: none"> <li>7. Cross-media content for leisure and entertainment</li> <li>8. GRID-based systems for solving complex problems</li> <li>9. Improving risk management</li> <li>10. eInclusion</li> <li>11. Products and services engineering 2010</li> </ol> <p>Communication, computing and software technologies</p> <ol style="list-style-type: none"> <li>1. Broadband for all</li> <li>2. Mobile and wireless systems beyond 3G</li> <li>3. Networked audiovisual systems and home platforms</li> <li>4. Open development platforms for software and services</li> <li>5. Embedded systems</li> </ol> <p>Components and microsystems</p> <ol style="list-style-type: none"> <li>6. Pushing the limits of CMOS and preparing for post-CMOS</li> <li>7. Micro- and nano systems</li> <li>8. Advanced displays</li> <li>9. Optical, opto-electronic, and photonic functional components</li> </ol> <p>Knowledge and interface technologies</p> <ol style="list-style-type: none"> <li>10. Multimodal interfaces</li> <li>11. Semantic-based knowledge systems</li> <li>12. Cognitive systems</li> </ol> <p>IST future and emerging technologies</p> <ol style="list-style-type: none"> <li>1. Open initiatives</li> <li>2. Proactive initiatives</li> <li>3. Open scheme</li> </ol>	
<p>Nanotechnologies and nano-sciences, knowledge-based multifunctional materials and new production processes and devices</p>	<p>Nano-technologies and nano-sciences</p> <ul style="list-style-type: none"> <li>▪ long-term interdisciplinary research into understanding phenomena, mastering processes and developing research tools</li> <li>▪ nanobiotechnologies</li> <li>▪ nanometre scale engineering techniques</li> <li>▪ handling and control devices</li> <li>▪ applications</li> </ul> <p>Knowledge-based multi-functional materials</p> <ul style="list-style-type: none"> <li>▪ development of fundamental knowledge</li> <li>▪ technologies for production, transformation and processing</li> <li>▪ engineering support for materials development</li> </ul>	<p>Contribution to the creation of the scientific base for the transition of European production industry from resource-based towards knowledge-based, more environment-friendly approaches</p>

	<p>New production processes and devices</p> <ul style="list-style-type: none"> <li>▪ new processes and flexible and intelligent manufacturing systems</li> <li>▪ systems research and hazard control</li> <li>▪ optimising life-cycles</li> </ul>	
Sustainable development, global change and ecosystems	<p>Sustainable energy systems</p> <ul style="list-style-type: none"> <li>▪ Short term impact (clean energy sources, savings and efficiency, alternative motor fuels)</li> <li>▪ Long term impact (fuel cells, carriers/transport storage, renewable energy technologies, capture and sequestration of CO2)</li> </ul> <p>Sustainable surface transport</p> <ul style="list-style-type: none"> <li>▪ Environmentally friendly and competitive transport systems and means of transport <ul style="list-style-type: none"> <li>○ New technologies and concepts for all surface transport modes (road, rail, waterborne)</li> <li>○ Advanced design and production techniques</li> </ul> </li> <li>▪ Safer, more effective and competitive rail and maritime transport <ul style="list-style-type: none"> <li>○ Rebalancing and integrating different transport modes</li> <li>○ Increasing road, rail and waterborne safety and avoiding traffic congestion</li> </ul> </li> </ul> <p>Global change and ecosystems</p> <ul style="list-style-type: none"> <li>▪ Greenhouse gas</li> <li>▪ water cycle</li> <li>▪ Biodiversity</li> <li>▪ Desertification, natural disasters</li> <li>▪ Sustainable land management</li> <li>▪ Operational forecasting and modeling</li> <li>▪ Complementary research</li> </ul>	<p>Strengthening the S&amp;T capacities needed for Europe to be able to implement a sustainable development model in the short and in the long term, integrating its social, economic and environmental dimensions; contributing to international efforts mitigating adverse trends in global change.</p>

Sources: information taken from the web sites: <http://cordis.europa.eu/fp6/activities-print.htm>



## APPENDIX B

**Table 3: Oslo Manual Guidelines**

	Goods	Services
<p><b>Product innovation</b> utilize new knowledge or technologies to change the design of a product or service</p>	<p><b><u>New products</u></b> goods that <u>differ significantly in their characteristics or intended uses</u> from goods previously produced by the firm</p> <p><b><u>Improved products:</u></b> development of a new use for a product with only <u>minor but significant changes</u> to its technical specifications</p>	<p><b><u>New service</u></b> services that differ significantly in their <u>characteristics or intended uses</u> from services previously produced by the firm</p> <p><b><u>Improved services:</u></b> Minor changes in the ways in which <u>a service is provided</u></p>
<p><b><u>Process innovation:</u></b> decrease unit costs of production or delivery, to increase quality, or to produce or deliver new or significantly improved products, which cannot be produced or delivered using conventional production methods → (increase the efficiency)</p>	<p><b><u>New production methods:</u></b> Implementation of <u>new automation equipment</u> on a <u>production line</u> or the implementation of computer-assisted design for product development</p> <p><b><u>New delivery methods:</u></b> <u>Logistics</u> of the firm and encompass equipment, software and techniques to source inputs, allocate supplies within the firm, or deliver final products (bar code RFID)</p> <p><b><u>Improved production and delivery methods</u></b> Changes in equipment, or production organization, or a combination of these changes.</p>	<p><b><u>New or significantly improved methods for the creation and provision of services.</u></b> changes or improvements in the <u>equipment and software used in services-oriented firms</u> or in the procedures or techniques that are employed to deliver services</p>

*Source: Summary of the sub-paragraph 3.3 of the third edition of Oslo manual Guidelines.*

**Table 4: Some examples of product and process innovation in automotive industry**

<b>Innovation</b>	<b>Innovations in the Automotive industry</b>	<b>Specifications and advantages</b>
Product	<b>Engine technologies or conventional fuel technology</b>	Direct fuel injection (or direct injection engines), variable valve timing and cylinder deactivation (improve fuel economy and increase energy efficiency)
	<b>Transmission technologies</b>	Improved Automatic and continuously variable Transmissions
	<b>Vehicle technologies</b>	Drag reduction, integrated starter-generators and weight reduction
	<b>Diesel (Compression Ignition) Technology</b>	Used to combust diesel fuel allow OEMs to produce more powerful and durable vehicles with potentially lower carbon emissions.
	<b>Hybrid Technology</b>	Hybrid electric vehicles (HEVs) have drivetrains that combine an electric drive (consisting of an electric motor and some form of electricity storage, typically a battery) with a fuel-based engine (e.g., an internal combustion engine). HEVs may use onboard electrical power to varying degrees. “Full hybrids” permit some actual propulsion using electric power, whereas “mild hybrids” may limit use of the electric motor to regenerative braking or vehicle idling (reduce well-to-wheel CO2 emissions by 50 percent compared to diesel and gasoline engines).
	<b>Fuel Cell Technology (Hydrogen technology)</b>	Fuel cells are electrochemical devices that convert a fuel’s energy directly into electrical energy (zero-carbon vehicles, if the hydrogen can be produced from renewable sources of primary energy, such as solar or wind). This technology is based on hydrogen that can be produced either with natural gas or with renewable energy resources like solar power
	<b>Tyre design</b>	To reduce noise emissions. This is a combination of technical solutions including ‘silent asphalt’ or traffic flow and traffic routing systems.
	<b>Phase-out of CFCs</b>	Substitution CFC with less harmful substances such as HCFC (hydrochloro-fluorocarbon) and HFC. This applies in particular to air-conditioning systems and the foam matting used for noise reduction,
Process	<b>Road safety improvements</b>	Key safety elements including crumple zones, inertia reel three-point seatbelts, airbags and side impact driver and passenger airbags Dynamic driving systems including ABS (anti-lock brakes) and anti-skid/traction control systems contribute greatly to maintaining vehicle control in hazardous situations.
	<b>Life-Cycle Assessment (LCA) methods</b>	These are methods ranging from the material and vehicle production phase to vehicle delivery, use, service and recycling. These are a method of quantitatively evaluating the environmental impact of a product throughout its life cycle. They are an increasingly important feature within the system of defining a product’s ecological benefits. In particular, Life-Cycle Inventories are a key element in Life-Cycle Assessment. The inventory is a detailed and complete balance sheet of all the

		materials and the energy used for a specific car model
	<b>New, solvent-free paint technology</b>	Water-soluble paints and powder coats lead to dramatic reductions in air pollution levels. Besides, these reduce costs associated with safe storage of fresh and used solvents in special tanks and costs of environmentally compatible disposal of paint residues.
	<b>Advanced wastewater treatment processes</b>	These increase water conservation by reducing industry-related water consumption
	<b>Dynamic build variation management</b>	Real time order visibility will enable Original equipment manufacturers (OEMs) to deliver products their customers have chosen more quickly and reliably. Technology enables this vision by driving out efficiencies in translating customer demand all through the chain, from the OEM to the multi-tier supplier network.
	<b>Agency model between OEM and dealer (Centralization vehicle inventory)</b>	Dears function as full service agencies that hold very little inventory of vehicles. By efficiently applying technology, car companies can offer comparable service levels with fewer vehicles.
	<b>Supplier collaboration networks (Virtual collaboration by electronic communication)</b>	Suppliers can collaborate online to develop and deliver high-quality, integrated modular systems in record time (Reduced time of product development).
	<b>Online warranty counselling (Use of IT systems to identify, track and fix key issues such as obsolescence, inventory and logistics costs)</b>	Technology enables processes will result in more accurate diagnosis and quicker settlements of vehicles problems. With the right technology in place, the supplier can participate early in the diagnostic activity (Increased possibilities to meet the demand of customized vehicles without sacrificing quality or sabotaging the bottom line)
	<b>Digital testing and release of vehicles</b>	Vehicle design, prototype creation and testing can be increasingly accomplished in a virtual environment before to launch
	<b>Virtual reality test driver</b>	Customers can experience and compare vehicles without setting foot in a car.
	<b>Dynamic pricing and incentive management (Automated demand forecasting across the entire value chain)</b>	Up to date information on customer demand from disparate sources (such as OEM websites, internal product planning database and external information on competitor's sales) will improve demand management and allow companies to fine-tune pricing and incentives to suit market conditions. (Increased product offering options such as custom wheels, CD player and spoilers)

Source: my elaboration from several references (UNEP 1998; Kearney 2003; Duncan, Rosinski et al. 2004; Kuik 2006)