Consumer' sovereignty and policy issues in the development of product ecolabels

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Consumers 'Sovereignty' and Policy Issues in the Development of Product Ecolabels

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Introduction

Quality labels are not new, but the last decade saw labeling schemes to be increasingly targeted at expert qualities – i.e. qualities involving a high degree of scientific expertise in order to be assessed. Instances of such labels are: the current "Genetically Manipulated (GM) Free" or "bio" labels for food products, the use of standardized medical allegations on food products (in the United States, China, under negotiation in the European Union (EU)), and environmental labels (ecolabels).

National ecolabeling schemes are probably the most common type of expert quality labels. They started proliferating worldwide at the beginning of the nineties. There are now approximately twenty of them in effect in the OECD. Brazil, China, India, South Korea, Malaysia, Singapore, Taiwan, and Thailand have also adopted national schemes.

When analyzing these labeling schemes, economists tend to reduce them to market mechanisms such as signaling or reputation devices, market differentiation (e.g. Crampes and Ibanez, 1996; Linnemer and Perrot, 1997; Mattoo and Singh, 1994; Sedjo and Swallow, 1998). While these models provide insight on the impact of labels on the market and the competition, they most often bypass their institutional dimension and do not address key problems faced by the regulators when attempting to develop them.

This paper takes a close look at the regulatory and institutional framework underlying the development of one of these labels: the EU ecolabeling program (CEE, 1992). As of June 1998, six years after its adoption, its development remained very limited: only 200 products were ecolabeled at the European level and the ecolabel was well developed over only six product groups. It has been argued that this was notably due to industry's opposition to the development of this ecolabel (Nadaï, 1999). As an illustration, the author described the opposition of the detergent industry during the negotiation of the

environmental requirements granting a product's eligibility for this label: the so-called *ecolabeling criteria* (Nadaï, 1998)[1].

In order to better understand the conditions for the development of product ecolabels, this paper examines a success story: the case of the paints and varnishes European ecolabel. In February 1995, the Commission approved the European ecolabeling criteria for indoor paints and varnishes. One year later, these criteria were adopted by the European Council of Ministers (Commission, 1996). In the EU system, each file of criteria is coordinated by a country, which in this case was France. In 1992, France had already adopted the AFNOR-Environment[2] criteria for this group of products (AFNOR, 1992). In spite of the difficulties encountered in the negotiation, stakeholders have regarded both the French and the European regulatory decisions as exemplary cases of co-operation between industry and public authorities in the development of product ecolabels. The AFNOR-Environment logo is widely used by paint producers in France. At the European level, the paints and varnishes ecolabel is the most successful of the currently adopted European ecolabels. As of June 1998, ecolabeled paints and varnishes accounted for 50% of the ecolabeled products at the European level.

We show that the paints and varnishes case study exhibits a striking difference from the detergent case study. One determinant of the detergent industry opposition to the ecolabel was the technological heterogeneity regarding the environmental profile of the products sold by the different firms[3]. On the contrary, leading paint producers being

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[1] As a general matter, the ecolabeling process is made up of two phases (OECD, 1991). The first one, the "negotiation phase", is aimed at devising minimum environmental requirements that any product eligible for the ecolabel has to meet. These requirements are called the *ecolabeling criteria*. When these criteria are adopted, firms can apply for ecolabeling their products and ecolabeled products can be exchanged in the market place: this is the "market phase".

[2] AFNOR is the "Association Française de Normalisation". It is a public organization devising quality certification, labels and logos that can be used by firms on their products. It is funded by the sales of these certification, labels and logos. Throughout the past years, AFNOR managed quality certification for final products such as helmets, white goods, pressure-steamer, etc. It has acquired a good reputation in the public. In 1991, the AFNOR launched an environmental brand called "AFNOR-Environment" working along with a product label (AFNOR, 1991).

[3] As a matter of fact, the detergent industry divided itself into two opposing interest groups during the negotiation of the European ecolabeling requirements for detergent products The core of the detergent oligopoly - made up of leading firms such as Henkel, Unilever or Procter and Gamble - opposed the development of the ecolabeling criteria; it tried by different means to obtain very loose ecolabeling criteria and to block the negotiation process. The green-fringe

selling identical sets of products (except for the brand names), there was no significant technological heterogeneity among them, and they did not have opposing interests in the devising of the ecolabeling criteria. Whatever the content of the criteria, all leading producers were already selling some products that would have been eligible for the ecolabel (as well as some that would not). Therefore, they all expected to benefit from the increase in the final demand, if any, that could be generated by an ecolabel.

As a result, this case study demonstrates the importance of the negotiation phase in the development of product ecolabels. It suggests that the degree of technological heterogeneity of the concerned industry - i.e. the extent to which the environmental performance of the products sold by the different firms are different - may be a variable determining the chances of success in the development of an ecolabel.

The first part of the paper presents the negotiation of the paint and varnishes ecolabeling criteria[4]. The history of the negotiation is preceded by a short description of the general rules framing the negotiation of European ecolabeling criteria and of some characteristics of the paint industry and market that are important to understand the course taken during the negotiation phase.

The second part examines the economic literature on product ecolabeling. We show that part of it overstates consumers' ability to assess the environmental quality of the product and assimilates product ecolabeling to a mere quality-signaling device. We argue that this perspective of analysis misses the point, for it does not allow for consideration of key policy issues such as the influence of the negotiation phase on the environmental effectiveness of product ecolabels.

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of the industry, made up of green SME's such as the well-known Ecover, structured itself in a second interest group during the course of the negotiation: the "Environmental Detergent Manufacturer Association" (EDMA). This group aimed at obtaining very selective criteria that would have allowed no more than five percent of the current EU detergent market to be eligible for the ecolabel.

[4] This analysis is based on a survey undertaken during the spring of 1996 for the French Agency for the Energy and the Environment (Nadaï A., 1996). Direct interviews have been carried over in the public administration as well as in the paint industry: various competent bodies (e.g. AFNOR (F), SIS (Sw), etc), the French Ministry for the Environment, the French Agency for the Energy and the Environment (ADEME), the EU Commission (DGXI), various paint producers, the French and European trade associations (FIPEC, CEPE), Green groups (e.g. Friends of the Earth). We also had access to the integral ecolabeling criteria file, including all stakeholders' position papers throughout the course of the negotiation.

The conclusion examines the lessons that can be drawn for the development of environmentally effective product ecolabels. It proposes tracks for further research on the subject.

1. The Development of the Indoor Paints and Varnishes European Ecolabel[5]

1.1. The rules framing the negotiation of the European ecolabeling criteria

In 1992, the EU Commission adopted an ecolabeling regulation (880/92). It imposes rules setting up a consultative process in order to develop product ecolabels (CEE, 1992; CEE, 1994) (cf. left-hand side of Figure 1). Each Member State has to designate a national competent body in charge of participating in the negotiation and in the management of the European ecolabels at the national level. Any firm, interest group, or public authority can ask for the development of a European ecolabel on a new group of products by addressing a request to the demander's country's competent body. When such a request is made, the Commission designates a leading Member State whose competent body will lead the development of the ecolabel. It consults an ad hoc group made up of representatives of the member States and interest groups. The proposal of criteria coming out of this preparatory phase is successively submitted to the European Commission, to a Forum of interest groups (i.e., trade unions, industry, trading sector, consumers and green organizations), and to a regulatory committee composed of representatives of the Member States.

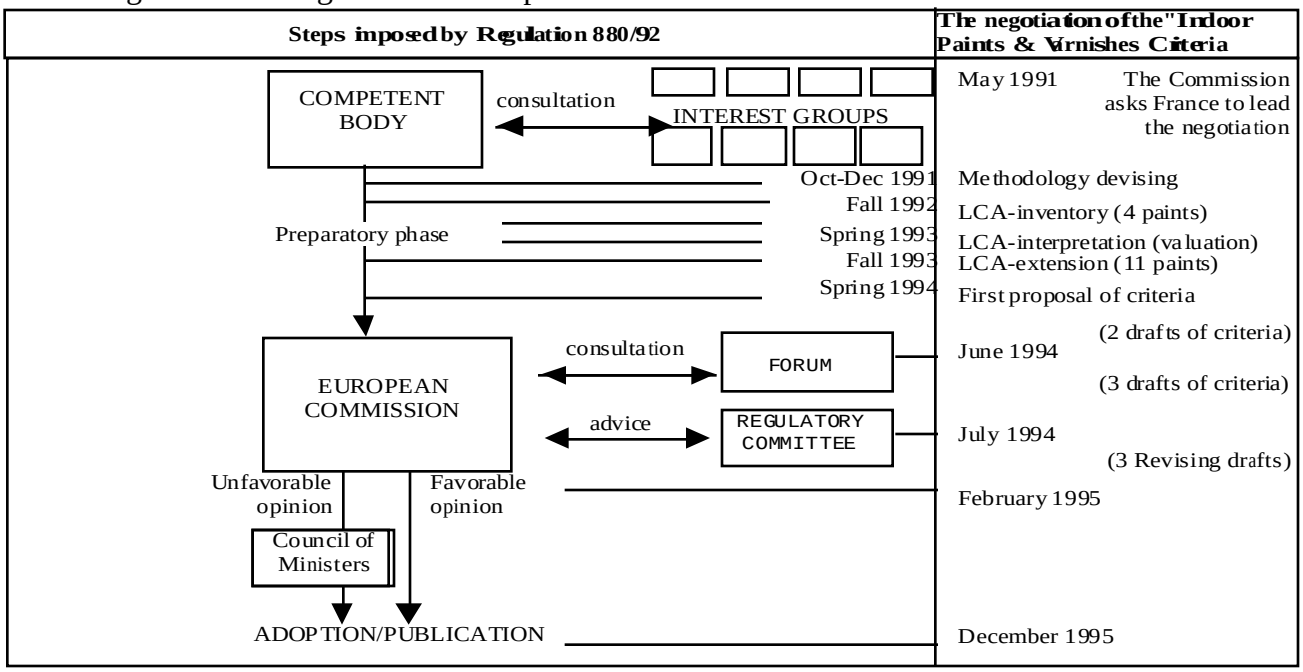
If the file receives adequate support from these parties, the Commission can either adopt the criteria or, if it does not agree with its content, forward it to the Council of Ministers for a final decision.

Ecolabeling criteria are legally valid for three years (CEE, 1992), but renegotiation may be scheduled on a selectivity basis. For instance, the European Commission aims at containing the rate of approval for launching ecolabeled products between 10%-

[5] This part is based on Nadaï (2000).

15% and to 35% at the time of renegotiation. Albeit this target rate is not registered in the regulatory text 880/92 CEE, all the stakeholders involved in the negotiation of the criteria are aware of this objective.

Figure 1: The negotiation of the paints and varnishes criteria



In the case of the indoor paints and varnishes criteria, the negotiation lasted $4^1/_2$ years, from May 1991 until January 1996 (cf. right-hand side of Fig.1). The preparatory phase was the longest step, as it took three years to reach a first compromise of criteria (June 1994). The consultation of the Forum and of the regulatory committee took $1^1/_2$ year. The last year of negotiation, from February 1995 to January 1996, was due to administrative delay. No further modifications were included in the criteria before their final publication.

Numerous stakeholders have been involved in this negotiation. Apart from the European regulators and the national competent bodies, the author counted about 40 industrial stakeholders at one or another stage of the negotiation process (AFNOR, 1992(d); AFNOR, 1993(a); AFNOR, 1994(a) to (c)). This attests to the strong interest that industry had in this regulatory process.

1.2. The industry, the product and the regulations

Some features of the paint industry and of its regulatory environment are worth recalling in order to understand the course taken by the negotiation.

While the European paints and varnishes industry is made up of a few hundreds of producers, eight leading firms (i.e. Akzo [NL, 6%], ICI [UK, 6%], Casco-Nobel [Sw, 5.8%], BASF [D, 5%], Hoechst [D, 4.7%], Total [F, 4.4%], Becker [Sw, 4%], Courtaulds [UK, 3.8%], PPG [USA, 3.6%])[6] serve about half of the European market. They account for most of the supply in the indoor paints and varnishes market segment, which is the only one targeted by the European ecolabel. Technological innovations are rather quickly imitated among these firms and do not provide them with durable competitive advantage. Each of the leading producers is actually selling a range of products that includes all the technologies available.

As for the final demand, consumers differentiate the products according to their aspect (shine: gloss or flat) and the condition of usage (e.g. type of solvent, washability, durability, smell, etc.). As most of these characteristics are typical of experience-goods[7], brand and reputation play a key role in sustaining consumers' choice on this market. Within the current state of technologies, the products' characteristics are strongly correlated with the type of solvent on which the product is based. The traditional distinction between glycerophtalic (organic solvent-based) and acrylic (water-based) products shapes the overall market-differentiation. Up to now, firms have mostly competed through brand and reputation, managing their products' range so as to be serving the various market segments.

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[6] % of the EU paints and varnishes market. Data from Total Group S.A. for 1992.

[7] An experience good is defined by micro-economists as a good whose quality can only be assessed post-purchase, by experiencing the good. Typical instances are food products, restaurants, movies, etc. Brand and reputation is, therefore, a key asset for the sellers of these goods.

Paints and varnishes contain five components: binders, additives, fillers[8], pigments and solvents. Pigments and solvents are the components raising environmental concern.

In particular, whiteness and opacity are commonly achieved with titanium dioxide (TiO_2), a pigment derived from ilmenite (iron titanate) by one of two processes: a process with sulfates that is well-developed in Europe, or a process with chlorides that is used in the US. LCA of sulfates-processed TiO_2 highlighted the high amounts of energy consumption and of emissions in the atmosphere (SO_X, CO_2, NO_2 and NO_X) and in the water (manganese, chromium, and chlorine) due to its production. No LCA has been carried out for the chlorides-process. While the energy performances of both processes are supposed to be identical, the by-products of the purification of the ilmenite are different. In the first process, they take the form of sulfates which are precipitated in tremendous amounts of solid titanogypsum (calcium sulfate), a solid waste that is one of the major environmental impact of this process. In contrast, chorides are difficult to precipitate and are currently injected into the ground water where the metal impurities they contain accumulate.

Some paints, recently marketed under the appellation "natural paints" by the German company Biofa, contain another white pigment: “lithopone”. The environmental impact of natural paints are not known since this firm refused to undertake a LCA of this component.

Paints are commonly distinguished according to the type of solvent they contain (cf. Table 1). Water (acrylic paints) and white-spirit (glycerophtalic paints) are the most common solvents. High dry-extract paints are a recent solvent-based[9] innovation under development. It might allow paint producers to almost halve the solvent content of solvent-based paints (cf. Table 2). Powders are solid, contain no water,

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[8] Binders ensure the cohesion of the product, its adhesion with the support, and give the coating its mechanical properties. Additives are chemicals that are incorporated into the product in order to modify some of its properties (e.g. anti-foam, anti-skin, etc.). Mineral fillers give paints their viscosity.

[9] They include: High-VOC alkyd paint ; Low-VOC Acrylic dispersion paint ; Low-VOC High-solid alkyd paint.

solvent or co-solvent but have to be applied with an electrostatic field. This restricts their use to industrial applications. Paint producers are currently trying to extend their use to indoor application by formulating powders that could be dissolved into water and applied as water-based paints currently are.

Table 1: Main types of paints

Appellation	**Thinner contained in the product**	**Thinner during usage**
Water-based or "Acrylic" products ->dispersion in water ->solution in water	 Water and co-solvents Co-solvents	 Water Water
Solvent-based -> "Glycerophtalic" products -> "High dry-extract"	 ->35 to 55% solvents -> 20 to 30% solvents	 Solvent Solvent
Powders	None	None (electrostatic application)

Source: Ecobilan, 1991 (a), FIPEC.

Volatile organic compounds (VOC) included in solvents raise serious environmental concerns because they are precursors of ozone and peroxy-acetyl-nitrate (PAN), gases that are considered as contributors to global warming and as irritants for the respiratory tract. Indoor paints and varnishes consumption contributes to 10% or more of the national VOC emissions in the different European countries[10], a figure that is obviously related to the consumption of glycerophtalic products.

Table 2: VOC content (g/liter) of paints and varnishes

Acrylic		**Glycerophtalic**		**High dry-extracts**	
Average Amplitude satin/flat shiny	250 0 to 450 ≤200 ≤450	Average Amplitude	450 400 to 600	Average Amplitude	300 250 to 350

Source: Ecobilan, 1991 (a), FIPEC

In the EU, these products have traditionally been marketed as top-of-the-line items and paint manufacturers are still making higher profits out of them. They are commonly considered as being more resistant to extreme climatological conditions

[10] In 1994, the EIONET (European Environment and Information and Observation Network) provided values for per country contribution of paint application to Non Methanic VOC (NMVOC) emissions. Results showed that it was more than 10% in countries such as Germany, Denmark, Netherlands, or Belgium, and close to 10% in France and Luxemburg.

(humidity, cold, and heat, etc.) and as having better durability, washability, and gloss. Acrylic products are of more recent invention and have benefited from significant technological improvements over the past 15 years. The respective market-shares of these two types of products are evolving very quickly. Countries from the north of the EU have already almost entirely turned to acrylic products. Several reasons tend to support this change in the remainder countries in the EU. Acrylic products are easier to use, their performance has been constantly improved (e.g. shine, durability, etc.), and there is a regulatory trend towards a reduction in VOC's emissions in the EU (Commission, 1993).

In the current state of technologies, a straight enforcement of this environmental pressure would support the development of acrylic products. It might end up erasing the current differentiation between top- and bottom-of-the-line products (i.e. glycerophtalic / acrylic), and reduce firms' profits. Since producers would prefer a smooth transition preserving a top-of-the-line segment, two paths are possible. Firms can progressively market the best performing acrylic products as top-of-the-line, or they can introduce innovative low-VOC solvent-based products (e.g. high dry-extract paints) to the top-of-the-line segment. The new market differentiation would match rather than oppose the notions of green and top-of-the-line qualities, allowing paint producers to focus on green innovations and better reward them. It would also homogenize market differentiation throughout the EU by bringing southern and northern markets into closer configurations. This may allow paint producers to create and take advantage of scale economies in production and marketing.

There are no significant technological asymmetries among the leading producers, and the whole core of the paint industry may benefit from the ensuing gains. Paint producers are not divided by conflicting interests when actually facing this evolution. They have been pro-active in this area. They devised a "self-proclaimed" environmental standard for their products during the late 80s. In 1989, as the European Confederation of Paints Manufacturers (CEPE) was on the verge of registering this standard as a trademark, the French AFNOR and the European

Commission proposed to the paint industry to get involved with their ecolabeling programs. The French and the European trade associations (resp. French Federation of the Paint Industry [FIPEC], European Association of Paint Manufacturers [CEPE]) accepted and gave up establishing an environmental trademark for the paint industry.

CEPE's trademark was based on composition criteria such as: VOC content<250gVOC/l; limitation on halogenated solvents content; absence of heavy metals; absence of substances classified as toxic or very toxic. While these criteria were in line with the ones underlying existing national ecolabels on paint products (i.e. Blue Angel [G]), Stichting Milieukeur [NL]), most of the CEPE's criteria were not quantified, thus making it impossible to predict the selectivity of the trademark.

As a matter of fact, several criteria had never been documented on a quantified, technical, and scientific basis. This lack of documentation made it difficult to decide how stringent the requirements included in the EU ecolabeling criteria should be. For instance, the negotiation of the French ecolabel on paints and varnishes highlighted major problems in devising a VOC requirement that could be selective enough while at the same time providing ecolabel access to some glycerophtalic products (Schwirtz, 1993). These concerns remained unsolved at the outset of the negotiation of the European criteria.

1.3. The negotiation of the European paints and varnishes ecolabel

The final EU ecolabeling criteria were adopted in December 1995 and published in the Official Journal of the European Commission in January 1996 (cf. Table 3). They were more quantified than the CEPE's one thanks to the use of an LCA for their development.

In the spring of 1991, France proposed[11] to base the preparatory phase (May 1991-June 1994) on a quantified LCA. An LCA was undertaken on a set of products that

[11] At the beginning of the nineties, France was one of the member states systematically opposing EU ecolabeling criteria that had not been based on quantified LCA.

were representative of the different technologies under development or available on the market place. The LCA was first carried out on four products (Ecobilan S.A., 1991(a), (b); 1992(a), (b); 1993(c), (d), (e), (f), (g)), then extended to eleven (1993(h)).

LCA results emphasized greenhouse effect and atmospheric acidification as major concerns. The former was related to $Ti0_2$ production, the latter to VOCs emanation when applying the paints (Ecobilan S.A., 1992(a)). Moreover, the LCA allowed the classifying of the products into three families having increasing environmental impact. Natural paints displayed the lowest concentrations in $Ti0_2$. They did not contain VOCs but contained lithopone, whose environmental impact had not been documented through an LCA. "Micro-vacuum" technology allowed reducing $Ti0_2$ and VOC concentrations in water-based paints, whereas " high dry-extract " technology allowed reducing these concentrations for solvent-based paints. In short, results showed that using "micro-vacuum" technology (acrylic), “high dry-extract” technology (glycerophtalic), or "natural" paints[12] would generate environmental benefits.

As of April 1993, the ad hoc European committee proposed a list of eight areas of concern for future ecolabeling criteria (Ecobilan S.A., 1993(c)). Criteria relating to these concerns had to be documented throughout the course of the negotiation. Two major issues, on which we will focus here, were to decide on thresholds for maximum authorized quantities $Ti0_2$ and VOCs in ecolabeled products.

Early on, it was agreed upon that the TiO_2 criterion should take the form of a maximum “$gTi0_2 / m^2$ covered” threshold[13]. A first value was proposed by France based on its past experience in the devising of the French ecolabel. This value was then negotiated in several steps during the preparatory phase, first increased under industry and TiO_2 producers’ pressure, then decreased under United Kingdom, Netherlands and Denmark’s pressure (AFNOR, 1993(c), (d), (g); Ecobilan S.A., 1993(e)).

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[12] This last statement still has to be checked, since the natural impact of lithopone has not yet been assessed by the means of a LCA.

[13] The criterion is based on an “input per unit of output” performance index. The quality of the coat is defined by 98% opacity.

Reaching a final compromise on the TiO_2 criterion required cross-negotiation involving the VOC criteria issue. Portugal and the paint industry, which were asking for more permissive values on both criteria, gave up on the TiO_2 criterion in order to obtain satisfaction on the VOC criterion.

Interestingly, the lack of LCA data on the chlorides process was another obstacle to reaching a compromise on this criteria. Outside expert advice was called for in order to compare the environmental impact of this process with that of the sulfates process. In spite of the lack of information, and without any further justification, experts stated that the environmental impact of chlorides-processed TiO_2 "should not" strongly differ from a sulfates-processed one. This consensus was obviously not based on facts, given the difference in the by-products emitted by each process (cf. above). Yet, the experts' answer was enough, at that time, to allow the ad hoc group to overlook the lack of information on the chlorides process.

The final TiO_2 criterion ended up being less stringent than the initial French proposal.

The devising of the VOC criterion was by far one of the most difficult issues. In 1993, a preliminary survey (Commission, 1993) concluded that a regulation on this aspect should distinguish between different categories of paints and establish separate VOC requirements. Yet, adequate product categories had not been defined. The EU negotiation will prove their devising to be difficult because of differences in national consumption patterns.

Industry ceaselessly defended the idea that, for the ecolabel to get fully developed, consumers should find it on the category of products they usually purchase. Accordingly, it proposed to differentiate two or three categories of paints, allowing some products in each one to be eligible for the ecolabel. While this satisfied Southern European countries (e.g. Portugal) using glycerophtalic products, Northern European countries wanted the ecolabel to be targeted at water-based products. This structural divergence got reflected in the successive proposal of VOC criteria made by the various member states during the preparatory phase (AFNOR, 1993(e) and (f), 1993(h), 1994(a) and (b)). This phase resulted in a relatively lax compromise that was close to

the paint industry and Portugal's initial proposal. While the Forum of interest groups favored the Northern countries' position and tightened the requirements (Consultation Forum, 1994; Commission, 1994 (a), (b), (c)), the paint industry replied by disseminating information about the selectivity of the ecolabel under different assumption of VOC criterion. It showed that the most permissive assumption of so-called "class 1 requirements" (i.e., for product with a low VOC-content) was fulfilling Commission's goal of selectivity (i.e., 10 to 15% of the European market at its launching) (Ecobilan, 1994(b)). Yet, due to differences among the national markets, fulfilling this goal might be incompatible with either a legitimacy of the ecolabel in some Northern countries (e.g., 40% of ecolabeled products would be perceived as unduly lax in Denmark) or the eligibility of southern countries' paint products for the ecolabel (e.g., Portugal).

Hence, the reasons underlying the opposition between Northern Member States (opposing lax criteria) and Southern Member States (opposing too selective ones) was documented, but not overcome. Austria and Sweden joined the negotiation during the final consultation of the Regulatory Committee. These additional Member States changed the balance of power and made it typical for European negotiations in which: 1) Northern countries (in this particular case: Austria, Denmark, Germany, Netherlands, and Sweden) are in favor of strengthening environmental requirements (i.e. lower threshold for low-VOC products and suppression or lower threshold for high-VOC products), 2) France lies in a middle ground, 3) Southern countries (Portugal in this case) ask for lax environmental criteria, 4) Industry joins one of these last two groups (France in this particular case).

Four revisions of the criteria (Commission 1994(d), 1995 (a), 1995(b) and (c)) were issued before reaching a final compromise (Commission 1995 (d)) that only slightly modified the criteria:

- The borderline between the two classes of products was modified. On the one hand, this modification allowed more products to fall into the low VOC class and was a concession to Germany, Denmark, and Sweden's request to cancel the high VOC

class. On the other hand, the requirement for the low-VOC class remained unchanged (i.e. kept at 30g/lmw instead of 10g/lmw as requested by Northern countries), which clearly was a concession to CEPE, France, and Portugal's request.

- The high VOC class was divided into two subgroups. The VOC criterion was strengthened in one sub-group (i.e. 200g/lmw instead of 250g/lmw) while "high dry-extract" paints could fall into the other sub-groups and be ecolabeled (i.e. 250g/lmw). This change satisfied the Northern countries' request for a strengthening in the VOC criteria on the high-VOC class, while allowing the possibility for the "high dry-extract" paints to become eligible for the ecolabel, if they were to be marketed in the near future.

The final VOC criteria were more stringent than the self-proclaimed CEPE environmental standard, but they still mirrored Industry's goals. The criteria distinguished between two classes of products: the first class roughly covered acrylic products, whereas the second one covered glycerophtalic products and allowed producers to ecolabel forthcoming low-VOC innovations into this group. Producers could thus preserve the current market differentiation while managing a smooth transition to new products.

The final ecolabeling criteria left several issues pending for future re-negotiation. One relates to the comparison of the environmental impact of the different white pigments - Ti02 and lithopone - as well as of both Ti02 manufacturing processes - i.e. sulfates and chlorides process. Others, which we did not focus on in this paper, relate for instance to the lack of information about the environmental impact of some solvents used in glycerophtalic products. The resolution of these issues had been postponed until the criteria would be re-negotiated, which recently happened (Commission, 1998). It seems that the new criteria are in line with the 1995 ones, strengthening only some of the already existing criteria (e.g. volatile aromatic compounds; waste and emissions related to titanium dioxide production, users warning for a better use of the product).

Interestingly, this case study casts light on the importance of the negotiation phase and on the potential role of Voluntary Programs as an alternative to both command-and-control and self-regulation. Indeed, paint industry's involvement into the ecolabel can be regarded as a double-edged sword. On the one hand, our analysis shows that industry influenced the course of the negotiation thanks to the information it owned about paint products and their market shares, and fulfilled its goal. On the other hand, final ecolabeling criteria are significantly more stringent than the former CEPE environmental standard was, so that the shift from self-regulation to a public voluntary program resulted in more meaningful environmental requirements on green products.

The other insight provided by this case study relates to the formulation of the policy issues that should be examined by economists on product ecolabel. The selectivity of the criteria and industry's interest in obtaining a compromise of criteria seems to be important aspects in the development of an ecolabel. We will now examine whether or not these points have been addressed in the literature.

2. Reformulating policy issues: industrial strategies and the environmental effectiveness of product ecolabels

Three types economic approaches to product labeling can be distinguished.

The first one, the *market approach*, assimilates label to a pure informational and market mechanism –i.e. signaling or reputation. Within this perspective, consumers are supposed to assess *post-purchase* the true utility they derive from a product. "True" means that their perception of the benefits and risks associated with a product is in line with the scientific (objective) assessment of these risks and benefits. While consumers get the information they need when actually experiencing the product, this is not necessarily the case *before* purchase. Accordingly, the role for labeling is to transfer to them this information before they purchase the product.

The second approach is the *consumer-centered approach* (Haldfield and Thompson, 1998). While it admits that a discrepancy between perceived and actual risks and benefits might remain after purchase, it is based on the principle that consumers assess for themselves the cost and benefits of a transaction. Consequently, regulation sees the problem of bringing consumer assessment of risk into line with scientific assessment *"…as flowing out of consumer demand for information. It is the divergence between what consumers expect, in fact, and what they get, in fact, that drives policy with respect to information" (p566).* Consumers are purchasers of information. They balance the expected value of additional information with the cost of acquiring and processing it. By pointing out a particular quality, the label is supposed to enhance the expected value of information about this quality, as perceived by the consumers. Accordingly, it will prompt them in learning about the product. In other words, scientific assessment and labeling help consumers by pointing out the potential value of quality-related additional information.

The third approach has been called the *paternalistic approach* by Haldfield and Thompson, (1998). It follows Viscusi's paradigm (Viscusi, 1994) according to which it might not be possible to reduce the discrepancy between perceived and actual risks or benefits, for scientific assessment is not within the reach of consumers. Consequently, the policy standpoint should be the consumer's expected welfare based on the *actual* risks or benefits associated with the product: *"The fact that consumers might gladly purchase a product while ignorant of the associated risks does not make a purchase worthwhile" (p326).* The role for labeling is to induce consumers taking actions they would take were their belief in accordance with the scientific assessment of risks and benefits. Different from the consumer-centered approach, it gives supremacy to science over consumers' assessment.

The cornerstone behind these approaches is a consumer's ability to assess the actual risk or benefits attached with a quality. Concerning a product's environmental quality, we find diverging views on this point in the literature.

The Law and Economics literature has been keen to point out that consumers have a limited cognitive capacity and are not able to process the information about the various environmental impacts of a product. They cannot prioritize these impacts and rank the product according to an aggregate index of environmental quality. Consequently, ecolabeling institutions have to undertake this task. They have to process product-related information, make value judgements in place of consumers, and face them with a simple logo o the product[14]. To a certain extent, the paints and varnishes case study illustrates this view. The final compromise on the criteria required the processing of a tremendous amount of information. It relied on a complex debate among experts and on value judgements in order to offset the shortcomings of scientific knowledge.

A psychological and anthropological approach to green consumers purchasing behavior has been carried over by Wagner (1997). He shows that attempts from well informed consumers to undertake a scientific[15] approach to green purchasing fails: they give up trying to identify products that are truly green. On the contrary, less informed consumers using proxies such as labels, brand or shop-names to guide their green choice, are more successful in actually purchasing products identified as being green. In other words, green consumers' preferences cannot be targeted at the technical profile of green products; they have to rely on proxies.

A logical economic view on the subject should also meet these conclusions. Indeed, as environmental spillovers are non-divisible, it seems impossible for a consumer's subjective assessment to be in line with the actual value of risks and benefits associated

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[14] *"For example, even if an advertiser truthfully asserts that a package is made from 30% post-consumer recycled material the package may nevertheless be made with chlorinated bleaches or contain toxic additives. Consumers are unable to evaluate the multiple environmental impacts of the good they purchase"* (Grodsky, 1994, pp193)
"This Article maintains the Report Card program is scantily clad, if not functionally naked. Its methodology for evaluating product's environmental burdens and conveying that evaluation to consumers through a product label is riddled by qualitative judgement that belie Scientific Certification System's claim to present objective information unfiltered by experts. The few consumers who actually attempt to process the large amount of information found on the Report card are very likely to misunderstand it… In the case of Green Seal, this Article argues that its Certification Mark program is certainly clothed, and in many ways quite well, but that interested parties should maintain a careful watch over Green Seal nonetheless. […] Furthermore, Green Seal will operate much like a dictator, albeit one that aspires to benevolence. It will retain a great deal of discretion to craft product standards as it sees fit, and its power to influence green consumer decisions will be enhanced by consumers' proclivity to misunderstand the Certification Mark's actual meaning. Green seal has yet to abuse its power, but failure to maintain a vigilant watch over its operation amounts to an act of faith" (Wynne, 1994, pp56-57)

[15] Based on knowledge a bout a product's life-cycle analysis.

with a green product. This would not only require the consumer to know the environmental spillovers associated with a unit of this product, but also the size of its total market –i.e. the purchasing behavior of all other consumers[16]. Such a condition simply cannot be met.

Despite this set of facts and arguments, economists have adopted diverging assumptions on this point.

Crampes and Ibanez (1996), Linnemer and Perrot (1997) propose models of vertically differentiated markets with asymmetric information. They assimilate the ecolabel to a reputation or signaling device. As usual in these models, "green" (high) quality is a pre-existing notion and consumers are supposed to get the truth about it after purchase. The consequence of this *market approach* to ecolabel is that no institutional process is required in order to stabilize a definition of "greenness" (high quality), as is the case in real ecolabeling processes (Cf. above). The devising of the criteria and the function of the stakeholder process are by-passed.

Matto and Singh's (1994) as well as Sedjo and Swallow (1998), implicitly fall undertake a *paternalistic approach* to product ecolabeling. Indeed, in their models, the green demand curve does not react to a change in the selectivity of the ecolabel. We know, from the above, that a change in this selectivity mirrors a change in the technical definition of green quality. In other words, these authors assume that green consumers are shortsighted when it comes to assessing the technical profile of ecolabeled products.

Interestingly, Mattoo and Singh's model demonstrates that the selectivity determines the environmental impact of the ecolabel. More precisely, it shows that the ecolabel generates adverse environmental effects when the criteria selectivity overpasses the volume of the green-demand at the pre-ecolabel (undifferentiated) market equilibrium price. It not only increases the ecolabeled market segment (which is considered by the authors as a positive effect) but also the non-ecolabeled one (adverse effect). Yet, their result is limited in two ways. First, firms are not allowed to innovate in their model,

[16] Assuming, as usual in economics, decreasing external environmental benefits.

nor are they to choose whether or not to participate in the ecolabeling scheme. All the firms whose products already fulfil the criteria (and only those firms) are supposed to ecolabel their products and enter in the ecolabeled market-segment. Sedjo and Swallow (1998) have relaxed these conditions and generalized Mattoo and Singh's results. Second, both analyzes consider that ecolabeling criteria are exogenous. Different from this, we have shown in the above that they are negotiated within the ecolabeling process. We have even suggested (Nadaï, 1998, Nadaï, 1999) that industrial strategies during the negotiation phase depended on the degree of technological heterogeneity of the concerned industry - i.e. the extent to which the environmental performance of the products sold by the different firms are different. As these strategies contributed in limiting the development of the European ecolabel (Nadaï, 1999), this aspect should be examined in a more theoretical way by introducing the negotiation phase into the forgone models. Assuming that firms are profit maximizing, there is no *a priori* evidence that they will find in their own interest to have an ecolabel implemented in their market. They might oppose any compromise on the criteria. Moreover, in case firms are interested in an ecolabel, profit-maximizing criteria might be different for the different firms and might not necessarily be the ones inducing a positive environmental effect. Both the possibility of a compromise and the content of the resulting criteria have to be examined.

Haldfield and Thompson (1998) have criticized the paternalistic approach on the ground that it gives a supremacy to scientific assessment over consumers' assessment: *"Identifying a consumer protection problem solely by reference to scientific assessments of risks ignores both the reality of how consumers manage uncertainty and the reality that scientific assessments are themselves subject to substantial uncertainty and reached only through an exercise of judgement" (p564).* There is no doubt that the paternalistic approach overstates the objectivity of scientific assessment. For instance, the paints and varnishes criteria are based on scientific considerations, but value judgements had also to be made during the negotiation phase in order to offset the shortcomings of scientific knowledge (e;g; the expert arbitrage regarding TiO2 production processes). The consumer-centered approach is both more optimistic regarding a consumer's

cognitive capacity and less absolutist in its conception of science. On the one hand, a label is supposed to induce consumers to engage in a learning process, which will enable them to understand scientific assessment. On the other hand, consumers will offset what *they* consider to be the shortcomings of science by making value judgements. Different from the paternalistic approach, the consumer-centered approach considers that consumers' judgements are sovereign and subject to changes through a learning process.

Again, the negotiation phase is a missing piece in this framework. It ignores the fact that the apposition of a label on a product implies, *as a pre-requisite*, a clear definition of the quality to be labeled – i.e. What do we consider as being "green"[17]? Paradoxically, this is only when this question has been answered that a label can be used in order to entice the consumers to learn about it. As shown by Mattoo and Singh (1994), answering this question determines the selectivity of the ecolabel and its impact on the market shares of the different qualities. As the apposition of a label might deter the average quality on the market, regulators might be faced with a trade-off between the two impacts of a label: the increase in the expected value of information for the consumer, and the change in the average quality at market equilibrium.

3. Conclusion

The devising of the paint and varnishes EU ecolabeling criteria illustrates the importance of the negotiation phase for the development of product ecolabels. This phase has not received enough attention by analysts.

We have distinguished between three approaches to product ecolabeling. The *market approach* overstates the consumers' ability to assess green quality and assimilates product ecolabel to a market mechanism. It has obvious shortcomings in that it fails to

[17] In the case of the labeling of Genetically Manipulated (GM) Free Food-Products a negotiation is going in the European institutions so as to decide on the maximum threshold of GM ingredients that will allow a product to qualify as GM-free.

address the issues related to the devising of the ecolabel. The two other approaches, the *paternalistic* and the *consumer-centered* approaches are more realistic regarding consumers' cognitive capacity. They both acknowledge a discrepancy between perceived and actual quality. Even if they differ on their assumptions on this point as well as on the conception and status of scientific knowledge, they point out to two potential effects of product ecolabeling. These effects are: a modification of the products (ecolabeled; non-ecolabeled) market-shares at equilibrium and an incentive for consumers to learn about product quality. We have suggested that: i) these effects are not separable, ii) there might be a trade off between them, iii) it is necessary to take account of the negotiation phase in order to examine this trade off. There might be several steps before integrating these different aspects in a common model. The paternalistic approach has explored the impact of the selectivity of the criteria on market equilibrium but has not taken account of the fact that the criteria are negotiated. Based on qualitative case studies at the EU level, we have suggested that the degree of technological heterogeneity of the concerned industry - i.e. the extent to which the environmental performance of the products sold by the different firms are different - may be a variable determining the chances of success in the development of an ecolabel and its environmental impact. This aspect should be explored.

The research on product ecolabel is also of interest for two reasons. First, it emphasizes the role of green demand as an incentive for firms to participate in voluntary approaches to regulation. This question has most often been analyzed within a market approach paradigm (e.g, Arora S. & Gangopadhyay S., 1995). Second, the post purchase discrepancy between perceived and actual quality is not specific to environmental quality. For instance, many aspects of food-safety quality share this property (Caswell & Mojduszska, 1996)[18]. What we may learn about green quality and ecolabeling may thus be relevant for other types of quality and label setting processes.

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[18] Interestingly, food labeling may raise a similar type of problem only in certain cases.
"Food safety and nutritional characteristics are experience attributes in some respects[…] Several factors interfere, however, with food safety operating as an experience attribute. In many cases consumers may not be able to link accurately

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*a particular product with an incidence of illness or even be aware of a possible link. The inability to pinpoint cause and effects makes ex-post evaluation of safety as a quality attribute difficult."(*Caswell J.A. and Mojduszska E.M., 1996,pp1250).

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Table 3: Commission's decision for indoor paints and varnishes, 1995

CRITERIA	Applicable to	Requirement
Classification		Class 1 : - paints with specular gloss ≤ 45 u with _ = 60° Class 2 - paints with specular gloss > 45 u with _ = 60° - varnishes
Labeling	All products	Labeling must clearly indicate that the product is intended for indoor use.
Content in white pigment (all)	Paints	≤ 40g per m^2 of dry film, with 98% opacity
Production of white pigment (TiO_2)	Paints	Requirements limiting solid waste production, discharges in water and air.
VOC content	All products	Class 1 paints ≤ 30 g/l (minus water)
VOC content	All products	Varnishes and class 2 paints ≤ 200 g/l (minus water)
Aromatic hydrocarbons	All products	Class 1 paints ≤ 0,5% (m/m) of the product Varnishes and class 2 paints ≤ 1,5% (m/m) of the product
Water pollution coming form the cleaning of application tools	All products	The packaging should display recommendations for cleaning of tools in order to limit water pollution.
Solid wastes, packaging and product residues	All products	In order to limit solid waste (residues and can), the packaging shall display recommendations concerning product storage conditions after opening.
Pigments and other substances	All products	Paints should contain neither substances including cadmium, lead, chromium VI, mercury, and arsenic nor dibutyl-, dioctyl- or di 2-ethyl-hexyl phtalates
Dangerous substances	All products	Ingredients (substances or preparations) used in paints and varnishes shall not be classified as carcinogenic, mutagenic, toxic for reproduction, toxic, or very toxic.
Hiding power	Paints	Paints shall have a hiding power (area to be covered)≥ 7 m^2/l
Resistance to liquid	Varnishes	Varnishes shall have satisfactory resistance to water for one hour at ambient temperature.

Source: (Commission, 1996)