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Additional Information

ENVIRONMENTAL PRODUCT DECLARATIONS: EXPLORING THEIR SUCCESS AND THE FACTORS AFFECTING THEIR DEMAND

Abstract

This paper presents the findings of an exploratory study conducted to analyse the growing use of Environmental Declarations as environmental communication tools, together with the factors that have led to this situation in Europe. To do so, and focusing on the EPD programme called the International EPD System, an exhaustive analysis was performed of the evolution of Product Category Rules (PCR) and Environmental Product Declarations (EPD). The next step was to draw up a survey to be administered to companies that currently have EPD in that programme in order to identify the factors that led to its being chosen as an environmental communication tool, the communication channels through which they came to know about the programme, the target public of EPD, whether or not they intend to renew it and the reasons for not doing so if that is the case, and so on. Despite a progressive growth in the use of EPD, according to the companies, the main weakness of these programmes is the fact that final consumers do not know about EPD. Implementing actions geared towards raising awareness about them may therefore play a key role in maintaining and continuing to increase the success of EPD programmes.

1. Introduction

Today there is an increasing interest across Europe in establishing guidelines that facilitate and drive the measurement and communication of the environmental behaviour of products and organisations (COM 196, 2013). This interest arises as a consequence of the implementation of the Integrated Products Policy (COM 68, 2001; COM 302, 2003), which enhances environmentally friendly products by making their environmental information public.

A number of mechanisms have therefore been developed to favour the dissemination of the environmental aspects of products, most of them within the ISO 1402X family of standards (ISO 14020, 2000). This group of standards proposes Environmental Labelling (Type I) (ISO 14024, 1999), Self-declared environmental claims (Type II) (ISO 14021, 1999) and Environmental Declarations (Type III) (ISO 14025, 2006) as possible environmental communication instruments that can be applied by companies.

From the consumer's point of view, some studies show that little is known about the meaning of ecolabels, and interpreting the environmental information offered by some products is also often quite confusing. In this respect, the Flash Eurobarometer (European Commission, 2013) concludes that, amongst other things, only 7% of respondents believe that ecolabels provide sufficient, clear and easy to understand information about the environmental impact of products, whereas 32% think that ecolabels provide sufficient information, but that it is not altogether clear. This fact is also confirmed by organisations such as Terrachoice Environmental Marketing, which in 2010 warned about the large amount of environmental information that is sometimes included on the labels of consumer goods and which is not always complete or verified by a third party (TEM, 2010).

Within this context, Environmental Declarations (Type III) are the ideal tools to prevent this confusion from arising among consumers and to make environmental comparisons between products/services easier, since they represent a set of environmental indicators based on the application of the Life-Cycle Analysis methodology (ISO 14040-44, 2006) to the product/service

under study. This information, verified by an independent third party, is based on complying with a set of pre-established standard operating rules for each product category (Product Category Rules, PCR) and makes it possible to ensure the principle of comparability. That is to say, Environmental Declarations are verified environmental profiles that communicate quantitative information about products both to manufacturers and distributors (business-to-business) and to the final consumer (business-to-consumer). This allows the relevant environmental attributes of products belonging to the same product category to be compared (Manzini et al., 2006).

At international level, a number of different Environmental Declaration (Type III) programmes have come into being, and several PCR have been developed for different product categories. Some of the programmes that have published the greatest number of EPD are the JEMAI programme in Japan (JEMAI, 2014), Keiti-EPD in Korea (KEITI, 2014), ADEME in France (ADEME, 2014), IBU-EPD in Germany (IBU-EPD, 2014) or the International EPD® System at the European level (EPD®, 2014) (Hunsager et al., 2014).

The capacity of EPD to display comparable environmental information about products and services in a reliable and verifiable manner has turned them into instruments that are crucial on international markets (Bergman & Taylor, 2011). More specifically, their use in European markets has grown exponentially (European Commission, 2013), although they have still not reached the level of expansion currently enjoyed by Environmental Labelling (Type I).

This paper has essentially two aims. On the one hand, it seeks to analyse the evolution of the demand for environmental declarations by studying the PCR that have been carried out and the EPD published in the different product/service categories and by countries. On the other hand, it also intends to identify the motivating factors that have led companies to opt for this environmental communication tool, as well as to continue to use it over time. Furthermore, in the case of companies that have not renewed their EPD, it seeks to identify the reasons for not doing so as well as what environmental communication tool they have chosen to replace it and why. This information was collected by means of an online questionnaire, which was answered by a representative sample of companies with products that are certified with an EPD.

This analysis is focused on the International EPD System, as it is the pioneering programme and the most widely implemented at the European level, as it is present in 25 countries. Furthermore, it also has the greatest number of PCR developed by categories belonging to the industrial, construction, agricultural, foodstuffs and services sectors, amongst others (Hunsager et al., 2014).

2. Background

The implementation of EPD in companies has been studied in the literature from several different perspectives such as: the process of developing EPD and PCR, the differences between programmes, comparison of PCR and EPD between programmes, etc. Table 1 lists some of these studies, classified according to their main subject matter.

Table 1

Table 1. Classification of the literature related to EPD programmes and PCR

As can be seen in **Table 1**, although a number of publications have focused on analysing the process of obtaining EPD, PCR and/or carrying out practical cases (**Benaviste et al., 2011; De Moraes et al., 2013; Del Borghi et al., 2007; Fet & Skaar, 2006**; etc.), only three studies attempt to identify the motivating factors that lead companies to opt for EPD as a tool for communicating the environmental impact of their products/services. These studies are those by **Räty et al. (2014)**, which identifies the preferences of firms in the Norwegian timber sector as regards environmental certification; **Zackrisson et al. (2008)**, which obtains EPD for 10 products from different industrial sectors and identifies the main advantages and disadvantages experienced by the companies in that process; and **Manzini et al. (2006)**, who interviewed managers from 17 Italian companies, evaluated in the years 2001-2002, to identify the motivations driving the public/industry to obtain EPD.

There are also several studies that were conducted to analyse the factors that lead companies to choose other tools as alternatives to EPD. Hence, for example, **Subramanian et al. (2012)** identified the lack of alignment and standardisation of PCR on a global scale and **Hunsager et al. (2014)** pointed out the need for greater harmonisation and transparency in the processes involved in generating EPD.

3. Evolution of the implementation of EPD

According to **Hunsager et al. (2014)**, the International EPD System, launched in 1999, was the first EPD programme to be developed on a worldwide scale. Moreover, it is the EPD programme with the greatest number of PCR developed for several products belonging to a wide range of categories (**UNSD, 2013**).

Specifically, it has developed PCR and published EPD for the categories shown in **Figure 1**. It can be observed that the categories “Food & agricultural products” and “Services”, followed by “Construction products” and “Machinery & equipment” are the ones that have developed a greater number of PCR. This result is repeated in terms of the EPD published, except for the category “Services”, which has published a lower number of EPD.

Figure 1

*Basic module: generic information applicable to products from the same sector for which their own PCR has still not been developed

Figure 1. Evolution of PCR and EPD by economic sector

[Figure 1]

By analysing this fact in greater depth, it is convenient to relate the number of EPD published for each PCR developed (no.EPD/no.PCR), the results show that the category “Construction products” offers a ratio of 4, followed by “Food & agricultural products” and “Wood & paper products (non-construction)” with 3, the categories “Electricity”, “Food & agricultural products”, “Transport vehicles & equipment” and “Furniture and other goods” have a ratio of 2, and the other categories have a ratio of 1.

If it is analysed the way the number of EPD published since the creation of the International EPD System have evolved over time, an exponential growth can be seen for all its categories (**Figure 2**). The years 2009 and 2011 stand out for having reached the highest rates of growth both in terms of the publication of new EPD (rates of 85% and 74%, respectively) and as regards the increase in the number of publications already in effect (both with a rate of 57%). The categories with the highest growth were “Food & agricultural products” and “Construction products”, which grew at a far higher rate than the other categories as of the years 2011 and 2012, respectively.

Figure 2

Figure 2. Evolution of the EPD issued annually since the creation of the programme

In terms of the countries with the highest number of products with EPD, Figure 3 shows how Italy, followed by Sweden, Switzerland and Spain stand out above the rest in this respect. Furthermore, it can be observed how the number of EPD belonging to the categories that were previously identified as the most common (“Food & agricultural products” and “Construction products”) are spread evenly across practically all the other countries. Nevertheless, some countries are seen to display a certain degree of specialisation in other categories, such as Switzerland, which focuses on the categories “Machinery & equipment” and “Electricity”, or Germany, which concentrates on the category “Fuels & chemical products”.

[Figure 3]

Figure 3. List of the EPD published by countries

The validity of the EPD that are published can vary from 1 to 5 years, depending on the company's preferences or the type of product. Annual EPD are used for products that are valid for a year (e.g. crops) and account for 15% of the EPD, whereas 71% are renewed every 3 years, the 4- and 5-year periods being the least commonly used.

Finally, at this point attention should be drawn to a type of certification within the International EPD System called Carbon Footprint (CF) (ISO/TS 14067, 2013), which is considered a partial environmental declaration, since it shares the same principles as Environmental Declaration Type III, but only takes into account the publication of the indicator for the category “global warming impact”. The International EPD System also allows this kind of CF certification to be obtained, either independently or in combination with EPD. Only 7% of companies choose the CF certification, while 22% combine CF and EPD, although the majority still prefer just EPD (71%).

4. FACTORS AFFECTING DEMAND FOR EPD

With the aim of identifying the reasons that have led companies to choose EPD as their mechanism of environmental communication rather than any of the alternatives they could opt for and to continue to use it over time, it was designed an online questionnaire that was made available to firms with products certified within the International EPD System.

4.1 Definition of the questionnaire and procedure

The questionnaire was defined in accordance with the following structure (see Full questionnaire in the Appendix).

- I. **Details about the company:** Contact person, General details, Environmental Management Systems implemented.
- II. **Knowledge about EPD:** Channel, Advantages, Weaknesses.
- III. **Implementation of EPD:** Products with environmental certification and the type of certification, Reasons for implementing EPD, Target public the EPD is aimed at.
- IV. **Non-renewal of EPD:** Products with non-renewed EPD, Reasons, Alternative tool (if any).

Once the questionnaire had been designed, it was sent out to all the companies with products certified within the International EPD System, and the person responsible for managing the EPD in each of the companies was contacted by email.

In order to define the representative sample size that would be needed, the procedure proposed by Bartlett et al. (2001) was followed. Results of the test showed that the sample size corrected

for a total population of 130 companies with products certified in the International EPD System, a confidence interval of 95%, variability of 5% and a margin of error of 10%, was 55 companies.

4.2. Results

Following the process described above, the 130 companies were contacted and a total of 55 valid responses were obtained, which was the statistically representative sample size. The characteristics of the representative sample can be seen in **Table 2**. Most of the companies are very well consolidated as they have been operating for more than 30 years (i.e. were founded prior to 1980). Most of them are in Italy, Sweden and Spain and they belong chiefly to the agro-food industry, construction, and machinery and equipment manufacturing categories, thus reproducing the structure of the population to be analysed.

Table 2

Table 2. Characteristics of the sample (n = 55)

With regard to the environmental management system implemented in the companies, 11% of them do not have any such system, while of the remaining 89%, 55% have **ISO 14001** (2004) and 12% have EMAS Registration.

Dissemination of EPD: channel of knowledge and target public

The first parameter analysed has to do with the dissemination of EPD and two different aspects were analysed: the channels by which firms come to know about the International EPD System and the target public that their EPD are intended for.

Figure 4 shows the channels through which the companies that have EPD first became aware of the existence of the International EPD System. Companies usually find out about EPD tools through technical consultancy (over 50%), the market (nearly 45%) or directly from other companies or products (more than 25%). Although these tools have immense potential to contribute to the transparency and continuous improvement of the environmental behaviour of companies/processes/products, it can be seen how the existence of government incentives or campaigns aimed at encouraging their use is lower than expected (10%). The same can be said of their promotion in the mass media, something that barely 20% of the companies invest in. It should be noted that these percentages add up to more than 100% because some enterprises discovered EPD through several means or channels running parallel to each other.

Figure 4

Figure 4. Channels of knowledge about EPD

On analysing the findings according to the International EPD System categories examined in the previous section, in **Figure 5** it can be seen that, except for the channel “Suppliers”, which has only been selected by two categories “Electricity” and “Machinery & equipment”, the other channels of knowledge are used by the majority of categories.

Figure 5

Figure 5. Channels of knowledge about EPD, by categories

On the other hand, if we analyse the target public that companies aim this kind of environmental communication tools at, product distributors (39%) and highly skilled professionals in each sector (39%) are identified as the main target users of EPD, rather than the final consumer (16%).

Advantages and disadvantages of EPD

The use of EPD rather than other environmental communication tools may be accompanied by certain advantages and disadvantages for companies. **Figure 6** shows which of them were identified in the companies that answered the survey and the specific weight granted to each of them.

[Figure 6]

Figure 6. Advantages and disadvantages of EPD

On the one hand, some of the main advantages offered by the use of EPD include their capacity to communicate objective information (selected by almost 70% of respondents), improve the corporate image (60%) and communicate large amounts of environmental information (45%). Neither the cost, which is generally lower than that of an ecolabel Type I, nor the absence of any obligation to comply with pre-established ecological criteria are perceived as significant advantages. It should be noted that all the advantages included in the option “others” (10%) are related to the opportunity for improvement and greater knowledge of the productive processes carried out by the company.

On the other hand, the main disadvantage pointed out by almost 80% of the companies analysed is how little consumers know about EPD. Somewhat surprisingly, in this case respondents did point to the costs of applying for, renewing and carrying out the LCA needed to develop the EPD as being a clear disadvantage. The lack of international standardisation of PCR (45%) and the difficulties inherent to the interpretation of the information contained in EPD (30%) are also disadvantages that should be taken into account with a view to improving and expanding the use of this environmental communication tool.

The advantages and disadvantages identified by the companies when using EPD as an environmental communication tool by categories are shown in **Figure 7 and 8**, respectively. As regards the advantages, it can be seen that apart from “Don’t require compliance with any criteria” and “To obtain/renew an EPD is cheap”, which are only identified by the “Food & Agricultural”/“Construction products” and “Electricity”/“Food & Agricultural”, respectively, the others were identified by most of the companies. As far as the disadvantages are concerned, no important differences were observed between categories.

[Figure 7]

Figure 7. Advantages of EPD, by categories

[Figure 8]

Figure 8. Disadvantages of EPD, by categories

Factors that influence the acquisition of an EPD

Many factors exert an influence when it comes to deciding on EPD as an environmental communication tool. **Figure 9** shows the real factors that led the respondents to obtain it. These factors are grouped in two blocks: internal requirements and external requirements, and each factor has been scored on a scale from 1 to 5 (from no influence to maximum influence).

[Figure 9]

Figure 9. Factors that influence the acquisition of EPD

Generally companies are led to acquire an EPD by a combination of internal and external requirements. Yet, as can be seen in Figure 9, the external requirements are which drive them to make a decision. More specifically, complying with the company's environmental policies and improving its corporate image are the main factors leading them to obtain these tools, both of them with a score of 4 out of 5. The possibility of being able to expand their markets or of complying with the demands of suppliers also exert a certain influence, although they are not decisive.

Factors that influence the non-renewal of EPD

Not all companies wish to renew their EPD once they have expired. Several of the companies that were surveyed have not renewed some of their EPD or intend not to do so. Knowing the reasons that led them not to renew their EPD can be useful to improve the deficiencies or difficulties offered by the system. They were therefore asked to give the reasons that have led them or would lead them not to renew the EPD. Moreover, they were asked to state the weight/influence of each motive when it comes to making a decision (1 – no influence, and 5 – maximum influence).

Figure 10 shows the results that were obtained. As can be observed, there is no clearly differentiated reason that led the companies to cancel their EPD. Some of the main factors include loss of interest in the tool by consumers or changes in the financial situation of the company, both with scores slightly higher than 3.2 points out of 5. The third reason is the change of communication tool.

[Figure 10]

Figure 10. Reasons for not renewing currently valid EPD

The company's intention to renew its EPD or to replace them with another environmental communication tool is then evaluated. To do so, they are initially asked about whether or not they wish to renew the EPD they currently have in effect. The answers that were obtained can be seen in Figure 11a. As can be observed, 26% of the companies have decided not to renew the EPD, while only 27% are sure they will continue with it.

The graph that appears in Figure 11b shows, as percentages, the environmental communication tools that companies are going to use instead of the non-renewed EPD. That information was obtained by asking only the 26% of respondents who clearly intend not to renew their current EPD. The results show that Environmental Labels Type I are the environmental communication tools that are going to replace EPD. More specifically, the European Ecolabel, the Carbon Footprint and White Swan are the programmes that are most commonly chosen.

[Figure 11]

Figure 11. Company's intention to renew or replace its EPD

In order to find out what leads this 26% of companies not to renew their current EPD and replace them with another environmental communication tool, they were asked to give the reasons for doing so. In Figure 12 it can be seen that over 52% of the companies intend to replace their EPD with another environmental communication tool that is more widely known and can be easily identified and interpreted by the final consumers. Trying to use more international tools also plays an essential role in decision-making (27%).

[Figure 12]

Figure 12. Reasons for changing environmental communication tool

4 Conclusions

These are the findings of an exploratory study conducted to analyse the growing use of EPD as an environmental communication tool, together with the factors that have given rise to this situation. Hence, in addition to a thorough analysis of the evolution of the EPD/PCR published since the creation of the International EPD System, a survey aimed at companies that currently have EPD in that programme was also drawn up in order to identify, among other things, the factors that account for their being chosen.

The main conclusions from the survey are:

- 90% of the companies with EPD have incorporated voluntary environmental management systems. This shows that the majority of companies are aware of the existence of voluntary environmental continuous improvement systems and have an environmental policy that guides them towards the environmental certification of the product.
- Less than 25% found out about EPD through the mass media, which is the primary means of disseminating information on a worldwide scale.
- 89% of the companies with EPD have other companies as their target public (business-to-business). Nevertheless, in accordance with ISO 14025 (2006), their use in business-to-consumer communication cannot be ruled out, although in this case the target consumer needs to have a high level of environmental awareness.
- Almost 80% consider the main drawback hampering the application of EPD to be the fact that consumers are not at all familiar with them. This is confirmed by the conclusions of the [Flash Eurobarometer \(European Commission, 2013\)](#). Conversely, the main advantage is the objectivity of the results communicated by the EPD and the fact that it allows the corporate image of the company to be improved.
- There is no decisive factor that leads companies not to renew their EPD once they have expired. Nevertheless, 26% of respondents are sure they will not renew their current EPD, and will replace it either by the Carbon Footprint or by the European Ecolabel. The reason for changing the environmental communication tool is essentially that firms prefer a tool that is better known by the final consumers, as well as having a more international scope.

The analysis of the evolution of the International EPD System shows a progressive growth in the use of EPD as an environmental communication tool by European companies. The survey carried out on companies that currently have EPD can, however, be used to define initiatives that improve the implementation of Environmental Declaration programmes. These could include, first of all, promoting awareness-raising campaigns and government incentives targeted towards both manufacturers and distributors and the end consumer, with the aim of making them known to a wider public. These campaigns must be intended for dissemination in both technical and sectorial media and in more generic media aimed at the end consumer. Secondly, if the EPD is aimed at the end consumer (business-to-consumer), it should be accompanied by the global warming indicator summary of the Carbon Footprint, since companies perceive this as being better known and more easily interpreted by the general public, which coincides with the conclusions of the [Flash Eurobarometer \(European Commission, 2013\)](#).

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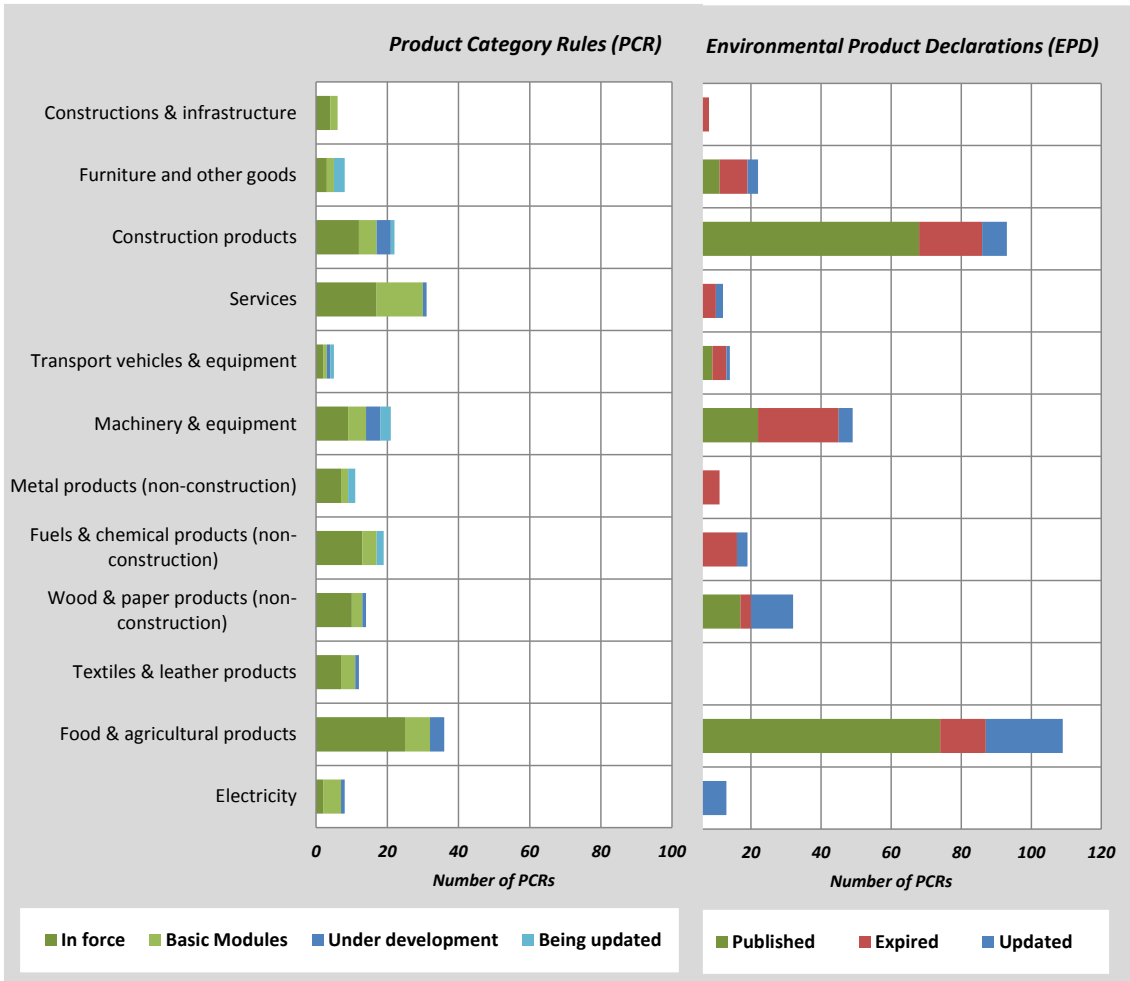
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Tabla 1. Classification of the literature related to EPD Programs and PCR

		EPD-PCR		PCR			EPD				Caso de aplicación	
		Marco y revisión del estado de las EPD/PCR (reviews)	Compara PCRs	Análisis de PCR (ventajas, desventajas, utilidad, comparabilidad...)	Desarrollo de una PCR	Alignment / Harmonization	Presentación programa de EPD	Compara EPD / Programas EPD	Visión empresarial (ventajas, debilidades, utilidad, efectividad...)	Análisis de indicadores, desarrollo de EPD/LCA, interpretación de resultados		
2014	Andreoni, 2014										x	Polymers to fibers
2003	Ardente et al. (2003)										x	Renewable energy system
2011	Benaviste et al. (2011)				x						x	Ceramic flooring systems
2011	Bergman & Taylor (2011)	x								x		
2014	Cerutti et al. (2014)	x								x		Fruit sector
2013	De Moraes et al. (2013)									x	x	Chemical industry
2007	Del Borghi et al. (2007)			x				x			x	Waste disposal sanitary landfill
2008	Del Borghi et al. (2008)			x							x	Waste water treatment
2013	Del Borghi (2013)	x				x						
2006	Fet & Skaar (2006)				x						x	Furniture industry
2009	Fet et al. (2009)									x	x	Furniture industry
2014	Hunsager et al. (2014)	x										
2012	Ingwersen & Stevenson (2012)			x		x						
2014	Ingwersen & Subramanian (2014)				x	x						
2006	Manzini et al. (2006)	x							x			
2011	Mars et al. (2011)						x					
2013	Modahl et al. (2013)							x		x	x	Seating solutions
2003	Nieminen-Kalliala (2003)	x								x		Textile industry
2014	Räty et al. (2014)								x			Wood products
2008	Schau & Fet (2008)									x		Food industry
2012	Skaar & Fet (2012)								x			
2008	Steen et al. (2008)									x		
2010	Strazza et al. (2010)							x		x	x	Cement industry
2012	Subramanian et al. (2012)		x			x						
2014	Tellnes et al. (2014)									x	x	Wooden facade
2012	Vitall et al. (2012)						x			x		Electric components (RAES)
2008	Zackrisson et al. (2008)								x		x	Several sectors



*Módulo básico: información genérica aplicable a productos de un mismo sector que aún no tienen su propia PCR desarrollada

Figure 1. Evolución de las PCR y EPD por sector económico

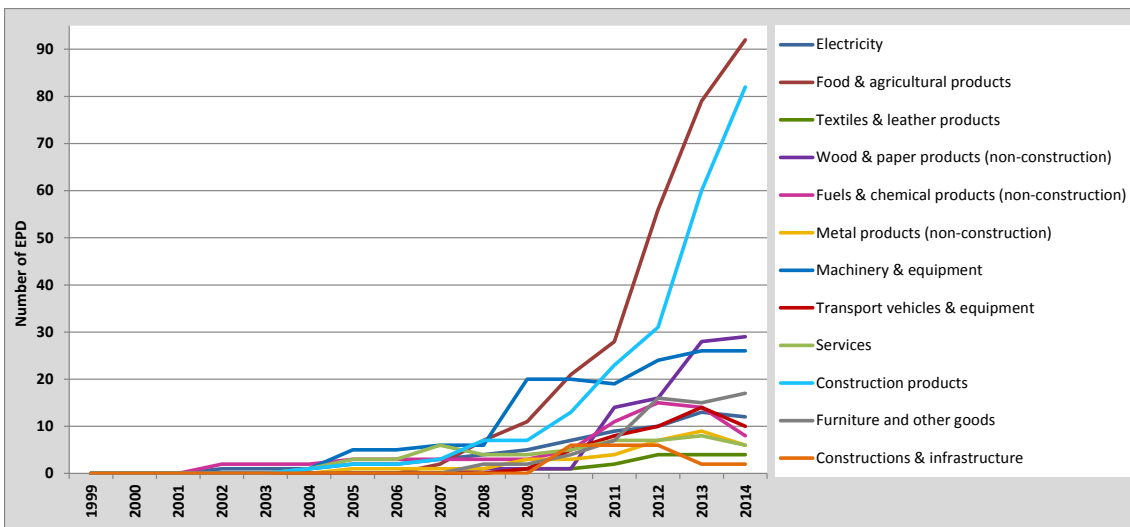


Figure 2. Evolución de las EPD emitidas anualmente desde la creación del programa

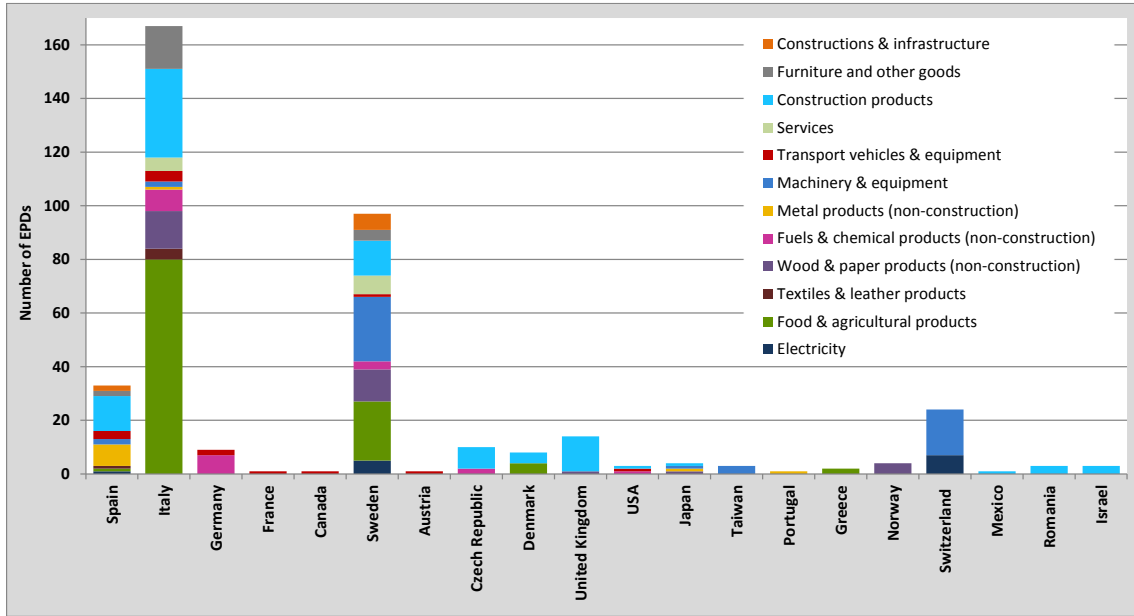


Figure 3. Relación de las EPD publicadas por países

Table 2. Características de la muestra (n = 55)

	Valor	Porcentaje
Año de fundación de la empresa:		
Before 1980	35	64%
1980-1984	3	5%
1985-1989	4	7%
1990-1994	6	11%
1995-1999	3	5%
2000-2004	1	2%
2005-2009	1	2%
2010-2014	2	4%
País de origen:		
Spain	8	15%
Italy	25	45%
Germany	1	2%
Sweden	11	20%
Czech Republic	1	2%
United Kingdom	2	4%
Taiwan	1	2%
Greece	3	5%
Norway	2	4%
Switzerland	1	2%
Categoría de productos:		
Electricity	3	5%
Food & agricultural products	11	20%
Textiles & leather products	2	4%
Wood & paper products (non-construction)	3	5%
Fuels & chemical products (non-construction)	1	2%
Metal products (non-construction)	2	4%
Machinery & equipment	6	11%
Transport vehicles & equipment	3	5%
Services	5	9%
Construction products	16	29%
Furniture & other products	3	5%
Constructions & infrastructure	0	0%
Facturación anual:		
0 - 0.6 M€	1	2%
0.6 - 3 M€	1	2%
3 - 6 M€	3	5%
6 - 9 M€	4	7%
9 - 12 M€	2	4%
12 - 18 M€	1	2%
18 - 30 M€	8	15%
More than 30 M€	32	58%
No answer	3	5%

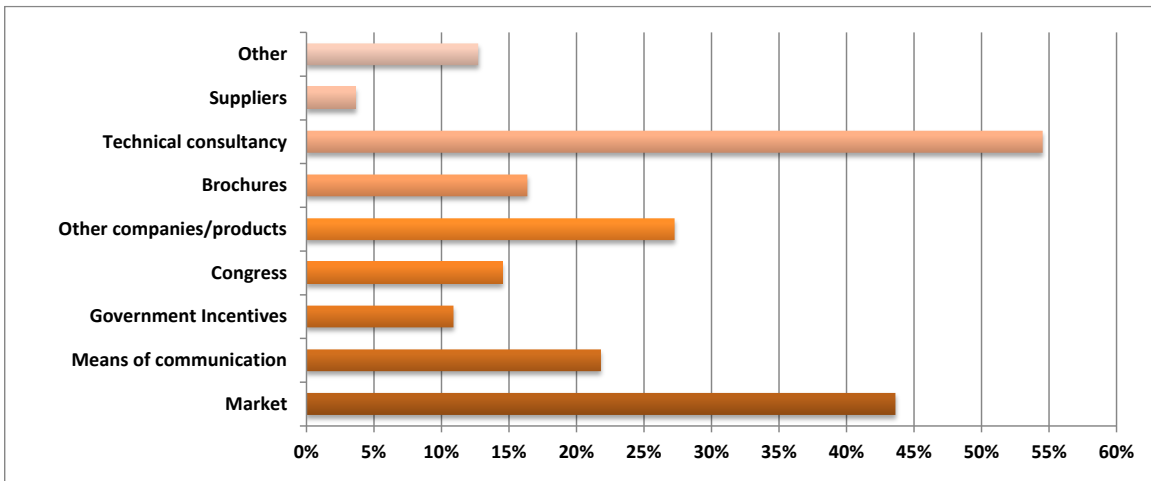


Figure 4. Canal de conocimiento de las EPD

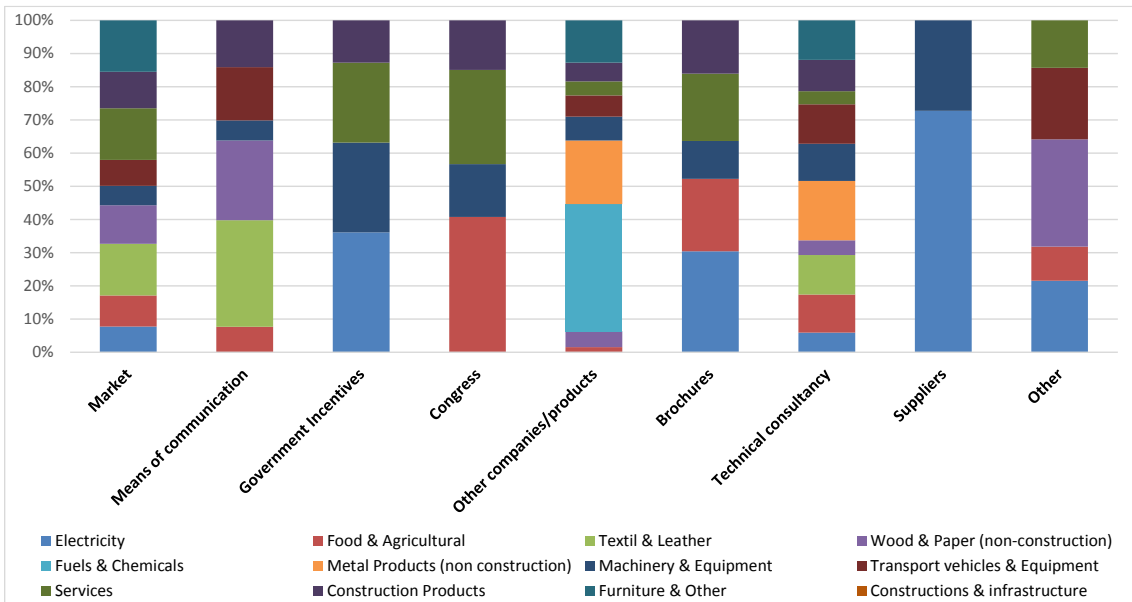


Figure 5. Canal de conocimiento de las EPD, por categorías

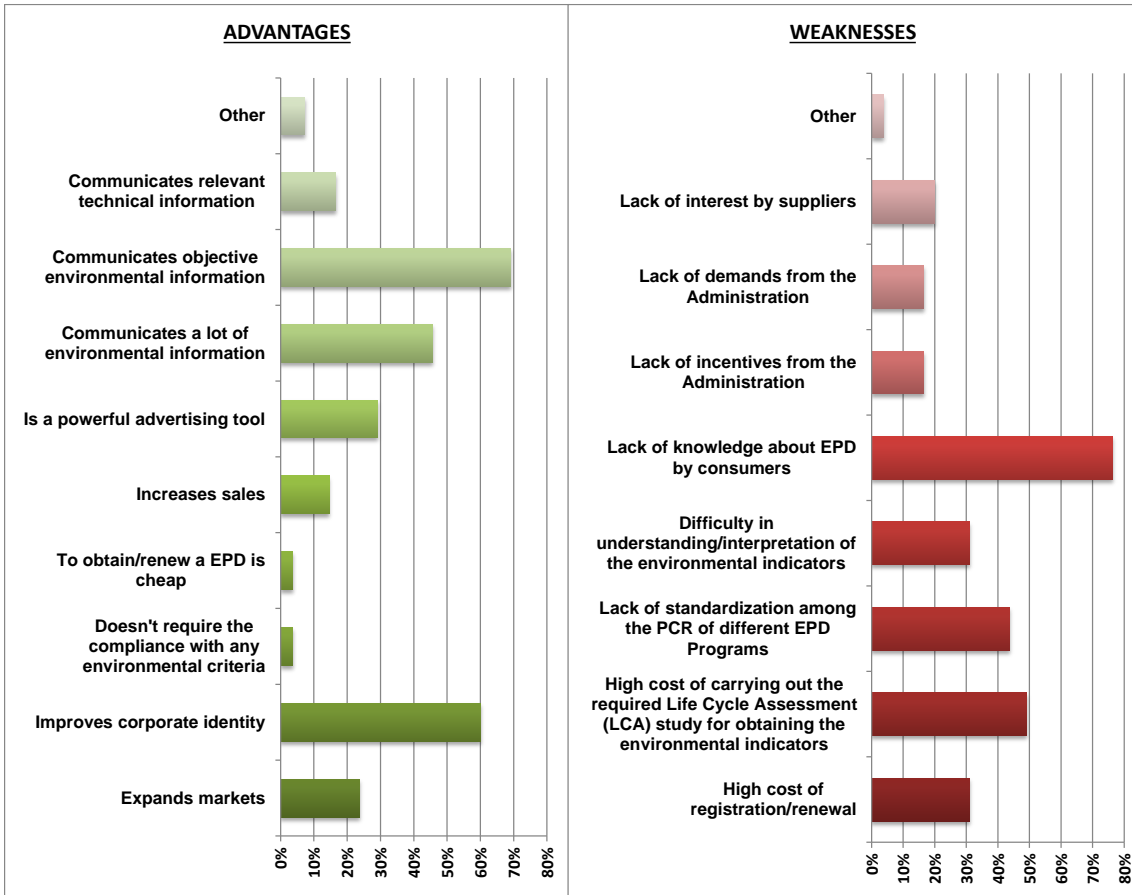


Figure 6. Ventajas e inconvenientes de las EPD

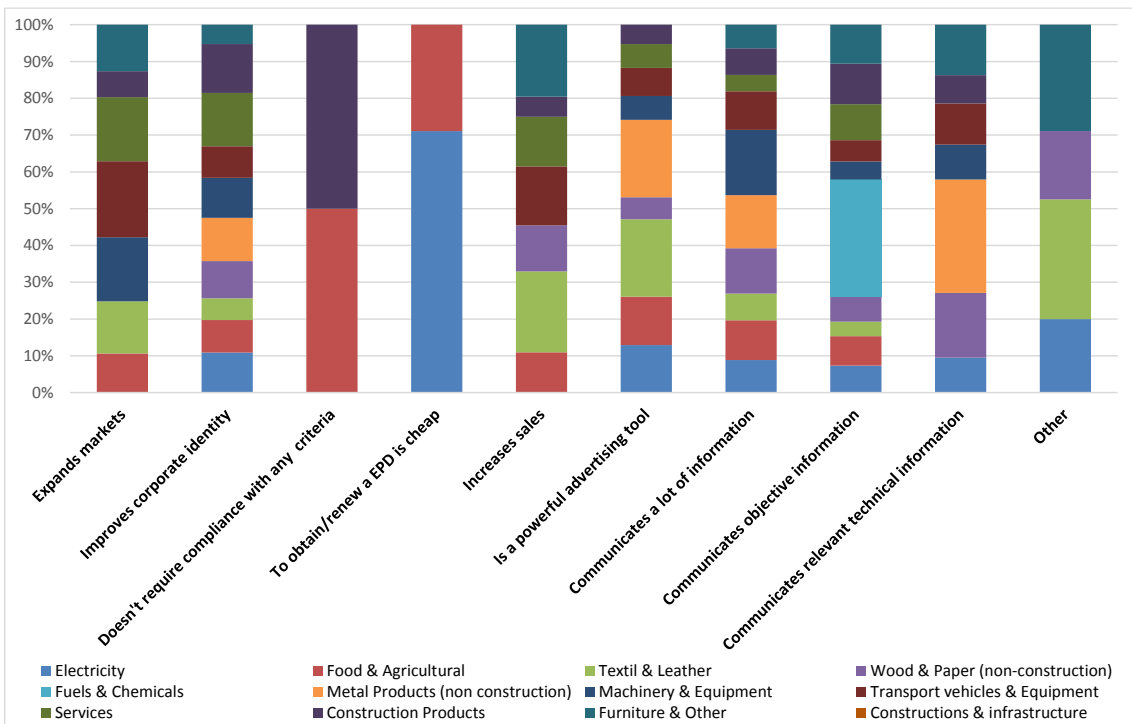


Figure 7. Ventajas de las EPD, por categorías

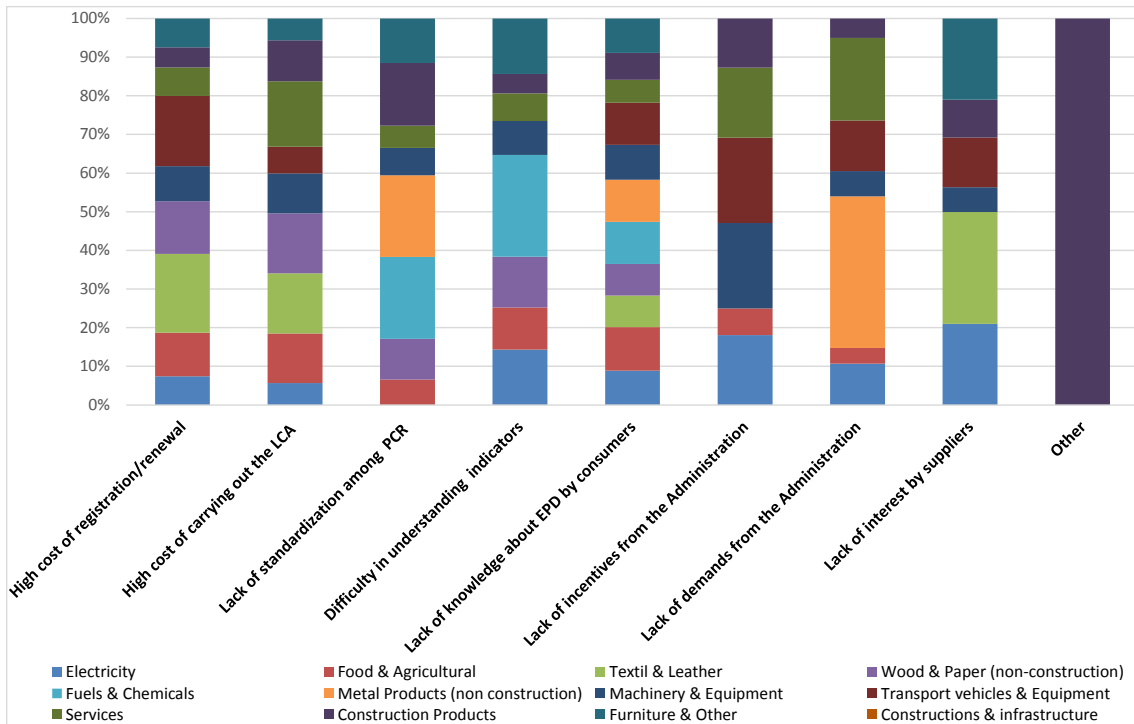


Figure 8. Desventajas de las EPD

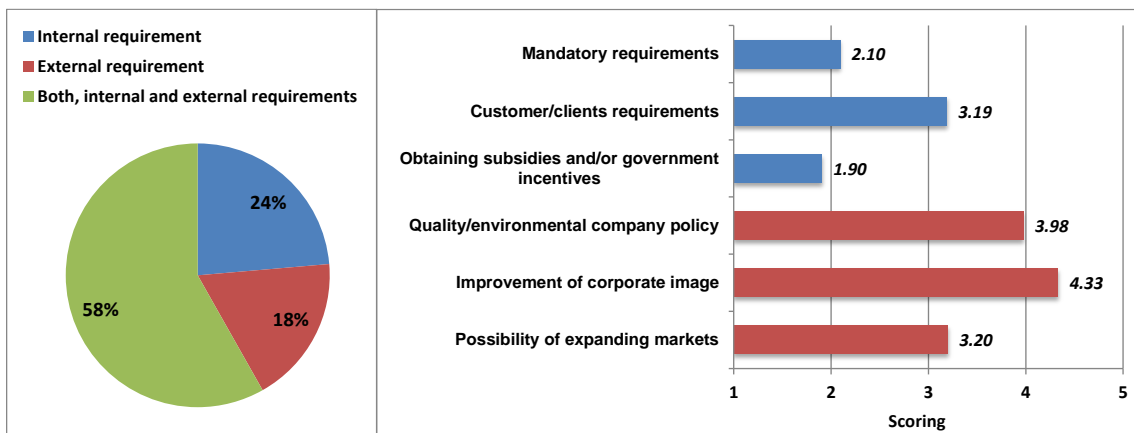


Figure 9. Factores influyentes para la adquisición de la EPD

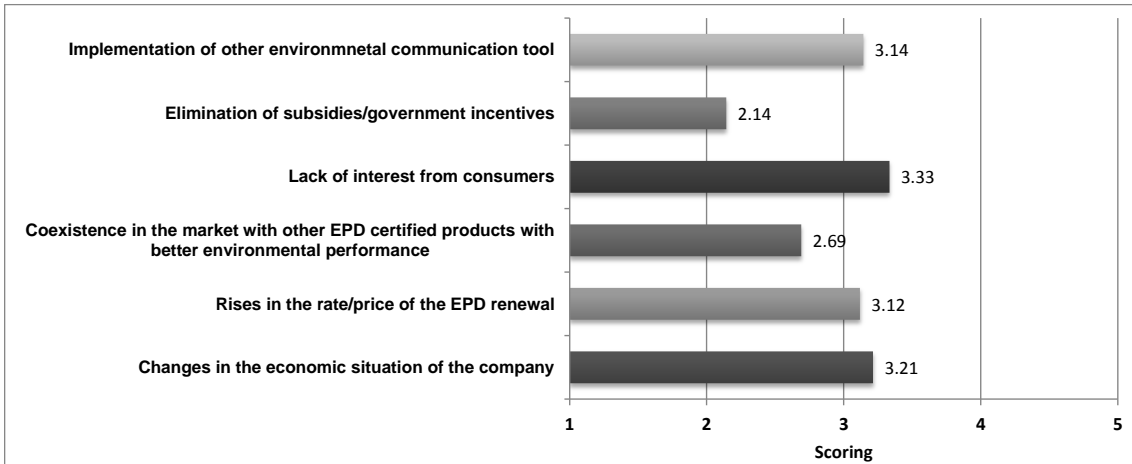


Figure 10. Razones para cesar la renovación de la EPD en vigor

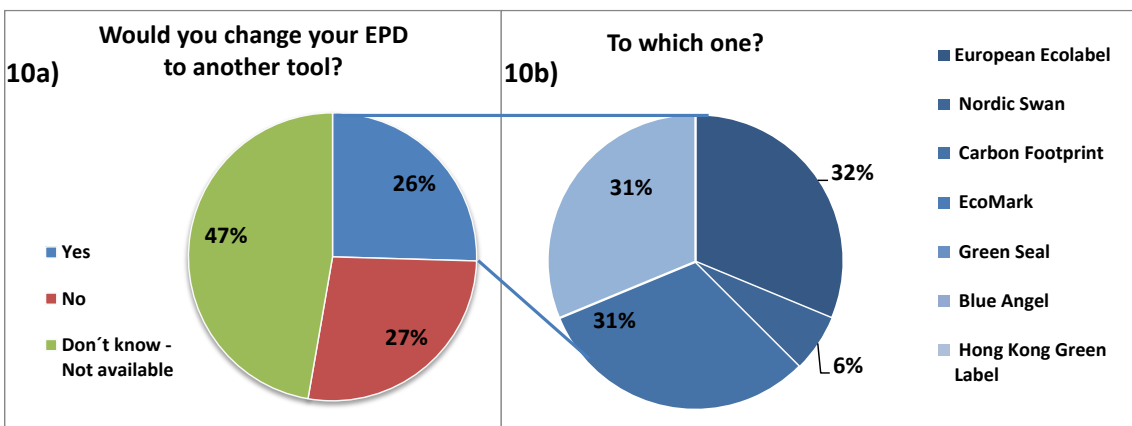


Figure 11. Factores influyentes para la adquisición de la EPD

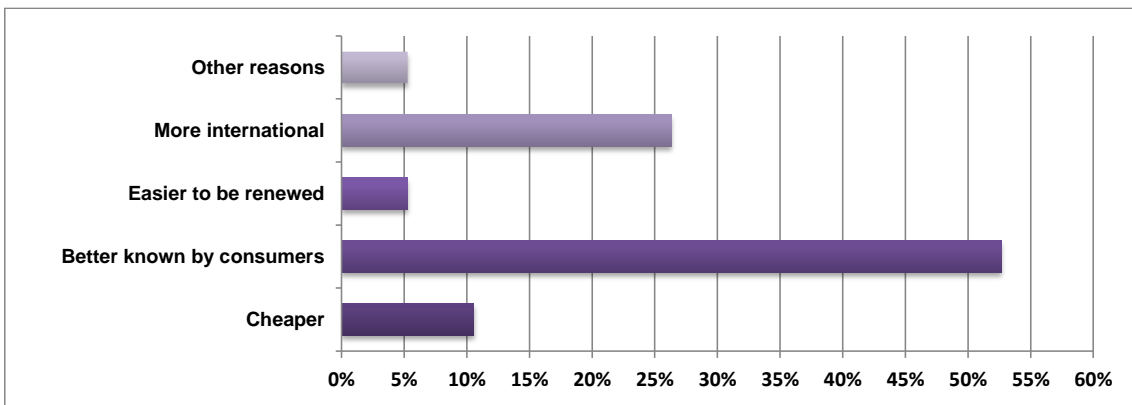


Figure 12. Motivos para cambiar de herramienta de comunicación ambiental