

INTEGRATED PRODUCT POLICES: ASSESSING ENVIRONMENTAL PRODUCT DECLARATION OPPORTUNITIES

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ABSTRACT

The growing awareness about environmental issues pushes towards a greater demand to the firms to transmit information about the environmental qualities of their products. One of the most innovative way to achieve this objective is through the so called "Environmental Product Declaration", that is a written statement of all properties of a product which, during its life from extraction of raw materials to the final treatment, are important from an environmental point of view. The International standard organization (ISO) has produced a technical report on the subject (ISO 14025, Environmental Labels and declarations – Type III environmental declarations) and it is currently considering to develop this into a full international standard.

Unfortunately, from an operating viewpoint, there is a very small experience on the effects associated to the introduction of this label; in fact, only two countries in the world have a concrete experience on the application of this specific tool: first Sweden and then Italy. They have created a very similar standard of type III label which is consistent with the ISO 14025 prescriptions; this label is called EPD (Environmental Product Declaration); however, the diffusion of this declaration is still in an introductory phase: few firms, especially in Italy, have implemented programs aimed at achieving such a label. A similar picture can be depicted when considering state of the art literature; it can be said that, in order now, literature on this issue is about completely absent.

Such lacks are critical since the importance of the topic; on the one hand, EPD can be used for "green" marketing and, hence, for achieving a competitive advantage with respect to competitors; on the other hand, its adoption represents a hard task for managers owing to the managerial complexity associated to its introduction: a complexity which could not be always justified from an economical perspective.

In the light of this framework, the paper attempts to overcome the above limits of state of the art literature; it suggests operating guidelines and a methodological approach for managers who aim at understanding under which conditions EPD can represent an useful tool for the company's competitiveness. In particular, the paper – starting from a comparative analysis of the available product environmental labels – will identify:

1. managerial and marketing implications of EPD for a firm;
2. determinants which can explain the feasibility of the introduction of a set of programs addressed towards EPD for a firm. In this respect, both internal factors – aimed at characterizing a company's internal configuration – and external variables – related to the extended supply chain where the firm operates – will be considered;
3. an operating model which allow managers to identify in which context the implementation of an EPD program may contribute to economic value creation. In this respect, an empirical analysis on twenty Italian firms will be carried out.

1. INTRODUCTION

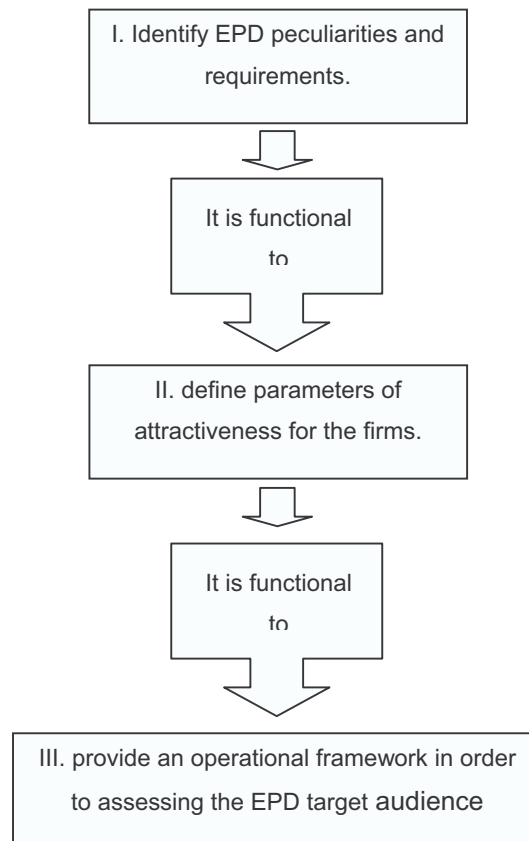
Over last few years, a large numbers of environmental labels and certification arise from different subjects in order to provide the enterprises with a credible and complete tools to demonstrate to the stakeholders (customers, public institutions, local community, etc.) their efforts in the environmental fields and consequently, to achieve a competitive advantage. In fact environmental issue are rapidly emerging as one of the most important topic for strategic planning because of growing of public awareness.

The common feature is that implementation of them arises voluntarily from the firm, according to a new approach of cooperation between the institutions, on one side, and the companies on the other, different to the traditional approach characterized by an approach of "command and control". Among the environmental tools at disposal of the enterprises, a new product certification has come to develop

in Italy – and in the same time in other countries -: it is the EPD (Environmental Product Declaration). EPD has characteristics completely different in respect to others certifications and labels actually on the market., Starting from the view of the environmental product certifications, the aims of this paper are:

- to identify the specific peculiarities of EPD and requirements;
- to define the parameters of attractiveness of EPD, related to its potential costs and benefits;
- to provide an operational framework in order to assessing the EPD target audience.

The three steps have to be considered on a logical sequence, in fact the development of an objective is strictly related with the results of the precedent, as shown here:



2. THE CONCEPTUAL CONTEXT

In the field of environmental policies, several different instruments are available that were developed by different subjects. Several authors have, in the recent years, discussed, completely and in depth, the application of all kinds of environmental tools over the enterprises and their implications (among them, Azzone *et al*, 1996 – 1997 – 1998; Hutchinson, 1996; Shrivastata, 1995). In fact, belonging to a new way of policy making, a wide number of national and international institutions, public and private, have developed these tools: from the environmental reporting to product – or process – certifications.

Three are the most important actors, involved in this process, and what is emerging is that:

- The public institutions: at different levels, they cannot be considered as the only trustee of a collective interest;
- The economical subjects: are always less “part of the problem” and more “part of the solution”;
- The other social subjects: referring, in particular, to the customer that are able to influence the behavior of the firms playing an active role and choosing the products with an higher environmental performances.

But in the hypothesis that these three actors are conscious and disabled to play their role, it is possible to activate a “*virtuous circle*” in which everyone can have benefits – in the same time the institutions, firms and citizens – because the institutions are not forced to be the only subject that is involved in the protection of the environment, the enterprises can turn environmental constraints into opportunities, the customers can directly push towards an improvement of the environmental situation.

In this dynamic, we identified some factors that can have a particular relevance:

- Quality of information and its diffusion;

- Availability of the actors to play their role;
- Social acceptability of chosen instruments;
- The diffusion of the environmental sensibility in the social and cultural system.

It is the combination of these elements that gives the base to identify the environmental instruments proper for a specific context. This means that for each specific country, industry, typology of customers have to be clearly analyzed that characteristics in order to understand which environmental tool can be considered fit.

To meet these requirements were created some voluntary instruments developed by national and supranational subjects, like the European Union but the most important role was played by the International Standard Organization – ISO – that disposed the standards related to several product / process environmental instruments.

We focus our attention on the environmental certification referred, specifically, to the product. By the side of product environmental instruments, in the last decade was growth of importance the role of the environmental labels. From the 80s was several countries has developed an environmental labels program; the German label “Blauer Engel”, the first environmental label in Europe was created in 1978.

The growing expansion of these instruments of environmental communication and the need of rules shared among the actors described above, have forced ISO to develop specific standards. The ISO’ standards have provided three kinds of product environmental label, as in the following table.

Denomination	Not verified by third part	Verified by third part
Environmental Labels	14021 (Type II)	14024 (Type I)
Self-declared Environmental Claims	14021 (Type II)	-
Environmental Product Declarations	-	14025 (Type III)

Table 1 – the three ISO’ standards of environmental labels

The environmental labels can be verified, or not, by a third part. If not, they belongs to Type II and so they are “Self-declared Environmental Claims” written directly by the firms; if they are verified they belongs to Type I or III, in the first case, we talk about “Environmental labels”, in the second one “Environmental Product declarations”.

In the following paragraphs we explore, more in details, the characteristics of each one of the standards.

In the normative 14020 there are the guidelines and the principles about these instruments. Among all: the labeling have to be accurate and verifiable, the methodology and procedures used have to be on disposal, the don’t have to be a limitation to the free trade (according to WTO rules), they have to evaluate all life cycle of a product and relevant aspects, the label and declarations have to be based on complete scientific methods, accurate and repeatable.

According to these general rules, were designed the specific normative:

2.1 Type I: Environmental Labels

The ISO standard 14021 concerns the selection of specific products or product categories product, the environmental criteria for the products, the functional features of the products, the ways of evaluation and the procedure of certification for the environmental labels. The programs for the type I labels, to develop an high level of credibility, have to be supported by an independent credited board and by clear rules.

In many countries (from Canada to Japan, from Nordic Countries – Sweden, Norway, Finland – to France and so on) was developed from 80s a national program of labeling according to standard 14021. In this picture, at the beginning of the 90s, the European Union developed the rules for a



Figure 1 - Ecolabel logo

European label (880/92) called “Ecolabel” (see Figure 1) modified with the rules n. 1980/2000.

This mark was thought for widely-used consumer goods. This means, obviously, that it cannot be issued to intermediate goods. As strength points the European label has:

- (a) European dimension: the same label usable in the whole European Union plus Norway, Iceland and Liechtenstein;
- (b) selectivity: the criteria for each single category are constantly review;
- (c) services: the rules 1908/2000 extend the Ecolabel also to services;

As weak points:

- (a) complexity: it takes several years to define the criteria for a category of products
- (b) cost: the direct and indirect cost are high;
- (c) limited access: just 20 – 30% of the products can obtain the label;
- (d) undifferentiated: it is not possible to differentiate two products with the Ecolabel;
- (e) rigidity: the bureaucracy structure that manage the label appear too jumbled.

2.2 Type II: Self-declared Environmental Claims

It concerns the self – certification and publication by a firm about the environmental performances of its products. The standard specific the criterion of utilization of declarations, symbols and graphs in order to give information true and not deceptive

The guidelines specify that, between the others, the label must be:

- (a) clear and specific;
- (b) relevant to the product and its use;
- (c) careful and not misleading.

In the case of the Type II labels there are not minimum environmental values to respect and each firms have the faculty to decide what communicate and what not.

An example of self – declared claims, actually used by the firms, are the TR 70 arranged by ECMA (European Association for Standardizing Information and Communication Systems)., but these are not The parameters are linked with the use of electronics and ICT goods (divided into several categories):

- (a) energy consumption;
- (b) emissions;
- (c) data about materials;
- (d) data about packaging.

The label is very simple to develop by a firm; in fact there are few data to collect - just inside the company – and there are few administrative steps. For these reasons TR 70 have an high diffusion in the whole EU.

2.3 Type III: Environmental declarations

The ISO standard 14025 concern about environmental product labels based on independent verify with predefined criteria. So there a quantification of the potential environmental impacts in predefined categories. These impacts are evaluated along the entire life cycle of the product with LCA (life cycle assessment) method, in perspective “from cradle to grave”, based on the standards 14040, 14041, 14042 and 14043. This data are validated from an independent board. For these labels there are not minimum environmental levels to respect (as is for the Type I labels). The first application of the 14025 is the “Environmental product declaration” developed first in Sweden. Italy begin to analyze the possible application of the label to the national context (See Figure 2).



Figure 2 – EPD logo

It is defined as a “quantified environmental data for a product with pre-set categories of parameters based on the ISO 14040 series of standards, but not excluding additional environmental information”.

The overall goals of an EPD is, “through communication of verifiable and accurate information, that is not misleading, on environmental aspects of products and services, to encourage the demand for and supply of those products and services that cause less stress on the environment, thereby stimulating the potential for market-driven continuous environmental improvement”.

The intent of an EPD is to provide the basis of a fair comparison of products by the products' environmental performance. They can reflect the continuous environmental improvement of products over time and are able to communicate and add up relevant environmental information along a product's value chain.

EPD adds new market dimensions to inform about environmental performance of products and services - objectivity, comparability and credibility. More detailed, the guiding principles for EPD programs are:

- voluntariness: EPD programs shall be voluntary in nature.

- openness and consultation: EPD programs shall implement a formal consultation mechanism for the participation of interested parties.
- product functionality: EPD programs shall ensure that the fitness for purpose of the product and levels of performance are taken into account.
- transparency: EPD programs must be able to demonstrate transparency through all stages of their development and operation, implying that information shall be available to interested parties for inspection and comment where appropriate.
- accessibility: EPD programs shall ensure that application and participation are open to all potential applicants fulfilling the specific data requirements for a given product category and the other program requirements and that they shall be authorized to publish the declaration and, if being a part of the program, entitled to be granted a license.
- scientific character: EPD programs shall, consistent with the principles of ISO 14020, rest on the methodology to develop EPD based on sound scientific and engineering approaches that accurately can reflect and communicate the environmental aspects contained in the declaration.
- confidentiality: EPD programs shall guarantee to maintain the confidentiality of all information, identified as confidential.
- national utilization: at the moment the EPD systems has a national validity.

The EPD system is operated by an independent body - the "A.N.P.A. – Agenzia Nazionale per l'Ambiente" (Environmental National Agency) in Italy - being responsible for making publicly available general guidelines. From the point of view of a company or an organization preparing an EPD for registration and publication, the overall procedure to follow includes the following steps:

- Preparing "Product Specific Requirements – PSR" (if not already available): these are defined as *"the contents that have to be considered to identify the characteristics of a single group of products as:*
 - *minimum requirements for the functional and technical identification of the group of products;*
 - *specific criteria to apply the LCA to these products;*
 - *the environmental relevant aspects for that group, added to the general rules."*
- Collecting and calculating LCA-based and other types of information to be included
- Compiling information for reporting the EPD.
- Verification and registration.

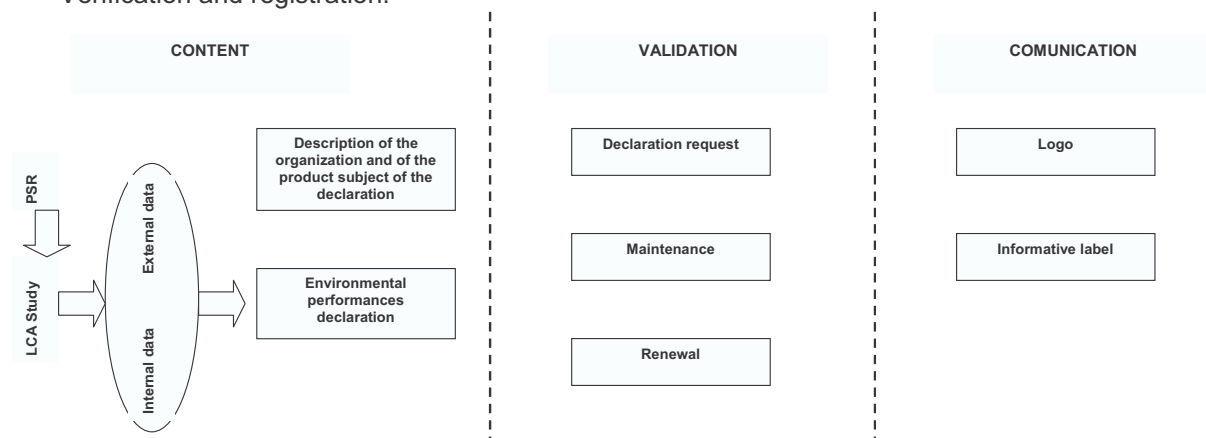


Figure 3 – the EPD requirements

3. RESEARCH METHODOLOGY

Because of the lack of state of the art about this topic, the case study approach is an appropriate choice for developing theory. More than 3 semi-structured telephone and in-person interviews were conducted with all the top managers of 17 companies working in four different industries (chemical, energy, mechanic and electronics) from March 2001 through December 2001. Respondents were asked questions related to three main issues a) company's business system characteristics, b) company's characteristics and c) expectations connected with the EPD. The interview was supplemented whenever possible through the use of both internal and public data. The development of the findings was done through an iterative process of ongoing comparison between the existing data and the emerging constructs (Eisenhardt, 1989). Initially, emphasis was on making rough frameworks that would guide later interviews. As an intermediate step, the emerging data was related to the received literature pertaining to EPD issues and the focus on the questions and the framework

was sharpened. Finally, a more systematic comparison was made between data and the emerging findings, and the concept developed was discussed with several respondents.

4. EPD ATTRACTIVENESS FROM THE COMPANY’S POINT OF VIEW

According to marketing literature, the target audience concept is strongly related to the attractiveness that a product/service has to specific customers or prospects. In this perspective, in order to assess the EPD target audience, we present an approach for identifying i) the dimensions and ii) the drivers of EPD attractiveness. Accordingly, this paragraph has been articulated as follows. At the first level we provide a taxonomy of EPD attractiveness by evaluating benefits and costs related to the acquisition of the EPD. At the second level, we present the main variables driving EPD attractiveness that have been identified both through a literature review and findings from an empirical exploration based on seventeen case studies.

4.1 Attractiveness matrix: the EPD target audience

This section 4 is the result of the mismatching of what emerged from:

1. a deep analysis of the characteristics and requirements of the EPD, specifically of the Italian version of the EPD – that is strictly related to the Swedish one –
2. the first part of the empirical study – specifically a “forum group” – with the enterprises, and external stakeholders: universities, research centers, institutions and industry association.

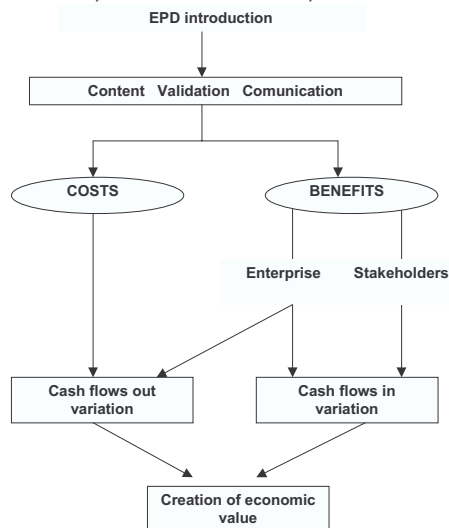


Figure 4 – EPD costs and benefits

EPD attractiveness is related to costs and benefits that a company exploits by acquiring the Environmental Product Declaration. Specifically:

- *EPD benefits*: we consider two main typologies of benefits: i) communication benefits, associated to green marketing actions enabled by the declaration, and ii) learning benefits, relative to the learning process enabled with the introduction of LCA;
- *EPD costs*: at this level we take into account two main typologies of costs: i) introduction costs, associated to the activities required to obtain the environmental product declaration and ii) communication costs, associated to the promotion of the EPD label.

A 2 X 2 matrix can be developed by arraying two levels along the EPD benefits and EPD costs axes where different levels of attractiveness can be identified.

	High	Low attractiveness	Potential attractiveness
EPD costs	Low	Medium attractiveness	High attractiveness
		Low	High

EPD benefits

Figure 5 – The EPD attractiveness matrix

According to figure 5, four levels of attractiveness can be identified:

- *low attractiveness*: for the companies that fall in this cell, the EPD is not attractive because costs exceed benefits;
- *medium attractiveness*: in this case the Environmental Product Declaration could have some “form” of attractiveness. In fact, even if benefits are low, introduction and communication costs are relatively low. In this perspective the chance to implement the EPD is relatively cheap.
- *potential attractiveness*: in this cell, even if companies can exploit a full range of benefits, the declaration has only a “latent” attractiveness for them because of the high costs;
- *high attractiveness*: the greatest value of the EPD occurs in this case where benefits are higher than costs.

Each level of attractiveness corresponds to a specific EPD target audience; companies that experiment higher levels of attractiveness cell are more suitable for promoting the EPD.

4.2 Drivers of EPD attractiveness

Our field research has highlighted that EPD attractiveness is driven by several variables that can be grouped into two main clusters:

- *firm level drivers*: those that are typical of a given company such as company’s culture, organization, etc.; and
- *industry level drivers*: those that are typical of a given industry; consequently these variables are shared among all the companies that work in the same industry.

In this way the proposed model aims at isolating drivers that occur at the firm level and those that occur at the industry level so that by matching them it may be possible to assess EPD attractiveness. In the following section we present several hypotheses about drivers of EPD attractiveness that have been successfully tested through our research findings.

4.2.1 Firm level drivers

At this level, four relevant drivers have been identified:

- *Organization*. Companies' organizational configuration could affect EPD attractiveness; specifically relevant drivers are:
 - *Vertical integration*. The degree of vertical integration affects costs relative to the acquisition of data required to accomplish the LCA study. Our hypothesis was that the greater the degree of vertical integration, the more the company could be in command of the above data; accordingly an increase in the degree of vertical integration should induce a decrease in EPD costs.
 - *Organizational complexity*. With organizational complexity we here refer to the degree of formalization of the decision-making process; companies with the highest organizational complexity tend to have less decisional autonomy. Our hypothesis is that the greater the organizational complexity, the more the inertia in acquiring the Environmental Product Declaration.
 - *Supplier relationship*. Supplier relationship is an important dimension for assessing costs of acquiring the data needed to implement the LCA study. The reasons for this hypothesis are the same as for Vertical Integration, and hence also the expected influences on EPD attractiveness. In this perspective, the stronger the supplier relationship, the less the EPD costs.
 - *Location*. Different locations of productive sites have different impacts on environmental performances. In this perspective, the greater the degree of eco-compatibility required by a specific country, the more the benefits.
- *Resources*: EPD costs can be evaluated only if compared to a company’s resources; specifically our hypothesis at this level pertains to the following resources.
 - *LCA competence*. The achievement of life cycle analysis requires specific competences; in this perspective the more the company has been involved in LCA projects, the lower the costs associated with the acquisition of the declaration.
 - *Technologic infrastructure*. Technological assets should support the acquisition of required data for the LCA study; accordingly our hypothesis is that the greater the sophistication of the company’s technological infrastructure, the lower the EPD costs.
 - *Financial resources*. The more the company’s financial resources of the technological infrastructure the more the company’s propensity to invest in the Environmental Product Declaration.
- *Strategy*. The company’s strategy strongly influences the company’s attitude to obtain the EPD. Specifically, our hypothesis is that the more the company’s strategy is oriented toward a green approach, the more the benefits that can be obtained through the EPD.

- *Final market proximity.* The company's role in the overall value system impacts on the costs associated with the acquisition of data needed for the LCA study. Specifically, the greater the company's proximity to the final markets, the higher the costs of acquiring data for the LCA assessment.

4.2.2 Industry level drivers

At this level, four relevant drivers have been identified:

- *Product characteristics:* at this level we refer to the "macro" characteristics of the products provided by companies working in a given industry. Specifically, our model takes into account:
 - *Lifetime cycle.* The LCA study requires a considerable effort and its results are specific for a given product. In this perspective, the shorter the product lifetime cycle, the less the attractiveness of the environmental product declaration.
 - *Product complexity.* With complexity we refer here to the number of product components. Growing product complexity should increase the company's effort to acquire external data for the LCA study. According to this consideration, the greater product complexity is, the higher the EPD costs.
 - *Environmental risk.* At this level we expect that given the growing environmental risk, EPD acquisition should present more benefits; in fact in such cases the EPD could be a vehicle for certifying the safety of the product.
- *Competition characteristics.* We refer to Porter's concept (1985); specifically two aspects are taken into account:
 - *Internal rivalry.* Our hypothesis is that the greater the degree of internal competition, the greater the need for diversification strategies and, consequently, the more the EPD benefits.
 - *Conjuncture.* The economic situation could influence EPD attractiveness. Specifically, favorable trends should increase EPD attractiveness whereas slumps should decrease EPD attractiveness.
- *Stakeholders.* Our model takes into account the follow dimensions which describe companies:
 - *Environmental sensibility.* The greater the stakeholders' environmental sensibility, the more the relevance of environmental product declaration.
 - *Contractual power.* At this level our hypothesis is that the greater the contractual power, the more the demand for environmental product declaration is driven by outside factors. This variable doesn't explain if the company stakeholders influence EPD attractiveness but explains the power of stakeholders' influence.
 - *Environmental Industry standard.* Companies that work in an industry where an environmental product declaration standard already exists, should find the EPD less attractive. This is the case of the electronic industry where several declarations have just been released such as the "Eco-declaration" from the Nordic Information Technology Organization (NITO) and the "ECMA TR70" released by the European Association for Standardizing Information and Communication Systems (ECMA).

5. THE EMPIRICAL INVESTIGATION AND FINDINGS

The second part of the empirical analysis is functional to apply the result of the first part, specifically the framework in order to evaluate the possible application of the EPD in some main industries and to identify the target audience of this environmental tool.

5.1 The sample

The parameters used for sample selection were different and coherent with some hypotheses we made about possible drivers of EPD attractiveness. More specifically:

- *Industries:* we analyzed companies operating in 4 different industries.
- *Market:* we selected the sample among companies operating for both the final and the industrial market;
- *Company's configuration:* we selected the sample among multinational and local companies;
- *Products:* we analyzed companies producing products with different characteristics: low/high variety (referring to the range of products satisfying the same functionality), simple/complex (referring to the functional product complexity), different life cycle, etc.

Table 2 presents sample's characteristics.

Company	Industry	Country	Target Market	Employees*
ABB	Multi-utilities	Switzerland - Sweden	Multinational	8.776*
AEM	Energy	Italy	Local	2.750*
Alcatel	Electronic	France	Multinational	6.000*
ASM Brescia	Energy	Italy	Local	878*
Celestica	Electronic	Italy	Multinational	450*
Edison	Energy	Italy	Multinational	1.900*
EniChem	Chemical	Italy	Multinational	1.300*
Euroball NN	Mechanic	USA	Multinational	700*
Fiat Auto Group	Mechanic	Italy	Multinational	220.000*
Hewlett-Packard	Electronic	USA	Multinational	88.500**
IBM	Electronic	USA	Multinational	316.000**
Italtel	Electronic	Italy	Multinational	3.500*
Schneider Electric	Electronic	Germany	Multinational	72.200**

*: only in Italy.

** : worldwide.

Table 2 – the sample

All the above companies were involved by the ANPA in the preliminary steps of the definition of the Italian Environmental Product Declaration guidelines.

5.2 Research findings – the application of the framework

Figure 6 highlights that EPD attractiveness among the sample was very diverse. As discussed in the previous section, EPD attractiveness is the resultant of the synergic actions of industry level drivers and firm specific drivers.

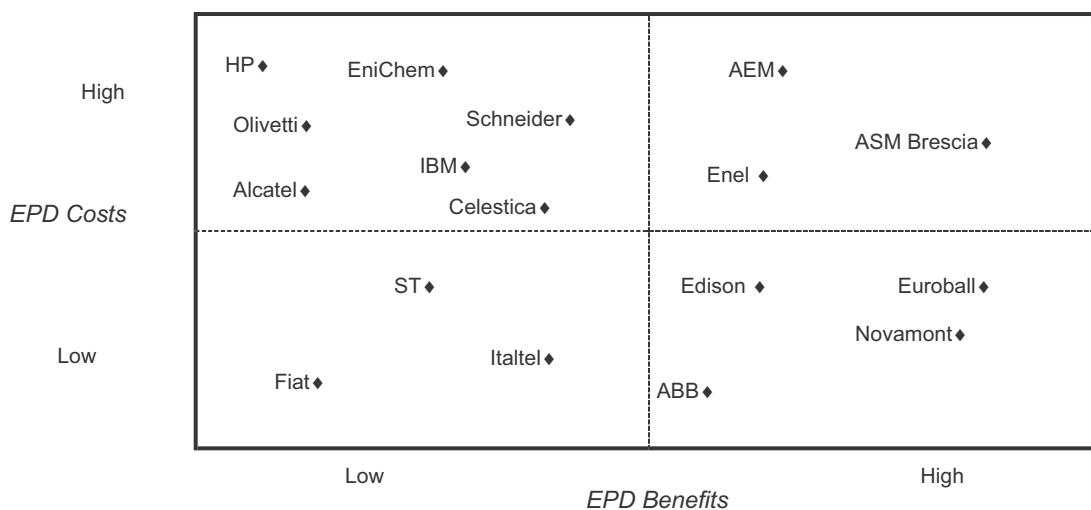


Figure 6 – EPD attractiveness for the analyzed companies

As regard industry level drivers, main findings highlighted by the research are:

- *Chemical Industry*: At this level we distinguish between *suppliers of traditional raw materials* and *suppliers of biodegradable raw materials*; specifically
 - suppliers of traditional raw materials: from the viewpoint of the analyzed EPD benefits are generally extended by the costs. Although companies that work in this industry are generally heavily involved in the environmental issues, there are no companies that find the EPD attractive. Main drivers at this level are: reduced rivalry among different suppliers (oligopolies market), which decreases EPD benefits, and high industry fragmentation, which increases EPD costs.
 - suppliers of biodegradable raw materials. At this level, although EPD costs are high (for the same reasons above) industry rivalry and stakeholders sensibility is definitely higher than in the raw supplier case; all of the above drivers increase EPD attractiveness.

- *Energy industry.* The energy sector has recently gone through a process of liberalization, as a consequence firms working in this industry are generally looking for new differentiation dimensions, which would induce a competitive advantage. In this perspective, the EPD can have a relevant role specifically for those companies that have better product environmental performances.
- *Mechanic industry.* At this level, industry drivers have not a significant impact on EPD attractiveness. Although the final market has no specific requirements about environmental performance, costs related to the implementation of the EPD are generally low. In this perspective, EPD attractiveness depends most on firm level drivers.
- *Electronic industry.* At this level the EPD has generally a low level of attractiveness: This can be explained in the light of three main considerations. First, the product life cycle is generally very short and costs connected with EPD implementation are extremely high, secondly the final market doesn't express any requirement about product environmental performances and finally several environmental standards already exist such as the "Eco-declaration" from the Nordic Information Technology Organization (NITO) and the "ECMA TR70" released by the European Association for Standardizing Information and Communication Systems (ECMA).

Driver	Industry	Impact on EPD attractiveness
Product life time cycle	Electronic	Costs increasing
Presence of environmental standards	Electronic and Chemical	Benefits decreasing
High Internal rivalry	Energy	Benefits increasing
Product complexity	Electronic	Costs increasing
Stakeholders	Electronic and Chemical	Costs increasing

Table 3 – the role of main industry drivers in the sample.

As regard firm level drivers, main research findings are:

- Among the sample Novamont and ABB have highlighted a great attention for environmental strategies and this seems one of the most important drivers of EPD attractiveness in these cases;
- For Alcatel, IBM, Schneider and HP organizational complexity tends to increase EPD costs. Specifically, our research has highlighted greater inertia for multinational companies than for other firms.
- For Euroball, which works in the mechanic industry where environmental performances are not perceived as relevant by the final market, EPD attractiveness is driven mostly by the learning benefits. In this perspective the main driver is the company's strategy strongly oriented to green performances.
- For ABB, Novamont and Euroball, LCA competencies play a relevant role in decreasing EPD costs.
- Finally, good environmental performances were highlighted as a driver of EPD attractiveness in four cases: AEM, ABB, Edison, and Novamont.

Drivers	Company	Impact on EPD attractiveness
Company's strategy	Novamont, ABB, Euroball, ABB, Novamont, AEM, Edison	Benefits increasing
Organizational complexity	Alcatel, IBM Schneider e HP	Costs increasing
Company's resource	Edison, ABB, Euroball,	Costs decreasing

Table 4 – the role of main firms drivers in the sample.

5.3 Research findings – Identifying EPD target audience: an operational approach

At this level, our aim is to provide an operational approach (which we present in figure 5) for assessing EPD target audience through the evaluation of EPD attractiveness drivers.

The above framework can support policy makers in the identification of more suitable contexts where to introduce the EPD. Specifically a two-step approach is proposed:

1. *Identification of suitable industries:* by the evaluation of industry drivers. Specifically, we performed these steps through public data by identifying proxy of each determinant. These proxies can be considered as a indirect measures identified for each determinant. Proxies of the above drivers can be chosen with different levels of accuracy according to the available

resources. To evaluate the product complexity dimension we collected data provided by previous studies about the average number of product components and the product's life cycle. As a proxy of industry complexity we referred to the ratio between the number of companies working in a given tier and the overall companies that work in the industry. As regard the degree of competition we referred to two indexes: the "Theil index" to analyze internal competition and the variation of industry level net income. Finally, stakeholders' sensibility has been estimated through a framework provided by Azzone et. al (1996) which provide different levels of stakeholders' sensibility by analyzing for each industry the intensity of environmental impact and the analysis of other environmental declarations available.

2. *Identification of suitable companies.* To evaluate organizational complexity we identified four different proxies: dimension, the higher the number of employees the greater the organizational complexity, governance structure, (multinationals generally have a higher degree of complexity) location, and the degree of vertical integration. As regard companies' strategies we distinguish among i) passive lobbying strategies, ii) reactive strategies and iii) proactive strategies (Azzone et. al 1996). As regard company resources we evaluate the following assets: LCA experience by verifying if the company was involved in previous LCA projects, financial availability and technology assets.

By assessing the above analysis in the Italian context, we found the following target audience:

- Suppliers of biodegradable raw materials that were involved in previous LCA projects;
- Companies working in the energy industry with Eco - compatible technologies such as cogeneration. Those companies can take advantage from the EPD as a tool for supporting differentiation strategies;
- Large companies that work in the final tier of the paper industry where the EPD can be both a marketing tool and a way for identifying actions for increasing product efficiency.

6. CONCLUSIONS AND REMARKS

The aim of our paper is to provide an operational framework in order to assessing the EPD target audience (as shown in figure 7), and, in order to achieve this objective, to evaluate, for Italy, which are the consequences, of the development, of the EPD in the industries and enterprises of the sample.

What we principally noted in this part, it's that:

- *Chemical Industry:* The situation is really different between *suppliers of traditional raw materials* and *suppliers of biodegradable raw materials*. Between suppliers of traditional raw there are no companies that find the EPD attractive principally for the reduced rivalry among different suppliers (oligopolies market). Between suppliers of biodegradable raw materials the situation is at the opposite, related to the firms' strategy.
- *Energy industry.* For the firms with higher environmental performances there is a opportunities in developing EPD.
- *Mechanic industry.* The final market has no specific requirements about environmental performance.
- *Electronic industry.* EPD has generally a low level of attractiveness for the short product life cycle and costs connected with EPD implementation are relevant if compared with low requirements of the customers about product environmental performances.

Anyway, the research suggests that the "Environmental Product Declaration – EPD" has a potential space to develop itself and, and, in some specific context, it is the only way to provide the consumers the information they need, to enable them to make environmentally sound purchase. The growing awareness of environmental issues will be the reason of a readiness to favor products with positive environmental qualities. On the other hand, the complexity of EPD – related to the LCA study and to its completeness – made it suitable for some specific fields. Our field study suggests that, in the Italian context the enterprises feel it as a "business to business" marketing tool; EPD attractiveness is the resultant of the synergic actions of firm specific drivers (vertical integration; organizational complexity; supplier relationship; location; LCA competence; technologic infrastructure; financial resources); and industry level drivers (lifetime cycle, product complexity, environmental risk, internal rivalry, conjuncture, environmental industry standard). The application of our operative tool have demonstrated, in our field research, that these parameters can identify, in a proper way, the fields in which the tool can be successfully applied.

A possible application of this tool is related to:

- public administration: using this tool can define the promotion strategy of the tool, addressing their efforts to the right industry fields and firms;
- firms: the enterprises can evaluate the opportunity to introduce the EPD in a systematic and rational way;

- stakeholders:
 - industry associations: can evaluate the opportunity of a promotional campaign, to increase the diffusion of this tools between the partners;
 - consumers associations: can evaluate which industries have to be forced to give more information about their environmental performances with this tool.

7. NOTES AND REFERENCES

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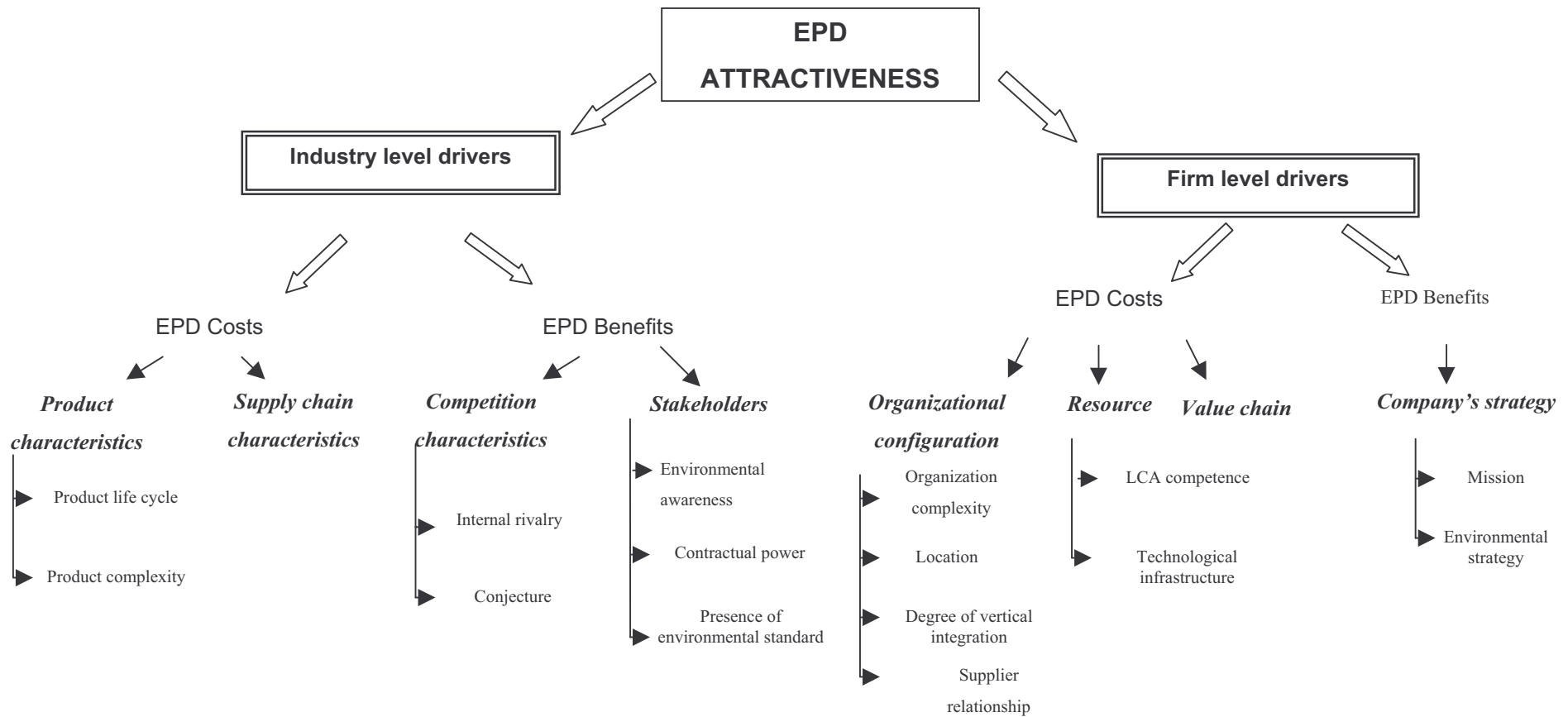


Figure 7 – an operational approach to identify EPD target audience