

Strategic Packaging Logistics. A Case Study From a Supply Chain Perspective

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Abstract Few companies give importance to the impact of an appropriate packaging design on the implementation of logistic efficiency and sustainability strategies in the supply chain. Thus, this paper sets out to illustrate how a strategic view of this design (“Strategic Packaging Logistics”) makes it possible to obtain competitive advantages throughout the companies in the supply chain. To achieve this, not only the conceptual field of this new concept is developed, but also in its application, analysing the Spanish distribution company Mercadona.

Keywords: Packaging, logistics, supply chain, strategy.

1 Introduction

In the current competitive context, companies must deal with the challenges, not only in terms of new products and processes, shorter life cycles or increased commercial range, but also in terms of the demand for ever lower prices, with increasingly improved quality standards and service. This situation has forced many organizations to look for a source of competitive advantages, a better management of their processes, particularly those to do with supply chain management (Christopher, 2005).

Alongside this scenario is the growing sensitivity in society as regards a responsible management or the ethics of entrepreneurial activities, meaning that the supply chain management should be enlarged to take in the concept of sustainability, which affects both the operational aspects of the logistics processes, as well as their strategic decisions. The field of sustainable development can be conceptually divided into three axes: environmental, economic and social. In this field, Corpo-

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rate Social Responsibility (CSR) can be defined as active, voluntary contribution to social, economic and environmental improvement by companies, generally aimed at improving their competitive situation and added value, not limiting themselves to a strict compliance with the requirements (Ciliberti et al., 2008). All organizations in supply chain should take an active part in designing and implementing logistic processes that could be considered as sustainable (Carter and Rogers, 2008; Seuring and Müller, 2008; Andersen and Skjoett-Larsen, 2009; Mejías-Sacaluga et al., 2011).

In this context, the organizational aspects for the sustainable improvement of supply chain, both within each company and between companies in the chain, is one of the issues that arouses most interest among researchers. This is due to the fact that it is considered as a source of competitive advantages (Stank et al., 2001; Christopher, 2005). But however, despite the competitive importance of the organizational aspects mentioned above, the results of numerous studies show very discrete values in terms of their development and improvement (Giménez, 2006; Crnkovic et al., 2008; Germain et al., 2008, García-Arca et al, 2011).

Likewise, although these organizational aspects are important, equally so and in a complementary manner are the systematic search for efficient, sustainable alternatives to design and manage the supply chain (which could include the organizational aspects mentioned earlier), both at strategic and operational levels, with a view involving doing away with “waste”. This view of doing away with waste is linked to the concept of “continuous improvement” or “Kaizen”, and also entails a basis of different approaches such as Just in Time (JIT) or Lean Manufacturing. In these improvement approaches lies the need to extend the field of action beyond the frontiers of a company, taking in the entire supply chain. Unfortunately, many companies consider that implementing sustainability strategies involves a certain incompatibility with the search for efficiency improvement in logistics (Andersen and Skjoett-Larsen, 2009).

2 Strategic Packaging Logistics

In the conceptual framework commented in the previous heading, packaging is one of the key elements that makes it possible to provide support for the combined action of efficiency and sustainability strategies. Thus, beyond the traditional (but nonetheless important) view of packaging as a means of protecting products, over the last few years, new design requirements have been added for packaging: on the one hand, to improve the differentiation capacity of the product, and on the other, to improve the efficiency of the product at logistic level. Furthermore, this contribution of packaging to efficiency in logistics should be considered not only in terms of its direct view (in the processes of supplying, packing, handling, storing and transport), but also reversely (re-use, recycling and/or recovery waste from packaging); this situation has meant, in practice, the development of specific legis-

lations (e.g., those arising from the European Parliament and Council Directive 94/62/EC; 1994) linking packaging design to environmental conservation and, in short, to the improved sustainability of companies' activities.

Also, in order to put these functions into practice (the commercial function, the logistics function and the environmental function), it is essential to consider the packaging as a system comprising several levels. So three levels are to be established (Shagir, 2002): the primary packaging (to protect the product and, in many cases, in contact with it; also known as the "consumer packaging"), the secondary packaging (designed to contain and group together several primary packages; known as "transport packaging") and the tertiary packaging (involving several primary or secondary packages grouped together on a pallet or load unit).

When contemplating packaging as a whole, the natural interaction among different levels would become manifest, depicting the important dependence among them (Saghir, 2002; García-Arca and Prado-Prado, 2008; Bramklev, 2009). Nowadays, the choice of the type of packaging is usually subject only to considerations involving cost reduction. Thus, packaging design affects costs both directly (costs of purchasing and waste management) and indirectly (packing, handling, storage, transport and claims). It is precisely this indirect way that makes difficult an adequate understanding of the repercussions of certain decisions in designing the product related to packaging (García-Arca and Prado-Prado, 2008). Besides, this cost reduction approach can be hazardous if not considered in an integral manner since, although an "economic" packaging would be linked to a standard format with an appropriate, tried and tested logistic efficiency. But however, it may be obliged to sacrifice some of its possibilities to be "different" and sustainable.

With this broader view of packaging, over the last few years, the integration of logistics and the packaging design has been conceptualized in the term "packaging logistics", particularly emphasizing the operational and organizational repercussions (Hellström and Saghir, 2006); Shagir (2002) considers "packaging logistics" as "the process of planning, implementing and controlling the coordinated packaging system of preparing goods for safe, efficient and effective handling, storage, retailing, consumption and recovery, reuse or disposal and related information combined with maximizing consumer value, sales and hence profit".

Delving further into the previous concept, authors consider that a greater emphasis should be given to the important strategic connotations to do with packaging design, in many cases this being one of the supports of competitive advantages in the improvement of supply chain management from an overall perspective of efficiency and sustainability. We have called this broader view "Strategic Packaging Logistics". With this approach in mind, the design and development of packaging would be structured on three basic cornerstones (García-Arca and Prado-Prado, 2008): The definition of the design requirements (based on packaging functions); the definition of a organizational structure integrating all the departments/areas involved (internally in the company and externally in the supply chain); and, finally, the application of "best practices" (in aspects such as palletization, modularity, standardization of formats and qualities, re-use, recycling ...).

As a result of this analysis, it is possible to deal with the search for packaging able to meet the needs of the companies based on the numerous possibilities associated with the combinations in the packaging structure (primary packaging, secondary packaging and tertiary packaging) and with the four main decisions to be taken in terms of design: selection of the materials used, dimensions, groupings (the number of packs per package) and “graphic artwork” (or the aesthetic design of the packaging).

After justification and the conceptual development of the “Strategic Packaging Logistics” approach, the main objective of this paper is to illustrate, by means of case study methodology, the potential of applying this approach in the the Spanish distribution company Mercadona. Mercadona is one of the frontline leaders in Spain of trade distribution, with an annual turnover of more than 17,000 million euros, employing over 70,000 workers, with 1,356 outlets in 2011.

3 A case study: Mercadona

At a global strategy level, it is noted that Mercadona applies a careful policy of creating value for its customers, by combining the search for efficiency in logistics with sustainability in all its processes; thus, the basis of its successful business model (“Always low prices”) is structured on meeting the needs of its customers (“the boss”), the workers, the suppliers, the society and the ownership, thanks to a very “lean” vision of its process (doing away with waste), which can be summed up by the phrase of its Chairman, Juan Roig, “The lorry full, the pallet full, the cash till full, the line full and the product full too”. This “lean” vision also reaches the commercial level, with a careful selection of the range of products offered, which combines well-known brand names with its own brands, but without the search for the best price being at odds with keeping up the quality perceived by the market.

In order to put this strategy of efficiency and sustainability into practice, the company takes on the management of its supply chain, especially the distribution and supplies transport chain (suppliers-logistics platforms-outlets); over 8,500 million “kilolitres” was sold in 2010 (the sum of kilograms and litres dispatched). In this line, for example, it succeeds in improving the occupancy level of its transport (especially on the return trips), making it easier to combine heavy goods with other less dense cargo (adjusting to the limitation of weight and volume in vehicles); also, it makes a careful selection of the location of its logistics platforms (in 2011, the company had a network of 10 logistics platforms with a total capacity of over 700,000 m².), in order to reduce the final number of kilometres made by each product within the supply chain. Likewise, the company selects the most efficient modes of transport (in terms of the location of the suppliers), combining road, rail and sea transport.

At the same time, it makes a selection of just a few suppliers (over 100) with which it maintains a long-term relationship (a very “lean” vision), able to provide a careful, limited selection of products, with a special preponderance of Mercadona own brands. This way of working guarantees the supplier a volume of production and a long-term work horizon that allows it to obtain scale economies in purchases and production (transport is the responsibility of Mercadona, as commented earlier). The development of own brand products is carried out jointly between the supplier and Mercadona, which facilitates the solution adopted being efficient, not only for one part of the chain, but also for the chain as a whole; clearly, this development of new products affects to packaging design.

As commented earlier, one of the cornerstones of the logistics and sustainability strategy of Mercadona lies in improving the efficiency in goods transport throughout the chain. In this context, the search for efficiency in its palletized loads (on EUR pallet) is paramount, adopting the dimensions of packaging design that make it possible to take advantage of the maximum standardized base and height, reducing not only the amount of space transported, stored and handled, but also adjusting the weight and the amount of materials used in the packaging. All the measures outlined above make it possible not only to provide support for its environmental strategy (sustainability strategy; less consumption of materials and fewer vehicles used in transport), but also for its strategy of low prices (lower costs for materials, for transport, handling and storage).

In order to achieve these objectives, at organizational level, as noted above, Mercadona along with its suppliers, looks into the global impact of the decisions in packaging design, providing incentives in order to improve products on an ongoing basis, with a strategic vision of their supply chain and from an efficient and sustainable perspective (Strategic Packaging Logistics). In this context, the following measures are examples of how this works in practice: the reduction of grammage used in packaging formats (seafood, milk, yoghurts, water), the increase of units of packing per package (sliced bread, sausages), promotion of SRPs (“Shelf Ready Packaging”, e.g., in eggs, fresh pizzas, cold meats), changes in the packaging process (fresh fish, canned foods, hams, cellulose, the elimination of superfluous packaging (cheeses, canned foods, infusions, cold meats, animal food), the redesign, resizing and rationalization of pack formats (rice, shampoos, oils, wines, meats, water, dental gel, detergents or the reuse of plastic foldable packaging (see in table 1 examples of changes in packaging).

In order to illustrate the process of improving Mercadona’s packaging, this part summarizes the methodology and the main results achieved in the packaging rationalization project carried out by one of its frozen products suppliers. Thus, with the structured approach outlined above for implementing “Strategic Packaging Logistics”, the three cornerstones are developed.

As regards defining the design requirements (the first cornerstone), in line with Mercadona’s global strategy and in accordance with the same, two basic principles were established: the optimization of the palletized units sent to the company (EUR pallet of less than 1,000 kg., with a height not greater than 2.1 metres) and

the optimization of packaging (less than 10 kg, but allowing for an increased number of packs per packaging, while not going over this maximum weight).

Table 1 Examples of changes in the packaging of Mercadona products (compiled by the authors)

Changes made in packaging	Impact on the supply chain
Change from a round to a square base in bottles of olive oil, combined with SRP presentation	16% improvement in the number of bottles per pallet (estimated saving of 0.01 euros per unit) Reduction of 122 tonnes of CO2 per annum
Change in the arrangement of bottles of wine in each layer of SRP (from linear to “a staggered arrangement”); fitting between SRP layers	20% improvement in the number of bottles per pallet Reduction of 26 tonnes of CO2 per annum
Elimination of retailer packs (film and plastic trays) used in fruit, replaced by plastic reusable and foldable boxes”	80% saving on the volume of empty layers on the return (foldable) Improvement in the efficiency of palletizing Reduction of 1,900 tonnes of CO2 per annum
Changes in the grouping unit from 12 to 15 units per box	Amount of cardboard/packing is reduced Improved palletizing Estimated savings of 3.4 million euros per annum
Reduction in the top size in sunflower oil bottles	Reduction of packaging material Improved palletizing (lower overall volume of the bottle) Estimated savings of 200,000 euros per annum
Change of material used in bottles of spices (plastic instead of glass)	Less weight and volume Estimated savings of 0.25 euros/unit
Change in the packaging of meat, from cardboard boxes to reusable foldable boxes	Estimated saving of 360,000 euros/year by adopting reusing foldable boxes. 80% saving in volume of empty boxes on the return (foldable)
Also, in spicy pork sausages, minced meat and chicken, resizing the trays used as packaging	In spicy pork sausages and minced meat, reduction in the consumption of materials and improved palletizing with an estimated saving of 414,000 euros/year In trays of chicken, reduction in the consumption of materials and improved palletizing with an estimated saving of 914,000 euros/year
Replacing metal packing for a plastic packing in cans of anchovy; removing box	Reduction of materials and improved palletizing Estimated savings of 3 million euros/year
Change in the shape and size of the 2 litre bottle of water	Reduction of materials and improved palletizing Estimated annual savings of 1.125 million euros

As regards the second cornerstone (organizational structure), it is noted that two work teams were set up to deal with the project: on the one hand, an operational team (responsible for analysing and proposing alternatives, involving the

participation of the commercial, production and purchases departments). On the other hand, a follow-up team was set up (responsible for validating and the internal clarification of the proposals in which the industrial director and the company manager took part). In both teams, the authors of this paper acted as coordinators of the packaging changes, in line with the “action research” approach. The frequency of the meetings held by the operational team was weekly/fortnightly, whereas the follow-up team met on a monthly basis. Also, every two months, the company chairman reported to Mercadona.

Finally, in terms of the third cornerstone (the application of “best practices”), it is noted that the measures or changes adopted included resizing of the packaging, the increase in the number of packs per packaging, the increased number of layers per pallet or the improvement of the “mosaic” in the pallet.

Thanks to this rationalization project, an average 12.6% increase in palletizing was achieved in Mercadona products (22 references with packaging changes, accounting for 85% of the kilos dispatched by the supplier to Mercadona). Alongside this, consumption of materials used in packaging was reduced; This is estimated to be at least 2.5 tonnes/year in plastic, 36 tonnes/year in paperboard and 90 tonnes/year in cardboard. All this means that only in the part of the supply chain controlled by the supplier, savings in the order of 130,000 euros/year can be made (80% in savings in packaging materials and 20% in internal logistics savings arising from internal handling, storage and transport). Added to this are the savings linked to the supply chain controlled by Mercadona (transport between supplier, platforms and outlets, as well as in handling and storage on Mercadona platforms and outlets), which would double those attained internally by the supplier.

4 Conclusions

In a competitive scenario such as today's, companies should improve and innovate their processes (particularly in logistics) from a sustainable perspective. But however, many companies (especially SMEs) view this demand for sustainability more as a threat that hamper the productive/logistics efficiency, than as an opportunity to compete. The real challenge for companies is how to integrate, proactively and strategically, both concepts; thus, redesigning packaging by applying the “Strategic Packaging Logistics” concept is an example of this integration.

In this regard, the sustainable strategy implemented by Mercadona in its supply chain, underpinned by the application of this concept has actively contributed to its position of leadership in the Spanish distribution sector. As described in this paper, apart from cost savings associated with the rationalization of the materials used in packaging, the company has also succeeded in making substantial savings at logistics level, providing backing for its efficiency and sustainability strategy. In fact, its sustainability strategy was acknowledged by the European Commission, in 2010, for its good environmental practices.

So, thanks to the redesigning measures in its packaging, with the active participation of its suppliers, and from an integral and strategic vision of its supply chain, the company has managed to reduce consumption of packaging materials by 4.5% between 2009 and 2010, which entails a saving of 23,000 tonnes of CO₂, thanks to the improved efficiency in palletizing and the reduction of materials. This improvement means an annual reduction of 7,000 tonnes of plastic, 8,000 tonnes of cardboard and 11,300 lorries less circulating on the roads. All this also has a direct beneficial impact on the company's exploitation account, entailing a real competitive advantage that is appreciated by the market (with a 14% reduction in prices for its products during 2009 and 2010).

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