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## The impact of environmental intervention on business management: an empirical survey of its presence in the packaging sector in Spain and of results achieved

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Juan Ventura Victoria

University of Oviedo, Facultad de CC. Económicas y Empresariales,  
Avenida del Cristo s/n, 33071 Oviedo, Spain  
Fax: 34.985103045 E-mail: ventura@econo.uniovi.es

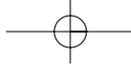
Federico Marbella Sánchez\* and  
Roberto Fernández Gago

University of Leon, Facultad de CC. Económicas y Empresariales,  
Campus de Vegazana s/n, 24071 León, Spain  
E-mail: ddefms@unileon.es  
\*Corresponding author

**Abstract:** This paper first reviews the theoretical basis or rationale underlying the environmental management of businesses in response to pressure from stakeholders, and more specifically the actions undertaken by government in environmental matters. It thereafter takes a quantitative look at the packaging sector with the aim of giving an idea of its size and the consequences that can arise from the use, recovery and treatment of the waste it generates. Once the regulatory framework introduced for packaging and packaging waste by new legislation has been analysed, consideration is given to the range of actions that the various agents involved have put in train with a view to adjusting their behaviour to the legal requirements. The paper ends with an overview of the economic and organisational logic ensuing, in the shape of forms of contract able to bring about an adequate level of collaboration, and by an analysis of various indicators of the quantitative efficiency of the systems set up to comply with the objectives laid down by the law.

**Keywords:** environmental regulations; integrated management systems; packaging; waste.

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**Biographical notes:** Juan Ventura Victoria is Professor in Business Administration at the University of Oviedo, Spain. He is the Director of the Institute for Enterprise Development (IUDE) within the University of Oviedo and has authored and co-authored several books and articles in Business Strategy.

Federico Marbella is currently Senior lecturer of Business Administration at the University of León, Spain. His background includes professional experience in the glass container industry.

Roberto Fernández Gago earned his Ph.D. degree at the University of León (Spain) where he lectures on management in the Faculty of Economics and Business. His research interests focus on stakeholder theory, corporate social responsibility and environmental management.

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## 1 Introduction

A desire to render economic growth compatible with ecological balance so as to achieve sustainable growth [1] in the economy lies at the base of the recent regulation of the packaging and packaging waste sectors. Approval of Directive 94/62/CE of the European Parliament and Council, together with the incorporation of this Community Directive into Spanish legislation with the passing of Law 11/1997, have brought in legal modifications of considerable impact, involving changes in the behaviours of the various agents who have a hand in the cycle of production and later treatment of the packaging used (reuse and recovery [2]).

The need to find a specific response to the new legal requirements has driven the agents affected to develop and install the logistical systems envisaged by the law for efficient management of the waste products from packaging used. In this way, an impulse has been given to the emergence of inter-sector associations among businesses and collaboration agreements with the various public authorities or layers of government, so that a dense network of relationships has grown up, the functions, activities and results of the introduction of which will be described and analysed in the course of this paper.

## 2 Environmental management of businesses as a response to pressure by stakeholders: the role of government

At present, the actions of businesses in relation to their environment can have very striking consequences for their survival and development, so that it is essential in many cases to set up a strategic policy targeted specifically on this point [3]. Such a policy can be expressed by greater or lesser commitment to the environment. In other words, it is possible to opt simply to comply with current legislation and existing societal expectations, or to choose policies that go further than both, which would be sure to have effects on the competitive position of a business [4]. In fact, according to Kleiner [5, p.38], 'today a

company does not expect to be considered environmentalist unless it is moving not only beyond the law but ahead of its industry and many of its consumers'.

The reasons touched on in the literature that are encouraging companies to introduce changes in the kind of relationship they have with the environment are of various sorts [6–8]. Pressure from groups outside the company is one that is particularly prominent. There is an ever-increasing demand from a range of sources for statements about the environmental actions undertaken by enterprises, and such a spreading of information through the various media available to firms will become more general in the immediate future [9]. This is accompanied by more active reactions to possibly irresponsible operations [10]. It is this pressure from groups with which businesses have connections that is frequently the justification for companies' actions. This is because in the absence of an external motivation, assuming nobody within the firm feels any need or interest in dealing with a matter, there would not seem to be any justification for change. Consideration of the role played by all those having some interest in an enterprise has taken the shape of the theory of stakeholders.

The process of identifying all the relevant stakeholders can yield different results in accordance with the topic being handled. Moreover, different firms may pick out different groups of stakeholders. The starting point must thus be that it is difficult to define the stakeholders in a company in a general way, especially since firms' fields of operations can vary very greatly.

If a stakeholder is taken to be 'any group or individual who can affect or is affected by the achievement of the firm's objectives' [11, p.25], then the definition is not realistic, as there are virtually no limits preventing anyone from being among the stakeholders. It is also unmanageable, because companies could not deal with all the information needed so as to take decisions relating to their stakeholders [12]. Each individual or group could affect or be affected by very different questions and to varying degrees of intensity. Hence, it seems appropriate to ring-fence the area of analysis to that of a given issue, and then to decide what specific interest or stake any potential stakeholder has in it.

Although for any given point under consideration there may well be an individual or group of stakeholders who are particularly involved, many topics cannot be assigned exclusively to a single group. In the specific case of the environment, it is possible to find authors choosing a wide-ranging view of stakeholders, for instance Polonsky [13], Rodríguez and Ricart [14, 15] and Rivera and Molero [16], or taking a more limited scope, as did Henriques and Sadorsky [17]. None of these saw it as a matter exclusively for one sort of stakeholder, as Clarkson had done [18] when he allotted it to those he termed 'public stakeholders'.

With a view to measuring the relative importance of each stakeholder of an enterprise, Mitchell *et al.* [19] carried out an identification process for stakeholders grounded in four variables: power, legitimacy, urgency and relevance. Fernández Gago [20] adapted these factors to the topic of the environment, stating that they cannot be evaluated in general terms, but have to be assessed as a function of particular points being considered. In this way four specific concepts emerged:

- environmental power covers the capacity and ability stakeholders have to ensure that a company adopts decisions in conformity with their environmental interests through the use of financial ‘sticks and carrots’, by direct application of force, through legal proceedings, or by affecting the company’s public image
- environmental legitimacy represents the extent to which environmental demands from stakeholders can succeed in being seen as appropriate by the company’s management team
- environmental urgency is determined by the weight assigned by stakeholders to their own environmental demands and the speed with which they press for them to be considered
- environmental relevance refers to the attention, time and priority conceded by the management to the demands concerned.

Table 1 shows the average values for each environmental factor’s rating in respect of interest groups for Spanish manufacturing businesses, in accordance with the empirical work set out in Fernández Gago [20,21]. It will be noted that no individual stakeholder was unanimously ranked with the maximum score of five or totally ignored by receiving the score of one. However, it is possible to detect some differences from one agent to another. On the average, the authorities, the government, is the stakeholder which by a long way those surveyed saw as having the greatest power to impose on businesses any environmental actions, as holding the greatest legitimacy to do so; their environmental requirements need most urgent attention, and they are the stakeholders with the strongest claim to be taken notice of and to receive priority than any other.

**Table 1** Average rating of environmental features for stakeholders

<i>Stakeholder</i>	<i>Power</i>	<i>Legitimacy</i>	<i>Urgency</i>	<i>Salience</i>
Owners	3.43	3.38	3.04	3.34
Government	4.07	3.63	3.45	3.68
Business associations	2.66	3.11	2.82	2.86
Customers	3.16	3.21	2.96	3.23
Local community	3.21	3.42	3.27	3.21
World community and future generations	2.99	3.40	3.14	2.95
Employees	2.90	3.22	2.94	3.10
Ecological groups	2.61	2.96	3.23	2.82
The media	2.91	2.71	2.83	2.71
Suppliers	2.19	2.53	2.32	2.35
Average	3.01	3.16	3.00	3.02

*Note:* Valid responses=277.

In the light of the special status held by different levels of government among stakeholders in a company when it comes to environmental matters relating to its business, it is appropriate to justify any need for them to intervene and to be aware of the tools they have at their disposal for intervening.

Businesses will not carry out all the activities that might interest society for the benefit of the environment, since they do not receive sufficient compensation from those benefiting. Likewise, they will tend to over consume and misuse natural resources because they do not have to pay all of those legitimately owning them. This leads to the concept of externality [22,23]. In such circumstances, only a part of the harm done or benefit accruing from a private action is reflected in the costs to be borne or the recompense received, which usually causes actions to go beyond the limits of, or not fully live up to, what is the best for society [24].

In some instances, the solution getting closest to the optimum for society may be attained through the free workings of the market and private negotiations between the parties concerned. However, it is often necessary for the government to play a more active part and for it to use the most efficient tools it has available, such as legislation and environmental taxes, to correct appropriately those externalities that the market is unable to manage, and so to reach the optimum for society as it emerges from a cost-benefit analysis.

Any environmental policy adopted by the authorities will in the first place imply the setting up of clear objectives indicating the level of protection of the environment they are aiming to achieve. These objectives will be embodied in indicators, which may be of two types. One type is primary indicators, which lay down key characteristics of the environment that it is intended to keep unchanged. The other is secondary indicators, which reflect which economic activities cause changes in the primary indicators. Once the goals set for secondary indicators are established and attained, achievement of the values imposed for primary indicators should be guaranteed [25].

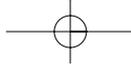
After primary and secondary indicators have been fixed, environmental policy must determine which are the tools to be used to reach the targets, by modifying or limiting economic activity in some way. The tools available for environmental policy are varied, but can be split into two major categories: direct regulation and economic or financial instruments, besides which there are other specialised forms of intervention.

Direct regulation is probably the most frequently used instrument for protecting the environment. Its function is to delimit the behaviours of individuals or institutions subject to the norms put in place. This regulation may be done either through specifying technological standards which must be adopted or through the establishment of operational norms which set a concrete objective for environmental quality but leave some freedom of choice as to the means and technologies to be used in moving towards this objective. Although this latter approach gives greater flexibility, any incentive to find and use 'greener' technologies disappears as soon as the norms have been reached.

In comparison with direct regulation, economic or financial instruments concede to agents a greater degree of freedom in order to adapt to a new situation, since they each carry out their own individualised analysis of the benefits or costs that their behaviours will bring, and opt for the solution which is most financially efficient for them. Obviously, the aim of such instruments is for this individual conduct to lead to the socially desired result.

Classifications that may be made within the category of economic tools for environmental policy vary. It is possible to pick out the following main categories [26–28]: refundable deposits, taxes, subsidies and transferable emission permits.

Besides direct regulation and economic instruments, it is possible to add two further types of intervention available in the framework of any given governmental policy: direct public investment and voluntary mechanisms. The first consists of commitment of public



funds to investments favouring the protection and improvement of the environment. As for voluntary mechanisms, it may be noted that on occasion, fundamentally through campaigns designed to inform and raise awareness, it is possible to modify firms' and individuals' behaviour in the interest of ecology, without either having to resort to the force of the law or to financial incentives.

As will be commented upon later, direct regulation and refundable deposits are the tools used most frequently by government when faced with the ecological problem posed by the constant increase in packaging waste.

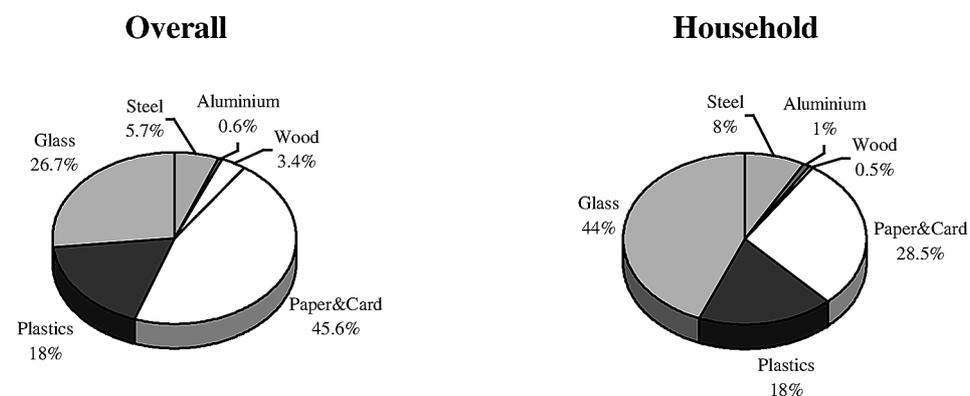
### 3 Quantitative approach to the packaging and packaging waste sector

The great size of the Spanish non-reusable packaging sector and the waste it generates is made plain by the data on consumption of such items, which at the end of the 20th century (1998) in Spain exceeded 100,000 million items, equivalent to 5.7 million tonnes.

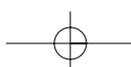
There are six main materials currently on the market for producing packaging: steel, aluminium, wood, paper or cardboard, plastics and glass. There are thus that same number of technological alternatives competing with each other to satisfy the needs of the various packaging industries. Each packing material competes with the others as a function of its capacity to create value for the customer and in terms of its relative costs. The various materials and the share of each measured in terms of weight are shown in Table 2. As will be noted, three materials dominate the market and must attract the greatest attention on the environmental and ecological level. These materials are paper or card, followed by glass and plastics, with a joint total market share reaching 90.3%.

**Table 2** Tonnes of non-reusable packaging entering the Spanish market (1998) (millions)

	<i>Steel</i>	<i>Aluminium</i>	<i>Wood</i>	<i>Paper/ cardboard</i>	<i>Plastics</i>	<i>Glass</i>	<i>Total</i>
Overall	325,951	33,876	195,946	2,598,385	1,029,200	1,523,239	5,706,597
Household	282,843	33,642	18,598	971,615	618,600	1,523,239	3,448,537



Source: ECOEMBES and ECOVIDRIO

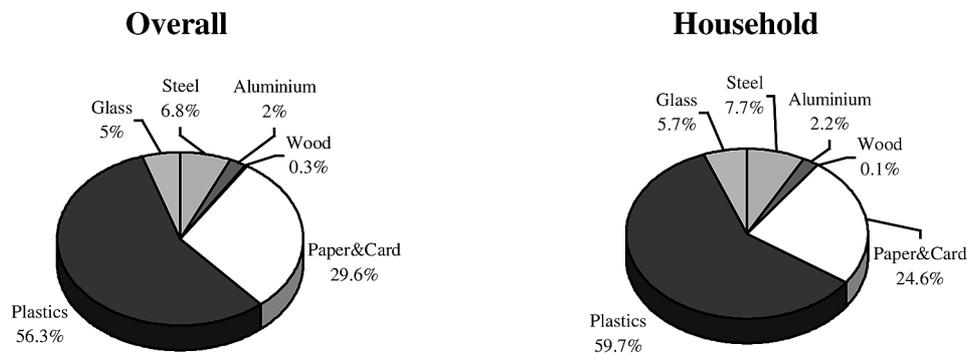


Of the total of 5.7 million tonnes of packaging sold, 60% correspond to household or domestic packaging and the rest to commercial or industrial uses. The split and relative weighting in tonnes of domestic packaging shown in Table 2 once again demonstrate, from a different analytic perspective, that the three materials in question (paper and cardboard, glass, plastics) maintain a predominant place in the market with a combined share of 90.5%. This confirms the importance of these materials in respect of their ecological impact.

If an analysis is based on totals of items, then as a result of the varying weights units of packaging can have, the ranking of materials changes, so that plastics take the first place, followed by paper and cardboard and then by steel (Table 3). A comparison with the data presented in terms of tonnes of packaging brings out the capacity plastics have to be used as containers whose weight, and thus whose consumption of resources, is much less than that of glass.

**Table 3** Numbers of non-reusable packaging items entering the Spanish market (1998) (millions)

	<i>Steel</i>	<i>Aluminium</i>	<i>Wood</i>	<i>Paper/ cardboard</i>	<i>Plastics</i>	<i>Glass</i>	<i>Total</i>
Overall	6,948	1,993	341	30,161	57,300	5,099	101,842
Household	6,901	1,987	46	22,129	53,700	5,099	89,862



Source: ECOEMBES and ECOVIDRIO

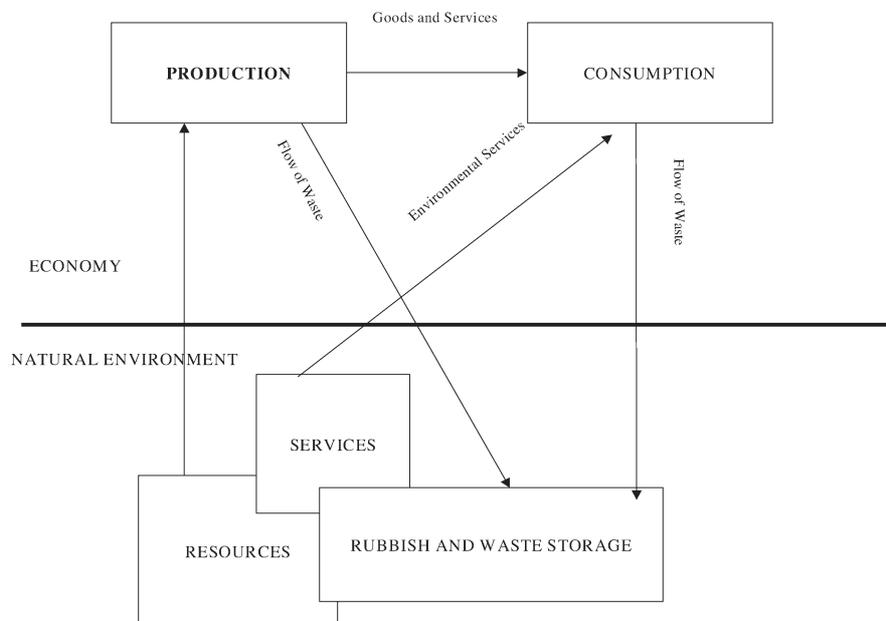
Moreover, of the 101,842 million units of packaging a large percentage (88%) relates to the household packaging market, in which similar weightings by packaging material to those in the market as a whole apply.

The quantitative approach outlined, whether by total weight or by units, shows how important this sector is in respect of waste generation and justifies intervention by the authorities to minimise the impact caused.

#### 4 Regulatory framework for packaging and packaging wastes

Despite the tendency to deregulate economic activities and to trust to the market's capacity to assign resources efficiently, there is no doubt that the impact on the environment of business activities constitutes, and will continue to constitute in the new millennium, an area subject to heavy regulation. As Common notes [29], the first function of the environment is to provide natural resources for productive processes, the second consists of absorbing the waste and residues generated by economic activity, even if this must remain within the limits of its capacity to assimilate them, and finally the natural environment offers services such as enjoyment of nature and, what is most important, it constitutes the basis for life (Figure 1).

**Figure 1** Environment and economy



Source: Adapted from Common [29]

Packaging has numerous advantages but in both its manufacture and its later use, through becoming waste material, it provokes environmental problems. Packaging affects the environment as it goes through each and every one of the stages that make up its lifecycle, generating negative externalities, such as damage to the surroundings, occupation of physical space, using up the limited capability of nature to absorb waste harmlessly and reduction of its capacity to generate resources and for renewal. These put at risk all three of the functions of the natural environment, although hitherto the greatest emphasis has been laid on the limited capacity for storing waste and residues.

As has been pointed out above, the presence of these externalities justifies regulation of activities generating them. In order to find solutions for the environmental problems caused by packaging and packaging waste and also to guarantee the proper functioning of

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the intra-Community market by removing commercial barriers arising from unharmonised national legislation, Directive 94/62/EC of the European Parliament and Council was approved. This norm replaces Directive 85/339/EEC of the Council, relating to packaging for beverages. The latter's principal shortcomings were, on the one hand its restricted character, as it was limited to a single type of container, those for consumable liquids, which constitute only a small percentage of the total of urban waste, and on the other, the great leeway allowed to member states in bringing it into national legal frameworks [30].

Directive 94/62/EC is built around three priorities: first, prevention; second, reuse, recycling and other forms of recovery; and third, safe disposal of non-recoverable residues. Transfer of the Community Directive into Spanish legislation led to approval of Law 11/97, of 24 April 1997, on packaging and packaging waste [31]. The quantifiable objectives imposed by this legislation in terms of minima and maxima to be met before July 2001 were:

- *Recovery of between 50% and 65% by weight of waste packaging generated*
- *Recycling of between 25% and 45% by weight of waste packaging, with a minimum of 15% for each material*
- *Reduction by at least 10% of the total weight of waste packaging generated [32].*

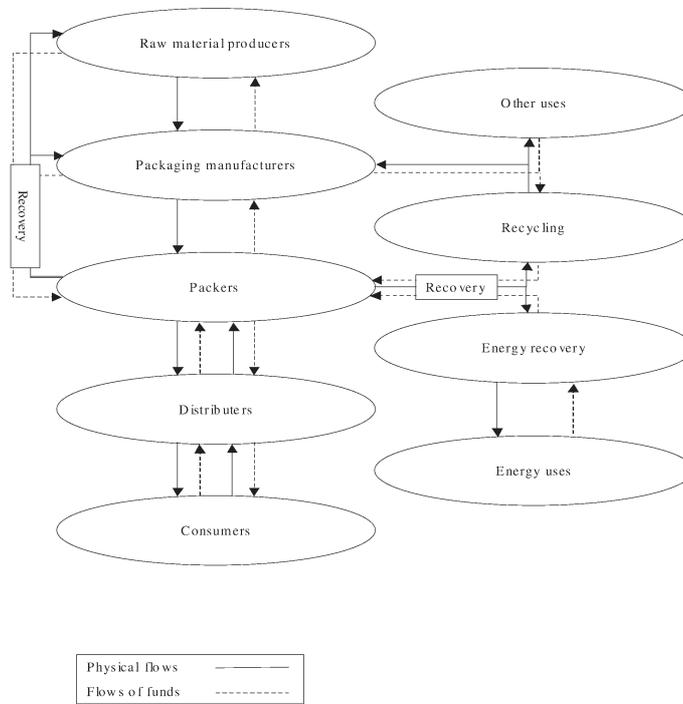
## **5 Organisational and logistic systems for managing packaging and packaging waste**

In order to reach the objectives established for recycling and recovery, Law 11/97 sets out and gives guidelines for two possible alternative systems for managing waste. The first, known as *Deposit, return and refund*, is established as obligatory if agents are not voluntarily integrated into the second system, termed an *Integrated packaging waste and used packaging management system (IMS)*. The basic idea is that every piece of packaging sold in Spain must belong to one of these two systems [33], although there are a number of exclusions such as those relating to reusable containers (for beer, soft drinks and mineral water). In their case, the packer, bottler or canner is required to hand them over to a collection and recovery centre only when the packaging item has ceased to be in reusable condition. This system for reuse has its origins in two ministerial orders [34] regulating its operation and has achieved a significant development in the catering trade, but this aspect is not an object in this paper [35].

### *5.1 Deposit, return and refund system*

Under this system, packers and sellers of the packed products are obliged to charge a given amount by way of deposit on each item sold, and also to use a specific identifying symbol, both aspects being established by the Order of the Spanish Ministry of the Environment of 27 April 1998. These economic agents, packagers and sellers, must also repay the deposit charged to customers when the latter return the item, with no right to refuse to accept it, if it is of a format and make sold by them, unless there is an arrangement for precise identification of their items and the one being presented for refund does not match this identification. Finally, the last holder of the item must hand it over for reuse, or, where applicable, to an authorised collecting, recycling or recovery operator.

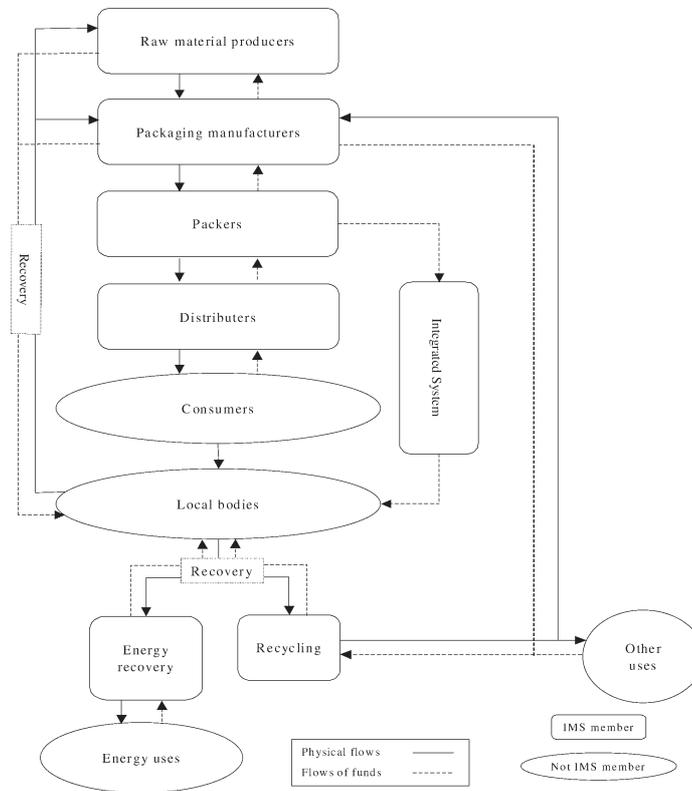
Figure 2 System for deposit, return and refund



Source: Authors' own work

### 5.2 Integrated packaging waste and used packaging management system

As opposed to the deposit, return and refund system, conceived in principle as an obligatory arrangement, there is an alternative for packers and sellers of packed products, which is participation in an integrated management system.

**Figure 3** Integrated management system

Source: Authors' own work

An integrated management system, with a geographically defined area of application, is constituted as a non-profit incorporated body by the economic agents belonging to the sectors involved, but not including government or consumers. Funding for the system is obtained from the packers [36] through a levy fixed individually for each type of package. This money is used to compensate the authorities for the extra costs arising from the selective waste collection needed to allow later recycling or some other form of recovery. Firms joining this system are authorised to use on their packaging a symbol indicating they belong to this arrangement, known as the green dot, and this exempts them from the deposit, return and refund system previously described.

### 5.3 Comparative efficiency of the two systems

The deposit system presupposes a multiplication of transactions among the agents along the chain of production, these taking place not just downstream as the product moves towards the end user, but also upstream as consumers return packaging for recovery. The increased number of transactions implies a loss of efficiency, and to this is added the need to invest in the physical space necessary for storage of empties on their return journey.

In view of the frequency of such transactions, it becomes advisable to replace one-to-one relations between independent economic agents with a centralised organisation in which all the agents involved participate. In other words, the setting up of an IMS reduces the number of transactions and permits specialisation in functions, although for this it is necessary to attain integrated management systems capable of reaching a size and extent ensuring the achievement of economies of scale and range.

In principle, it would be possible to think along the lines of creating a management system for each of the packaging materials used and for each of the Spanish Autonomous Communities, but this in turn would involve a larger number of transactions and an increase in the management costs. It should be borne in mind that many packing companies use containers of various materials, which would oblige them to belong to all the appropriate integrated systems (or for compensation arrangements to be put in place between them whenever one of them took care of handling a container linked to an affiliate of some other association), and moreover a great many of the packing, canning and bottling firms compete at a national level, so that there should be the best possible fit between the sphere of operations of the firms and that of the integrated management systems.

Furthermore, the bigger the number of IMSs, the larger the number of contacts and negotiations there will have to be between the systems and the authorities, relating principally to the concession of authorisations for the systems on the part of the Autonomous Communities and the signing of collaboration agreements with local bodies to arrange for selective collection and transport to recycling or recovery centres of the packaging waste.

In consequence, to ensure efficient solutions through the design of integrated management systems it is necessary to keep their number sufficiently small so as to gain the advantages of an optimum size, reducing transaction costs and providing quality integrated packaging waste management services to the businesses and public authorities involved.

## **6 Solution adopted in Spain: integrated management systems (Ecoembes and Ecovidrio)**

Once legislative intervention had occurred, the economic agents in Spain adopted a clear stance in preference for the creation of integrated management systems rather than deposit, return and refund systems. As a result, two nationwide integrated management systems of relevance were created, in which producers of raw materials and packaging, packers, bottlers, canners, importers of ready-packed products, distributors and recovery firms all participate. These systems are called Ecoembalajes España, S.A. [Ecopackaging Spain, plc] (Ecoembes) and La Sociedad Ecológica para el Reciclado de los Envases de Vidrio [The Ecological Company for Recycling Glass Containers] (Ecovidrio) [37].

The explanation for this result is to be found both in the legal requirements and the willingness of the agents involved to implement them and in the savings to which this approach leads. On these lines, glass manufacturers had already developed a system for selective collection of glass containers, spurred on by the possibility of achieving production efficiencies, in the sense that glass constitutes an input, which because of previously having gone through a production process, is in a purer state, permits higher utilisation rates and savings in energy use in kilns, while simultaneously prolonging the economic

life of certain basic assets in the producer industries. It is clear that regulatory intervention in the activities of prevention, reuse and recovery with the objective of cutting down on negative externalities has given an impulse for greater development and installation of an organisational and logistical system for managing packaging and packaging waste. However, it is no less true that these activities in themselves bring about greater internal efficiency [38,39] in the glass container industry. In consequence, it may be stated that for the glass sector the industry, partly on its own initiative and partly in order to fulfil the regulatory norms from time to time imposed [40], has run ahead of the requirements of the new environmental legislation on packaging, through having designed and put into operation a selective collection and recycling network set up by ANFEVI (Asociación nacional de fabricantes de envases de vidrio [National Association of Glass Container Manufacturers])[41].

It is also appropriate to mention the efforts to promote recycling systems that have been undertaken by firms using packaging materials other than glass, although their development has not been so striking as in the case of the latter, principally for economic reasons.

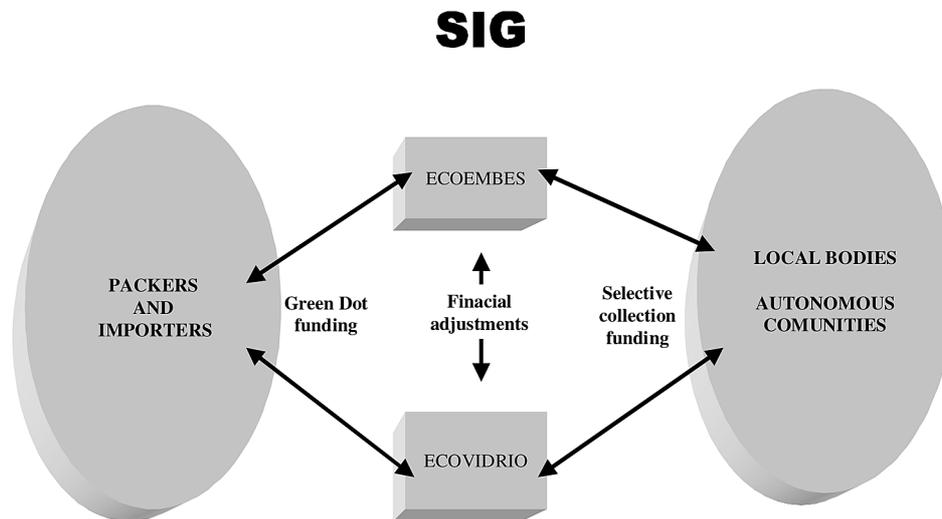
Ecoembes was set up in November 1996 as a non-profit limited company, with the aim of designing and running an integrated management system. This company is the larger of the two [42], as measured in quantities handled, and its sphere of operations covers all packaging materials except glass, which is the preserve of Ecovidrio. These two enterprises share the same general mission, which is to comply with the objectives stated in Law 11/97 of April 1997 concerning packaging and packaging waste and differ only in:

- the stated aim of the IMS each runs
- the main origin of their members (firms with greater connections to glass packaging will belong to Ecovidrio, those principally involved with other types of materials form the shareholder base for Ecoembes).

The contractual relationship of these businesses with their members is characterised by not exempting any of them from the principle of joint responsibility in fulfilling the objectives set, even though there may be distinct categories of members and these may be from different parts of the lifecycle of the packaging within each category.

## **7 Organisational design: accords**

From the overview offered it is clear that the new legislation of necessity involves changes in the conduct of the various economic agents affected so as to reach the environmental targets envisaged. Moreover, these changes are characterised by bringing in a large number of firms (packers, bottlers, canners, importers, trade distributors, raw material producers, packaging manufacturers and recyclers) as well as public bodies (Autonomous Communities, Local Government and the Ministry of the Environment), which increases their complexity and renders any harmonisation of interests difficult, as these do not always coincide. There is thus a need to come up with cooperative solutions capable of integrating different objectives through a system of voluntarily adopted accords, whose ultimate goal must be fulfilment of the new legislation while simultaneously finding organisationally efficient solutions.

**Figure 4** Agreements initiated by the IMSs

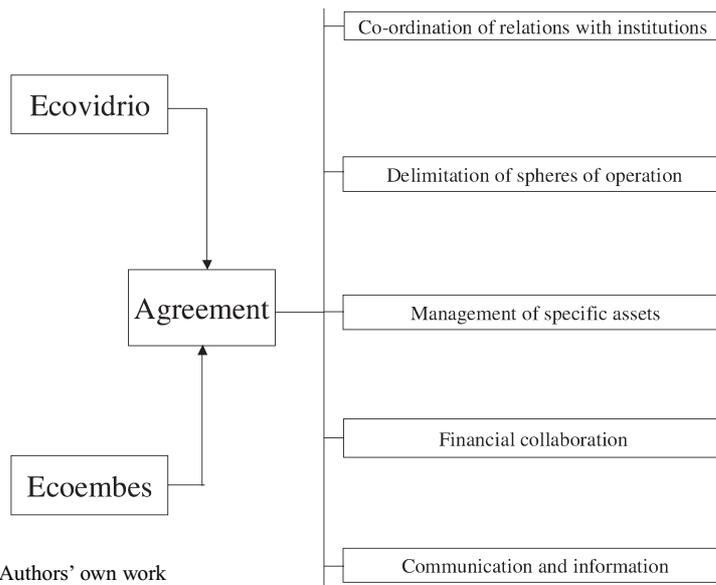
Source: Authors' own work

As detailed in Figure 4, three types of agreement developed in Spain can be considered the consequence of setting in train of the two integrated management systems described above: those governing relations between each of the two IMSs (Ecoembes and Ecovidrio) and packing and importing firms, those covering the relationships of Ecoembes and Ecovidrio with local government or the Autonomous Communities, and those regulating collaboration between Ecoembes and Ecovidrio.

- Accords linking Ecoembes and Ecovidrio with packers and importers put in place a contractual relationship through which the two IMSs permit packers and importers incorporated into their respective management systems to use the Green Dot symbol, and commit themselves to manage provision of packaging waste recovery services in exchange for a financial contribution intended to fund the system [43]. This relationship can be described as an agency arrangement whereby Ecoembes and Ecovidrio become agents for the packing and importing firms, who are the principals in the relationship and delegate to the two bodies the management of services for the recovery of packaging waste. They are thus instrumental non-profit bodies, whose members are also their customers [44]. In consequence, they may be characterised as mutual-interest non-profit-making organisations, as they have been constituted solely to satisfy their members' requirements in environmental matters. The setting up of these bodies can also be interpreted as a cooperation agreement, whereby a group of firms associate to create a new entity legally independent of them. On that basis the accord can be seen as a joint venture, where congruent objectives and the need to respond to the legal requirements justify their establishment, with the intention of reaching a size sufficient to reduce the transaction costs and allow the exploitation of possible economies of scale and range [45].

- Secondly, Ecoembes and Ecovidrio make agreements with local government and Autonomous Communities for selective management of packing wastes. This sort of accord can be defined as subcontracting agreements (vertical accords). In them, Ecoembes and Ecovidrio, principals in the relationship, come to an agreement with the local body or Autonomous Community as agent so that the latter will take on the job of selective collection of packing waste and used packaging close to the homes of consumers and then transfer it to treatment, or, where appropriate, recycling or recovery centres which belong to the integrated system. In exchange, Ecoembes and Ecovidrio give a commitment to cover the difference in costs between the normal system of collection, transport and treatment of rubbish and solid waste at a controlled tip and those arising from an integrated management system. In this sense, the two IMSs perform a task as financial intermediaries between each member firm and the local or regional authorities. The effectiveness of this kind of agreement grows as these authorities create consortia capable of handling solid urban waste, as on the one hand a minimum efficient size for the activity is reached and on the other the transaction costs regulated by this type of accord are reduced.
- Finally, Figure 5 outlines the collaboration agreement between Ecoembes and Ecovidrio. This horizontal accord regulates the relationship between the two integrated management systems that have developed in Spain. It is an agreement between two bodies of similar standing or rank and has as its general aim to encourage fulfilment of the law on packaging and packaging waste. This agreement covers the following points: coordination of the relations of the two IMSs with public institutions, definition and division of the sphere of operations of each of the IMSs, and finally collaboration over funding and commitments to share internal and external information.

**Figure 5** Collaboration agreement between Ecoembes and Ecovidrio

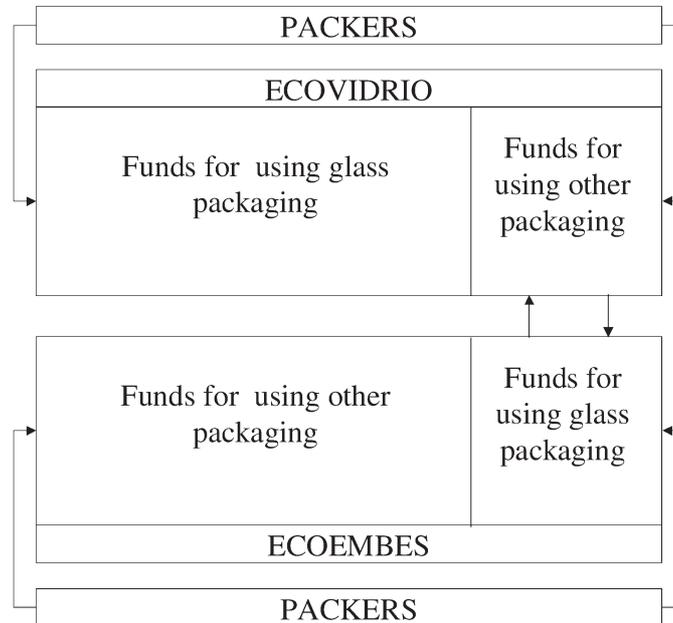


Source: Authors' own work

In respect of coordination of relations between the two IMSs and institutions, although both bodies recognise their independence from each other to act in their respective areas of competence, the accord notes that relations with the central government and with those of the Autonomous Communities should be based on coordination of the institutional links maintained by Ecoembes and Ecovidrio [46]. Such joint work concentrates on coordinated actions towards the Autonomous Communities to achieve a geographical share out of zones of operation, to participate in the drawing-up of a national programme for packaging waste and used packaging and to advise the respective communities in a coordinated way on the design of plans for waste management. This coordination avoids duplication of effort and reduces the costs relating to these matters.

With regard to the sphere of operations, the accord delimits the field of activity for each Integrated Management System, or to put it simply, the market is divided up as a function of packaging type. Thus, Ecovidrio is to have as its area of actions everything relating to glass containers and Ecoembes is to be responsible for all other types of packaging. However, by virtue of the agreement subscribed to by the two systems, an enterprise belonging to Ecovidrio which uses other types of packaging is permitted to assign them to Ecovidrio, subject to the agreements for financial collaboration and fund transfers described below, and vice versa. Furthermore, the accord lays down that the network of containers intended for collecting glass, items of packaging that fall under the control of Ecoembes will be accepted, as well as those directly assigned to Ecovidrio and the converse will apply in case of the network of bins designated for the collection of materials other than glass, which will accept, not just the packaging directly assigned to Ecoembes, but also items falling into the category handled by Ecovidrio. This formula for collaboration permits more efficient exploitation of specific assets, in the form of the networks of bins and containers provided for different types of packaging [47], avoiding duplications that would obviously signify inefficiencies in the management of collections.

Agreements about use of the networks of containers require the presence of a financial accord. Through an agreement for financial collaboration, any funds obtained by Ecovidrio from its member businesses that come from packaging other than glass must be transferred to Ecoembes. In their turn any funds accruing to Ecoembes from enterprises that are its associates and are derived from glass containers are to be handed over to Ecovidrio (Figure 6). This financial collaboration between equals gives rise to just two transactions instead of the multiple operations that would be necessary if there were no such collaborative link. It is maintained on the basis of a mutual obligation to inform about the origin of funds transferred.

**Figure 6** Financial collaboration agreements

*Source:* Authors' own work

Finally, the accord also regulates the obligations to communicate data and provide information, covering the following lines of action:

- both systems, whether individually or jointly, if this is deemed appropriate, will provide to the competent authorities the information needed to show the degree of compliance with the objectives required by the law and will request confirmation of this compliance
- both systems will participate in and finance proportionally the cost of informative actions of a general nature and those intended to encourage collaboration by the general public and by other economic actants in the processes of selective collection.

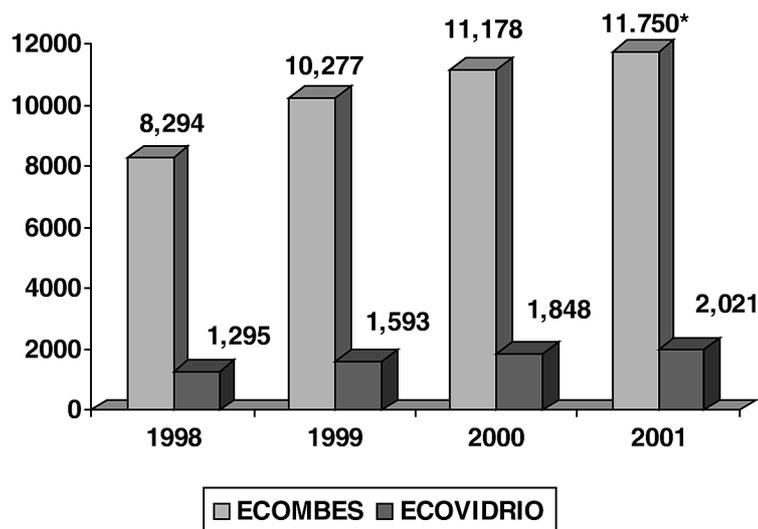
## 8 Results of the establishment of IMSs in Spain

The analysis of their quantitative environmental impact runs over a set of factors affecting the various companies concerned in different ways, depending on the part they play in the packaging management chain. On this point, it should be made clear that for some factors (number of companies affiliated, number of agreements signed, fulfilment of legal objectives, and so forth) the information available is extensive and consistent while for other features related to habits and behaviours among the population only very general lines can be appreciated. In any case, analysis of the information to hand does allow

evaluation and measurement of the impact caused by the norms put in place and the relative efficiency of the two integrated management systems set up in response to them from early 1998, when compliance with them was first required, up to 2000.

One initial form of impact of the environmental standards is reflected in the tendency to join on the part of enterprises which is made plain by the evolution in the number having signed the relevant contract to affiliate to the integrated management systems. In the case of the Ecoembes IMS, in 1997 the number of firms that had joined was 2,540, and further affiliations came rapidly, so that by the end of 2000 the figure had reached 11,178. For the Ecovidrio IMS the pattern is also of considerable growth, close to 60% between 1998 and 2001. It is plain that for both IMSs the response to the legal requirement has been to join up in significant numbers, with the Ecoembes IMS having the broader base (Figure 7). On the other hand, it should be recalled that Ecovidrio inherited the advances in glass collection that derived from the formation of ANFEVI in the early 1980s.

**Figure 7** Businesses associated with IMSs

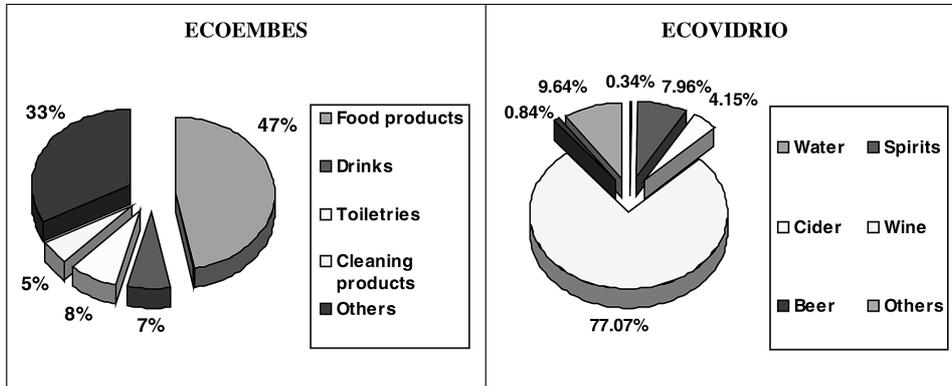


\*Forecast

Source: ECOEMBES and ECOVIDRIO

The degree of affiliation of businesses to the IMSs by sectors of activity is shown in Figure 8, with a large number of firms from the wine-bottling trade being a noteworthy feature for Ecovidrio and for Ecoembes the strong presence of businesses from the food and drink industry.

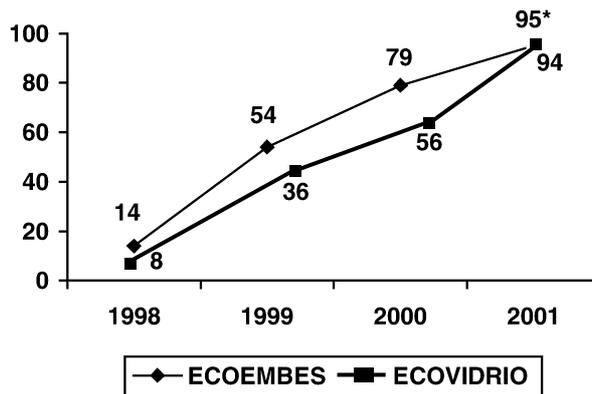
**Figure 8** Businesses joining IMSs by sectors of activity (2001)



Source: ECOEMBES and ECOVIDRIO

A second manifestation of the impact of the norms and of the effectiveness of the setting up and operation of the IMSs is reflected in the change and strong growth in the number of framework conventions signed with the autonomous governments and of collaboration accords with local bodies (Figure 9). This indicator shows active behaviour and interest in complying with the legal requirements, both on the part of the various levels of government and on that of the two IMSs. Although the starting point in 1998 was a small number of conventions (14 for the Ecoembes sphere of operations and eight for Ecovidrio), forecasts are of around 95 in 2001 for both IMSs, indicating a similar geographical and population coverage for both systems and reflecting noteworthy growth.

**Figure 9** Agreements signed with local, regional and national governments

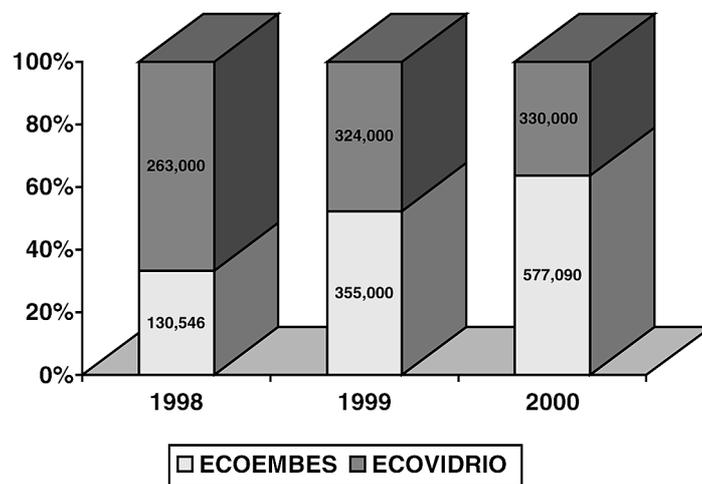


\*Forecast

Source: ECOEMBES and ECOVIDRIO

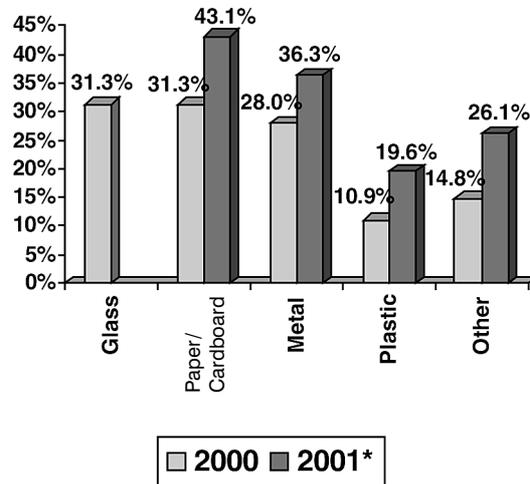
Finally, it is possible to observe the impact that the setting up of the IMSs is having in respect of protection of the environment. On this point, recycling of glass items through Ecovidrio that have come from containers and bins has gone up, rising from a recovery rate of 17.27% in 1998 to 21.48% in 2000, and this percentage climbs to 31.3% if one includes waste glass from bottling plants and collection from large sources such as schools and supermarkets. In the case of Ecoembes, the average recycling level was 4.8% in 1998 but rose to 23.8% in 2000, while the recovery of energy went up from 9.1% to 16.4% over the same period. Thus, in relative terms it is the increase in the contribution by Ecoembes to waste recovery in Spain that stands out most (Figure 10).

**Figure 10** Tonnes of packaging recovered (through IMSs)



Source: ECOEMBES and ECOVIDRIO

The figures available relating to recycling rates by materials (Figure 11) and the efforts being made to reduce the weight of packaging items lead to foreseeable compliance with the legal minima established and give well-founded expectations for continued improvements in the treatment of packaging and packaging waste in Spain.

**Figure 11** Recycling rates (through IMSs)

\*Forecast

Source: ECOEMBES and ECOVIDRIO

## 9 Conclusions

The analysis carried out makes clear what influence stakeholders in environmental management can have, the quantitative importance of non-reusable packaging and waste arising from it in Spain (plastics, glass, steel, aluminium, wood, paper or cardboard) and the environmental problems and ecological consequences they have over their lifecycle. It was in response to this pressure and with the aim of reducing environmental impacts that Directive 94/62/EC European Parliament and Council was approved, as was the incorporation of this community directive into Spanish legislation through Law 11/97, introducing major changes in the competitive surroundings of the businesses affected.

The law basically envisages two options or waste management systems: a deposit, return and refund system or an integrated packaging waste and used packaging management system (IMS). Comparative analysis of the efficiency of these two systems permits the conclusion that the advantages lie with integrated management systems, in view of the inefficiencies the first type offers both because of the multiplication of transactions and as a consequence of the investments in physical space needed for storage of packaging on its return route.

Preference for IMSs requires an organisational design capable of offering integrated services to businesses (presence throughout the nation and coverage for all types of packaging) and an optimum size able to take advantage of economies of scale and range. To put it in other words, as the basic function of IMSs consists of serving as intermediates or a shared nexus between packing companies and public institutions, an excessive fragmentation, whether by materials or by territorial limitations, would bring with it a loss of efficiency due to the duplication of investments and an increase in the total number of transactions.

The solution adopted in Spain, involving the setting up of just two IMSs, Ecovidrio (for glass containers) and Ecoembes (for all other packaging) has contributed to the achievement of targets for efficiency and integrated services for firms. To make this solution work it has been necessary to establish a collaboration agreement between the two systems, permitting companies to subscribe to a single system even if they use more than one type of packaging material for distributing their products.

This article concludes with an analysis of various quantitative indicators for the results achieved through the establishment of the IMSs from the early months of 1998, when the new legal requirements came into force. On this point, a high level of efficiency can be noted, demonstrated by the striking increases in the number of firms incorporated into the IMSs, the wide territorial and population coverage attained and the favourable evolution of the rates of recycling and recovery of the various packaging materials used.

### References and Notes

- 1 The term 'sustainable growth' was introduced in 1987 by the World Environmental and Development Commission of the United Nations to refer to growth that satisfies the needs of the present generation without putting at risk capacity for future generations.
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- 21 The business directory used was *Duns 50,000 Principales Empresas Españolas – 2001* [Duns 50,000 Principal Spanish Businesses – 2001], with 2,120 manufacturing companies being selected for distribution of a questionnaire to their environmental representative or managing director. The data collection process was carried out between the months of April and July of 2001, with a total of 277 valid responses being received, implying a sample error of plus or minus 5.95% with a 95% confidence level.
- 22 A certain type of favourable or unfavourable effect, produced by an economic agent (an individual or a business) on the production, income, leisure, wealth or welfare of another economic agent, such that current technology, customs or laws do not permit the payment or receipt of a price for the benefit or damage caused by the effect in question, to cite Nath, [23].
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- 30 Transfer of this Directive took the form of Spanish Royal Decree 319/91 of 8 March 1999, laying down actions to be taken in relation to the production, sale, use, recycling and refilling of containers for liquid foodstuffs.
- 31 B.O.E. [Spanish State Gazette] no. 99, of 25 April 1997. The Regulations for developing and implementing Law 11/97 were approved by Royal Decree 782/98, of 30 April 1998, promulgated in B.O.E. no. 104 of 1 May 1998. Further legislation with effects on the application of the norm would include Law 66/97, containing tax, administrative and social provisions, Law 10/98 on waste products and the Ministerial Order on the Environment of 27 April 1998. In addition, the Orders of 31 December 1976 and 16 July 1979 have remained in force, as will be noted later.
- 32 This constitutes an item not present in the European text. The setting of intermediate objectives for recycling to be reached during the year 2000 was also an innovation with respect to the European original.

- 33 The requirement to meet the obligations imposed by Law 11/97, which give rise to both systems, was postponed from 1 January to 2 May 1998 by Law 66/97, of 30 December 1997, relating to tax, administrative and social arrangements, under the terms of supplementary provision 38 (B.O.E. no. 313 of 31 December 1997).
- 34 The orders of 31 December 1976 and 16 July 1979, as partially modified by two orders issued on 30 November 1981.
- 35 Apart from the exemption for reusable containers indicated, there are other exclusions. These cover commercial and industrial packaging, and reusable containers not for industrial or commercial purposes for which producers and sellers set up their own system for deposit, return and refund, authorised by the appropriate Spanish Autonomous Regions. Both of these sorts of packaging, when once they reach the state of packaging waste, are governed by the provisions of Article 12 of Law 11/97. Finally, the Government may rule that certain specific packaging, because of special characteristics of size, weight or design, is to be excluded from the provisions of Article 6 of that Law.
- 36 For the purposes of funding the system, importers of ready-packed products are treated by the law as equivalent to packers within the state.
- 37 It should be noted that in other areas, such as containers intended for pharmaceuticals, the same approach based on integrated waste management systems has also been followed.
- 38 Cervera, A. (1998) *Envase y embalaje*, Madrid: ESIC, Colección Universidad.
- 39 Since 1982, when the first recycling bins for glass were installed in Spain, more than two million tonnes of glass have been recycled, which means that in the first ten years of recycling in Spain 2,580,000 tonnes of raw materials have not had to be extracted. This is equivalent to no extraction of raw materials for the manufacture of new containers one year out of every three [38]. The outcome is that there is less need for raw materials and the natural environment receives less waste.
- 40 Directive 85/339/EC and Royal Decree 319/91, as previously mentioned.
- 41 This organisation is formed by seven enterprises which between them share 95% of the total national output.
- 42 The annual report for 2000 stated that Ecoembes had 11,178 member firms and that the paid-up company capital was held in the following proportions: packaging firms, 55%; distributors, 20%; raw materials group, 20%; recycling enterprises, 5%.
- 43 The financial contribution paid for the legal right to use the green dot logo is collected by application of a tariff legally established for each type of packaging. The current rates are 0.006 euro per kilo for glass containers, 0.031 euro per kilo for steel, 0.051 euro per kilo for aluminium, 0.118 euro per kilo for plastics, 0.083 euro per kilo for cardboard drinks containers, 0.034 euro per kilo for paper and cardboard, 0.018 euro per kilo for wood, 0.009 euro per kilo for earthenware and pottery containers, and for other materials 0.118 euro per kilo.
- 44 The double status of customer and member is a characteristic of mutual organisations and cooperatives. However, Ecoembes was constituted as a non-profit limited company and Ecovidrio defines itself in its articles of association as a non-profit organisation with a separate legal identity constituted in conformity with the provisions of the laws of the Kingdom of Spain (Law 191/64 of 24 December 1964).
- 45 From the organisational point of view, the main effect of adopting a joint venture format is the creation of a new body with a separate legal identity with the aim of carrying out the activities intended. Other contractual options usually fall within the category of contractual agreements: they are contracts defining rights and obligations of the parties involved without any implication that a new body is created, to summarise the views of García Canal *et al.*, 1998.
- 46 From the collaborative agreement between Ecoembalajes España, S.A. and Ecovidrio, S.A., Barcelona 11 April 1997, pp.1-2.
- 47 At present there are three types of bin: igloo-shaped exclusively for collecting glass, containers for plastics, cans and compound card products, and containers for paper and cardboard.