

# An integrated framework for assessing competitive advantages through the Environmental Product Declaration

Raffaella Manzini\*, Giuliano Noci\*\*, Massimiliano Ostinelli\*\*, Emanuele Pizzurno\*

\* Università C. Cattaneo - LIUC, Corso Matteotti 22, 21053 Castellanza, Varese, Italy, Phone: +39-0331-572233, Fax: +39-0331-572220, E-mail: [rmanzini@liuc.it](mailto:rmanzini@liuc.it); [epizzurno@liuc.it](mailto:epizzurno@liuc.it)

\*\* Department of Management Engineering, Politecnico di Milano, Piazza Leonardo da Vinci 32, Milano, Italy, Phone: +39-02-2399-2767, Fax: +39-02-23992700, E-mail: [giuliano.noci@polimi.it](mailto:giuliano.noci@polimi.it); [massimiliano.ostinelli@polimi.it](mailto:massimiliano.ostinelli@polimi.it)

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## ABSTRACT

The LCA study is an effective tool which supports managers in the identification and assessment of the environmental effects of a product / process, according to a “Cradle to Grave” perspective; in this perspective, its introduction allows a firm to collect and analyze an enormous quantity of data which was not available before. Organizations can use this information not only (i) to achieve internal benefits like, for example, efficiency of the operations, resource productivity and (ii) to implement effectively management tools such as design for environment, environmental accounting, life-cycle costing, financial assessment of different environmental options, but also for an effective communication towards different stakeholders. According to the international standard ISO 14025, this is the case of the so called “type III” Eco-label. Unfortunately, from an operating viewpoint, there is a very small experience on the effects associated to the introduction of these labels; in fact, only two countries in the world have a concrete experience on the application of these specific tools: first Sweden and then Italy. They have created a 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 literature on this issue is almost 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 a 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 allows 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

The type III labels are the last frontier in the topic of environmental labels and certification that, at the moment, are available in several ways, in fact the need for the enterprises to demonstrate to the stakeholders (customers, public institutions, local community, etc.) their efforts in the environmental fields and, consequently, to achieve a competitive advantage. The EPD has as its scientific base the LCA study in a perspective “from cradle to grave” and its application guarantees that almost large parts of environmental impact are evaluated.

In this context the Italian environmental agency – A.N.P.A. Agenzia Nazionale per l’Ambiente – is trying to launch this

new environmental product label, as Sweden has done few years ago, and as other countries are going to do.

But, if the environmental topic can be considered *consolidated* for the awareness shown by institutions, firms and customers, our hypothesis is that each specific label or certification has its own specific referring context, where the application is possible and it is a value driver for each one of the actors involved.

So, our objective is to comprise *how* and *where* is suggested to use the results of the LCA study to develop a tool of environmental communication.

The aims of this paper are:

- to identify the specific peculiarities of EPD and its requirements;

- to define the relevant variables of the EPD operative application, in a managerial perspective. It means to give a sight of the EPD through its own impacts on the firm's structure;
- to provide, at the end, the management with an operational framework able to assess the competitive advantages of the EPD in each enterprise.

The following figure 1 show the logical sequence that we have followed.

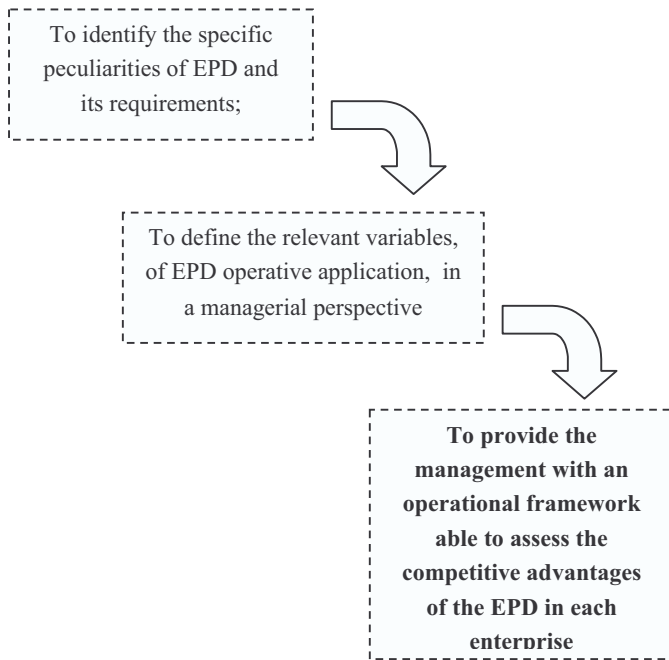


Figure 1 – the logical steps

## 2. 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.



Figure 2 - the 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 if 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 – LCA study – 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.

The EPD system is operated by an independent body - the A.N.P.A. 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)
- Collecting and calculating LCA-based and other types of information to be included
- Compiling information for reporting the EPD.
- Verification and registration.

The EPD’s requirements are summarized in figure 3.

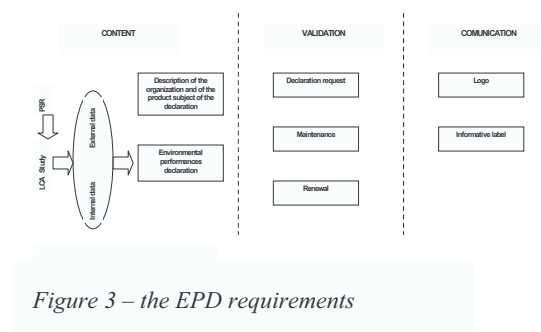


Figure 3 – the EPD requirements

### 3. RESEARCH METHODOLOGY

Because of the lack of state of the art about this topic, the empirical analysis approach is an appropriate choice for developing theory. The empirical analysis was conducted through several different channel, in particular:

- *Case studies*: more than 3 semi-structured telephone and in-person interviews were conducted with all the top managers of 19 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. A specific questionnaire of 20 slides was built specifically for our research. The interview was supplemented whenever possible through the use of both internal and public data.
- *industry’s associations*: 4 meetings were organized in order to paint a complete picture of enterprises’ position and necessities.
- *focus group*: several focus group, about the possible application of the EPD into enterprises, were organized in order to understand the impressions of the managers of enterprises involved or not in the EPD development,.
- *forum*: during a period of several months a public forum was created into the Web, in which were

collected about 100 slides of opinions about the first and the second version of the rules for the Italian EPD.

- *PSR presentations*: further than be present in several PSR presentations, we organized a supported one of them.

We have to underline that our methodology, composed by various informative sources, presents the feature to provide us with data, remarks and information with different points of view, sometimes in contrast each other or really different. That is what has given to our research its completeness and richness and it allows us not only to understand the relevant variables but also to relate the relevance to the specific contextual variables. Moreover it renders our analysis more unbiased and rigorous.

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. THE ENVIRONMENTAL PRODUCT

#### DECLARATION: THE IMPACT ON THE FIRM

This paragraph should be an operating support in the decisional process to drive the managers in order to understand if the EPD can be considered a value driven for their firm. It derived by the continuous interaction with the enterprises and other subjects of the sample shown before.

#### The operative framework to assess EPD advantages

From the previous paragraphs takes its origin the operative framework, which summarized the results and what emerged by the empirical analysis.

This framework was designed in the perspective to provide an operative support to the manager that has the intention to comprise if the EPD, potentially, turns out attractive for the specific enterprise.

In this prospect must be placed *four fundamental questions*, that analyze punctually the determinant variables, leaving from the presupposed one that for the EPD, as for every other investment in the environment field or not, the objective remains the "maximization" of the economic value of the enterprise itself.

In the figure 4 are summarized the four questions split out into their intermediary steps.

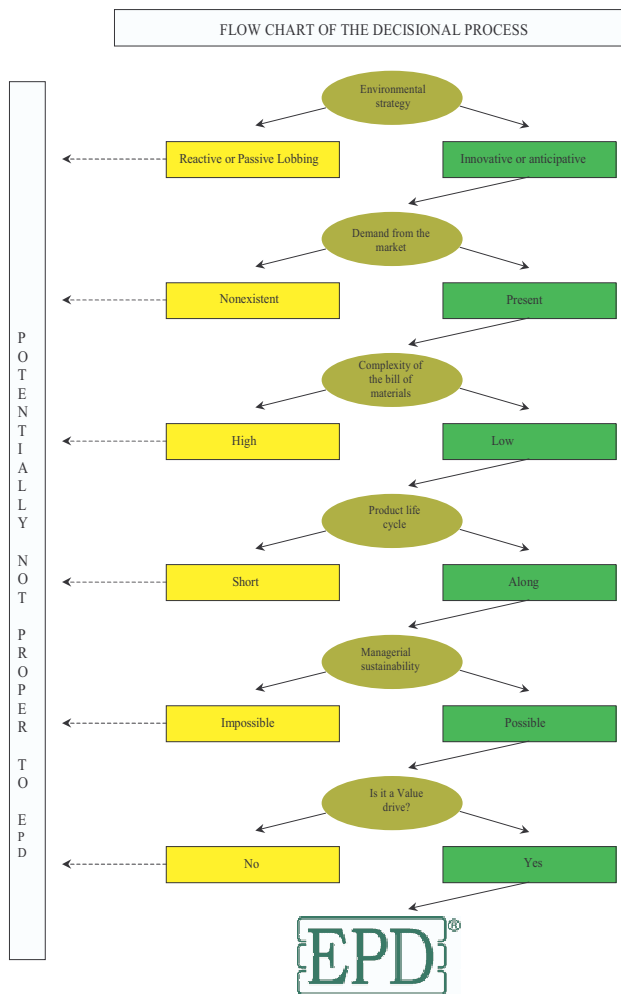


Figure 4 – the most important questions on the way to EPD development

1. *Is the EPD relevant for the enterprise' strategy?*

If the answer is positive, in other words the enterprise has a strategy of differentiation that use a competitive leverage also the environmental variable, so the EPD will be potentially attractive, but there is to check to characteristics of the firm and his competitive context, contrarily this tool is not proper to the enterprise's strategy. The variables that can influence the answer to this question are:

- the enterprise's strategy
- the environmental enterprise's strategy.

The enterprise strategy must be related to the differentiation more than to the price, this because it is simple to predict that in fields in which the variable price is the most relevant there is a very limited space for the so called "green policies", because these give a value added to the product, but can cause a price reduction just in the long term, in relation with the improved efficiency of the production processes. On the other hand there are four possible environmental strategies (Azzone *et al.* 1997):

- passive lobbying strategy,

- reactive strategy,
- anticipative strategy,
- innovative strategy.

The passive lobbying and reactive strategy feel the environment like a menace and so the firms, that adopt this kind of strategy, move themselves to react to an highest normative pressure or to try to avoid this improvement.

On the other hand, completely different is the situation, for the firms that choose anticipative or innovative strategy: in this case the strategic planning is completely suitable for the development of tools like EPD, in fact the environment is perceived as a way of competitive advantage, according to an emerging awareness of the public opinion, or, at least, focalizing the attention on this growing process.

2. *Is the environment a relevant variable for the enterprise competition?*

In other words, the good/service is itself compatible, with the requirements of the rules to obtain the EPD, and is the declaration potentially appreciated from the market?

If the answer is positive and if the product/service has these following aspects:

- i. length of the life cycle;
- ii. the complexity of the bill of materials;
- iii. the market's dynamics and concern of public opinion about "green" products.

About this three aspects our field research, show that:

- i. EPD fit to products with a medium – long life cycle, this can be explained according to the length, complexity and cost of a LCA study that cannot be repeated, each time, to product that frequently change or frequently new releases.
  - ii. The same observation can be applied to the material bill, in fact an LCA study can be more expensive where the good present an high number levels in the bill of materials, and consequently an high number of components.
  - iii. One of the more relevant aspect is the analysis of the referring market: the receptivity, in the sense of the level of customers' demand, social pressure or a stricter legislative regimes, that pressed companies to undertake significant changes in their products/processes and to find a way to communicate.
3. *Is the EPD sustainable from the managerial and organizational perspective?*

In other words, does the enterprise show an infrastructure able to support the data collect and their elaboration, according to the prescription of the LCA study, in a level of costs and time reasonable?

If the answer is positive the firm probably has a level of vertical integration medium - high, collaborative and national suppliers and has adequate resources (like competencies in: LCA study, managerial and

organizational, technologies) or has the availability to invest. In this case the EPD is probably attractive, but it has to investigate more in depth into the enterprise and its competitive context. But we have to precise that in this case, different respect the first two, we note that in presence of some characteristics apparently negative it doesn't mean the complete inability of the development of the EPD.

These following are the variables that influence the third answer:

- financial resources: to cover the LCA study and data elaboration and, eventually, other investments;
- organizational complexity: the enterprise's structure can result determinant in the LCA study, in fact some enterprises, especially multinational, with many seats and factories are relatively disadvantages in comparison to others with an higher concentration. In fact, 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.
- localization: what it is said before about complexity can be amplified if the seats are in the same country or in different nations;
- level of vertical integration: it measures the number of activities that the enterprise do itself. At the growing of this number it results less complex to find all the data necessary to the LCA study;
- relationships with suppliers: the capacity of relationship and the quality of their relations are two further aspects, to assess the costs of the LCA study. If there is a high level of collaboration, the data necessary to the LCA study will be collect in a easy way, on the other hand there will be a potential increasing of the costs;
- LCA competencies: at this level we are referring to the internal human resources that have the competencies to operate with the LCA method that require specific competencies. More the LCA competence are high, less the EPD development costs;
- organizational competencies: the EPD involves a large number of people, data and information. For this reason, to prevent cost and time loosing, it's necessary for the firm to own an high level of internal organization ;
- technological equipment: we have noted that the absence, or low level, of information systems, and more in general, of systems to collect information about the products, is an element that can support the process of acquisition of internal data with

consequence that greater the sophistication of the enterprise's technological infrastructure, the lower the EPD costs ;

- ability to promote the EPD: the firms have potentially *push* or *pull* methodologies to promote the EPD. In this sense an higher bargaining power could be considered effective in order to obtain a shortest time of diffusion and knowledge of the EPD between clients and suppliers ;
- distributive channels: related to the features of the EPD the more relevant distributive channel is the direct sales force (like agents that operate in a exclusive way for the firms), in fact the EPD needs of an explanation in details the importance and contents, that in particular in this phase, could be an important way of diffusion.

#### 4. *Is the EPD a value driver?*

Definitely, in which way and related to which factors the EPD can create economic value for the firm?

We have identified five classes of variables that influence the answer to this question:

- stakeholders environmental sensibility;
- stakeholders' contractual power;
- presence of industry environmental standards;
- internal rivalry
- economic conjuncture.

More in details:

- stakeholders environmental sensibility – but the clients that we have considered before as the most important stakeholder – is one of the more relevant parameter in the process of choosing the EPD. In fact the greater the stakeholders' environmental sensibility, the more the relevance of environmental product declaration. In this process, we have identified some classes of more relevant stakeholders:
  - shareholders (or enterprise's owner): they indicate the guidelines to the management and strategic priorities. Their medium – long period vision and an environmental culture facilitate the develop of project with a economic returns in a long period;
  - management: they play a key role carrying out with determination the necessary steps to and in putting into effect the aims assigned;
  - NGO and local community: they are two actors who take part in the life of the enterprise and that they push, in a more and more determining way, towards sustainable development politics and their weight is increasing. At this level, we note that, at the same level of pollution, the stakeholders' sensibility changes according to the

- "social - cultural" characteristics of the single geopolitical area.
- workers: their capacity to participate into the modified process of data collection and to *absorb* new procedures and processes at this level is to be evaluated in a positive way;
  - suppliers: into the LCA study, the data and information coming from suppliers are essential. So their complete collaboration has to be considered determining.
- 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 standards: 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).
  - 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.
  - economic conjuncture: the economic situation could influence EPD attractiveness. Specifically, favorable trends should increase EPD attractiveness whereas slumps should decrease EPD attractiveness.

#### **The external bonds**

We have split the possible reasons of unattractiveness divided into two categories: the causes possible to remove by the single enterprise or impossible.

The external causes removable:

- *environmental industry standards*: it has been empirically realized that where exist environmental industry standards, inevitably, new tools. But the positive features of the EPD (credibility, objectivity, transparency, standard ISO) can prevail.
- *Stakeholders' sensibility*: in the case in which the stakeholders (at this level we refer principally to the clients, but not only) have a limited sensibility to the environmental issues this not have to be considered as a fact but as a removal criticality (i.e. with sensitization meetings, with promotional activities).

- *Availability of necessary investments*: we have seen as the EPD can necessitate, potentially, many investments, that sometimes may not in the firm's availability. In this sense it is possible to involve the financial institutes for a specific financing.

The external causes irremovable:

- *Fragmentation of the supply chain*: this is one of the causes for the higher organizational complexity that means difficulty or sometimes impossibility to obtain data, necessary for LCA study, in reasonable time and cost, but this cause belong to the industry and the firm itself cannot remove it;
- *Economic conjuncture*: the world macro – economic situation, has dynamics that can influence the choices of the each enterprise;
- *Country system*: at this level, we refer to the characteristics of each country . In this sense part of the environmental impacts associated to a specific product and pointed out through the LCA study come from structural conditions of the country (i.e. the production of electric energy), can have a relevant impact on benefits, but the firm cannot act on.

## **5. CONCLUSIONS**

The EPD is a completely new tool in the panorama of the environmental instruments, and its development can be considered as owner of specific features like, between the others:

- completeness,
- credibility,
- objectivity,
- transparency,
- scientific character.

But its scientific credibility and completeness become it suitable for specific industries and, inside them, specific firms. The only way to achieve this result is to analyze, in depth, the enterprise and the context in which it operates, following guidelines as in the fifth paragraph.

The framework has been applied to the Italian firms in order to verify the conditions of its development, and consequently, of the model that lies behind (Noci *et al.*, 2002). It fits perfectly to the Italian context, in which the enterprises that adopted the EPD or not, are perfectly individuated by our operative tool. But, in the hypothesis that, as for the Swedish case, an international EPD system will developed on the same bases respect to the Italian one, the framework can be, potentially, applied to the enterprises all over the world.

Some of the conclusions that emerged from the empirical application of the framework are that from the side of the costs, these are the most relevant observations:

- the high costs of development, linked, in the most of cases, with the complete absence of internal human resources able to manage the LCA study;
- the efforts needed to explain to suppliers and customers what the EPD represents, in this phase in which no one knows something about;
- in the electronic industry, the main reason is the presence of accepted and diffused environmental standards;
- in the case of Multinational companies the problem is connected with the high costs of data collection, through the sites in other countries;
- economic conjuncture: in many industries, like the semi – conductors, this, at the moment of the interview, is the most important cause of impossibility for developing new environmental tools;
- internal rivalry: in the chemical industry, for example, is extremely low, that means that there is no will to develop diversification strategies.

In the Italian case, what we noted from the side of the benefits of EPD development, is that, at the moment, these are limited, in particular related to

- the reduced sensibility of the customers.

The other possible causes that influence costs and benefits, were not so much stressed or were present only in few cases.

The Italian firms that have, actually, developed the EPD, have an innovative or anticipative strategy: so they are investing on a long period returns.

Or, on the other hand, we found some firms, that, in presence of a low level of EPD implementation costs, decided to develop this project.

But, what we observed is that most of them, are still “at the window” waiting for concurrency or government actions, related also to uncertainty of the EPD rules.

Related to the newness, the paper can be a practical support for the management: a complete operative framework to obtain the result of assessing competitive advantages.

## 6. NOTES

This paper is the results of the joint work of the authors. However Giuliano Noci wrote section 1, Emanuele Pizzurno wrote section 2,4 and Massimiliano Ostinelli section 3. The section 5 has been written jointly.

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