

## PACKAGING IN RETAIL SUPPLY CHAINS

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### *Abstract*

Packaging decisions have impact on logistics and sales performance in the consumer packaged goods industry. The packaging decision, i.e. packaging size and case size, is a major transmission belt between the logistical performances of a manufacturer and a retailer. It drives the cost of transportation, warehousing, and safety stock at the manufacturer as well as at the retailer in its warehouses and in the stores. Also, these decisions have effect on the sales of items.

However, the effects of diverse decisions regarding packaging are not clear. Moreover, conflicts of interest can arise between manufacturers and retailers. So, managing the supply chain is not without some extent of ambiguity.

We describe the effects of packaging decisions at a manufacturer of fast moving consumer goods and a retailer within a typical grocery retail scenario. For a specific product range we delve into more details of the trade-offs at a manufacturer and at a retailer. Then, the combined effects of the packaging decision are researched. A numerical example on shelf ready packaging is given.

**Key words:** packaging, logistics, supply chain management, case study, retail ready packaging

### 1. INTRODUCTION

A supply chain comprises all activities in the creation of a product. It is characterized by the flow of material from stages of raw material generation via manufacturing, i.e. combining materials, to the ultimate point of consumption of the product. This flow is described also as forward flow as products move in direction to the consumer. The supply chain contains as well the backward flow of parts and products, e.g. for repair or for recycling (E.g., see Wisner et al. 2014, pp. 5-7, Chopra & Meindl 2012, pp. 4-5).

Optimal organization of activities in supply chains is very difficult. This is due to the extent of the supply chain reaching over several firms, the large number of activities linked by the manufacturing process and the diversity of activities involved. Also, these activities are interdependent so that optimization efforts have to consider changes with respect to total supply chain performance. Furthermore, as activities are

spread over several firms, for an individual firm the activities of other firms are not accessible and identifiable. Hence, a prerequisite of optimizing a supply chain is communication between partnering firms of the supply chain so as to make the supply chain transparent for any party.

In this paper we look at the supply chain of fast moving consumer goods (FMCG). We consider the case of a manufacturer of sweets that produces candies. These candies are sold to retailers who will re-sell them to consumers. Hence, we consider only the last two major stages of the supply chain, the manufacturer and the retailer. The manufacturer receives ingredients and combines them to the product, i.e. the candies. The product is put into packaging of different types: Foil or paper to wrap a single candy, bag to carry a pre-specified amount of candies, a carton to carry a number of bags, a pallet to carry stapled cartons. On the retail stage the product itself remains unchanged. It is sold to the consumer by bag, i.e. the bag is the selling unit. The following table provides an overview of types of packaging at different logistics stages.

**Table 1.** Levels of Packaging in FMCG.

Level of packaging	Function	Sub-Function	Example
Primary Packaging	Establishing the Selling Unit	Separating individual items Collection of individual items	Wrap of candy Bag of candies
Secondary Packaging	Establishing the Logistics Handling Unit	Enabling Order Picking Collection of Selling Units Presentation (Shelf Ready Box)	Shelf Ready Box
Tertiary Packaging	Establishing the Logistics Transportation Unit	Mass Transportation	Palletized Cartons

Source: Authors.

It is very common to distinguish between three levels of packaging (See Hellström & Saghir 2006, Dujak et al. 2014). Besides typical protective functions of packaging the levels packaging serve further economic purposes, like enabling efficient handling and transportation by collecting several selling units. See the Report of ECR Europe (2007) for a survey. For example, shelf ready packaging has tremendous effect on the extent of handling in-store (See van Zelst et al. 2009, Villas Boas & Zhao 2005).

## 2. TRADE-OFFS IN RETAIL SUPPLY CHAINS

In optimizing their business retailers streamline their processes from receiving merchandize from manufacturers to presenting it to the consumers in their retail stores. Especially, grocery retailers adapted developed standardized procedures to restock their outlets and to present merchandize in store. The products are presented

on racks with shelves in order to minimize space required to show a large variety of items.

At the retailer's supply chain, the activities in the warehouse handle transportation units (pallets, cartons) whereas the activities in stores handle selling units. For example, full pallets are transported to their assigned storage or to the picking area where cartons filled with items are collected. Therefore, processes in warehouses are much more efficient regarding cost of activity by selling unit. For example, products are coming in by pallet, i.e. hundreds of units are received at the central warehouse and stocked at the picking area of this item. Therefore, any preparation done at the central warehouse of the retailer or at the manufacturer can reduce the amount of work at the stores by a multiple.

There are several activities to optimize the efficiency of the supply chain. They can be implemented at the manufacturer or the retailer. These are examples of arrangements at the retailer's central warehouse that can reduce cost of activities:

- Arranging the storage and order picking place at warehouse similar to the store
- Order picking of different items and packing their cartons on pallets in the sequence of the aisle layout at stores reduces transportation in stores.

Examples of strategies to be implemented at manufacturers to increase efficiency of the logistics processes:

- Large transport units (number of selling units per carton)
- Labelling of packaging (clear and easily identifiable labelling of cartons to reduce risk of picking errors)
- Shelf-ready packaging (minimize effort in-store to prepare selling units for presentation to the shopper).

Here, we look at shelf-ready packaging (retail-ready packaging), i.e. the carton carrying a number of products, is adjusted such that it helps to reduce activities when preparing the selling units for sale in the retail store. A case study is presented to describe the effects of changing from standard American type of carton to a retail-ready carton.

### **3. SETTING OF THE CASE**

#### **3.1. Croatian Chocolate Producer**

In the early twentieth century Kandit ltd. was founded as a sugar factory. During 1920-ties the company started with production of candies and confectionery. After the Second World War Kandit started with chocolate production and in 1960-ties it became one of the biggest chocolate and confectionary producer in former Yugoslavia. During 2011 Kandit became member of Mepas group of companies and started with heavily investing in production facilities. In 2014 a new factory worth more than 20 million EUR was finished and Kandit continued with its production growth. Currently, the company employs more than 300 employees and has continuous growth in sales during last several years.

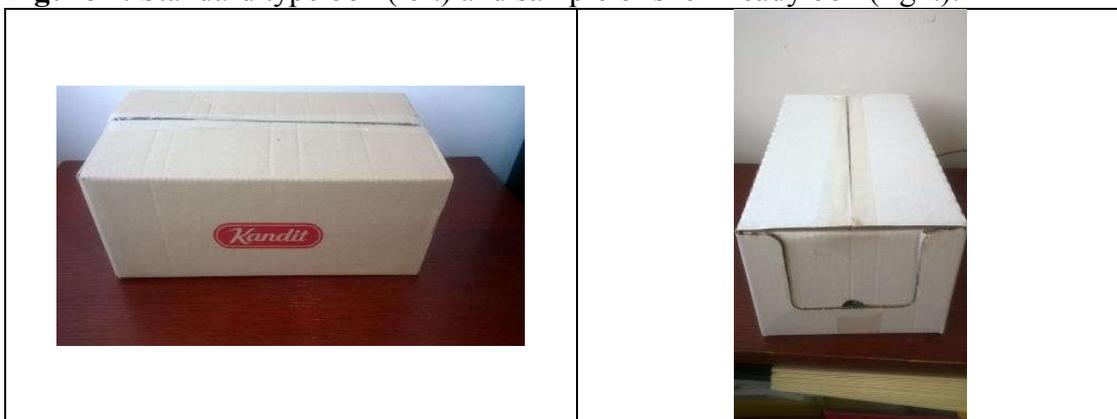
The economic setting for Kandit changed considerably after Yugoslavia disappeared from the political map and the Republic of Croatia was formed. From 2000 on, the economic development of Croatia restored. It became a member of the World Trade Organization (WTO) and signed the Stabilization and Association Agreement (SAA) with the European Union in 2001. Lately, it joined the European Union on July 1<sup>st</sup>, 2013. Following the opening of its markets foreign direct investments followed quickly. In the retail markets foreign retailers entered the Croatian market, among them Kaufland, Lidl, dm originating in Germany, and Interspar of Austria.

Consequently, the development of the Croatian retail market adapted to new players. Likewise, in the food market. Domestic retailers, like the Konzum chain, and food processors had new types of competitors penetrating into the Croatian market applying their business models. For example, retailers try to multiply stores according to the strategically set store format.

### 3.2. Initiation of retail ready boxes project

Due to the changes in the Croatian market and entrance of the big European supermarket chains there are also changes in their demand for different packaging options from their suppliers, i.e. Croatian producers. At the beginning of the year Kandit has been approached by one the biggest Croatian retailers with demand to switch from standard cardboard boxes (so called American type) to retail ready boxes (shelf ready boxes) for the hard boiled and chewy candies. (Figure 1)

**Figure 1.** Standard type box (left) and sample of shelf-ready box (right).



Source: Kandit, 2016

Obviously, when a customer, here the large retailer, is asking for a change of packaging, the client will check and take a change into consideration. Therefore, in order to be able to satisfy demand of this retailer Kandit started a project of replacing standard boxes which it is currently using for candies in its production by new shelf ready box. In the following the main considerations are the cost of sourcing cartons and the consequences of a replaced carton on the logistics processes and their cost. Thirdly, it is of interest whether there may be effects on the sales performance due to shelf ready cartons. The presentation is guided by these points.

### 3.3. Cost of Sourcing

In order to compare the cost of cartons the suppliers were asked to hand in new offers for a shelf ready carton. A basis for this is the current volume of cartons required. Table 2 exhibits the yearly volumes, cost per box, and cost of boxes per year regarding three different variants used before starting the project.

**Table 2.** Current cardboard boxes

Box code	Quantity	Price EUR/pc	Value EUR
Transport box T-111	350.000	0,185	64.750,00
Transport box T-112	30.000	0,230	6.900,00
Transport Box T-113K	120.000	0,150	18.000,00
Total			89.650,00

Source: Kandit, 2016

As it can be seen from Table 2 Kandit is currently using three different boxes (5-layer cardboard) for packaging of hard boiled and chewy candies that are being sold and delivered to this specific and also to other retailers. The three variants of boxes currently in use have different dimensions, different prices for different yearly quantities. The total yearly volume is 500.000 boxes at a cost of EUR 89.650,00.

The different variants of standard carton may carry the same products. Historically three different cartons existed due to demand of retailers.

They are made from same cardboard quality and as the result of this project all three types of boxes should be replaced with one shelf ready box – 114SRPv1 which is made from 3-layer cardboard. Therefore, the complexity of sourcing and storing different boxes for candies would be reduced. Of course, this decision to reduce the number of different cartons is a by-product of the project.

In the course of the project Kandit is also testing another type of box 114SRPv2 which is made from so called KRAFT quality cardboard. It has a higher quality such that it is stronger, i.e. withstands higher loads when stacked on pallets. This is important especially during transport.

Though it is more expensive this cardboard guarantees better logistic performances in transport and on shelves. Consequently, two alternative variants of shelf ready boxes for candies were taken under evaluation. Regarding sourcing costs, the shelf ready variants deviate. Due to the different dimensions and for the second type of test shelf ready box Kandit has received new prices for the boxes (Table 3.).

**Table 3.** Cost difference – old and new transport box

Box code	Quantity per year	Price EUR/pc	Value EUR
Transport boxes (T-111, T-112, T-1113K)	500.000		89.650,00
Transport box T-114SRPv1	500.000	0,169	84.500,00
Price difference (Old boxes-new box)			5.150,00
Transport boxes (T-111, T-112, T-1113K)	500.000		89.650,00
Transport box T-114SRPv2	500.000	0,191	95.500,00
Price difference (Old boxes-new box)			-5.850,00

Source: Kandit, 2016

Table 3 compares the total value of purchasing all three types of standard boxes with the two variants of shelf ready boxes. The first variant of shelf ready box accounts for a decrease in sourcing cost of EUR 5.150, the second one for an increase in yearly cost of EUR 5.850 compared to the current situation. Hence, the second variant amounts for increasing sourcing cost and is about EUR 11.000 more expensive than its alternative first variant of shelf-ready box. This holds for the assumption that each customer –not only the asking retailer- will be supplied with a new shelf ready box. Hence, all other retail clients have to be approached by Kandit to convince them for this change they did not ask for before. The sales management needs to bargain with all retail buyers on this change.

Standard cases and shelf ready cases have the same capacity to carry units of selling products.

### 3.4. Logistic side of the project

The change of boxes will result in a change of internal processes at Kandit as well as a change in processes downstream the supply chain. Besides the cost of the project itself, like development of the new box, financial and time resources needed for this project connected with box replacement, Kandit has to look upon logistic side of the project and that is connected with packing the products in company, putting them on pallets, delivering them to the buyers and finally putting them on shelves in the supermarkets. The effect of changing from three variants of carton to one is not evaluated here. From theory we expect lower average stock of cartons, less warehousing cost and a reduction of cost for reordering activities.

In transportation from manufacturer to the retailers' distribution warehouse there can be logistical consequences if the capacity by pallet changes due to different cartons. In this case there is the chance to have a larger capacity with the new boxes as there is the chance to add one row of cartons onto the pallet. This effect is neglected in the following.

Remarkably, in Croatia it is still the case that the supplier is replenishing the shelves at the retailer. In many instances in other European countries, like Germany, Austria, or France, the retailers occupy own employees or outsourced shelf-replenishment teams for this work. The reason is that the retailer has more control on the activities and realizes economies of scale as the teams fill all different products of a shelf in a single process. Hence, there the logistics related gains from shelf-ready packaging are all to the retailer.

Contrarily, in our case the logistical benefits occurring at the store are to the benefit of Kandit. The shelf ready carton brings savings in replenishment time that is paid by Kandit. It is estimated that the savings are about 7 cents per selling unit (bag of candies):

For the shelf ready carton, it is estimated that the employee requires 15 seconds to put box on shelf and needs additional 15 seconds to open it and make it ready for shoppers – so 30 seconds in total. Hence, with shelf ready packaging, 120 boxes can be replenished per hour, i.e. 120 boxes à 40 bags equals 4800 selling units per hour.

For the standard boxes a worker needs at least 1,5- 2 minutes in order to open the boxes, take out the candies (average 40 bags) and make them presentably for sales. So, a minimum of 30 boxes can be placed on shelf per working hour (1200 bags per hour). This is a quarter of the amount found with shelf ready boxes.

The monthly salary is around 4.000 HRK for an average of 168 hours (21 working days times 8 hours) of work so their hourly pay is around 24 HRK. Then, the cost of putting a bag carried by a shelf ready carton on shelf is 20 lipa, i.e. 0,03 EUR. The cost of putting product from standard box on shelf is 80 lipa, i.e. 0,105 EUR per selling unit.

Netting these with the cost increase due to new carton Kandit can realize a net gain through introducing shelf ready packaging of about  $0,105 - 0,03 - (0,191 - 0,169) = 0,051$  EUR per box.

In the case considered here, there is no change in the packing process at the manufacturer. The machinery will be the same and the packaging process is the same regardless on boxes. Though, there is a need for programming the new dimensions into the machinery control software. But there is no change in machinery. Manpower is estimated to stay at same level when switching to shelf ready boxes. Obviously, for other products of Kandit's portfolio it may be different.

### **3.5. Effect on sales**

Shelf Ready Packaging not only a driver to reduce logistics handling costs. It changes the appearance of the products' presentation in-store. Shelves filled with products in shelf-ready cartons may appear better filled, though on the other hand the additional cardboard on the shelves may be unattractive also. For example, in Germany the retailer REWE promotes shelf ready cartons to be used on shelves whereas its large competitor EDEKA is reluctant to apply shelf ready cartons to a large extent. See also their TV campaigns. So, shelf ready cartons change the appearance of supermarkets. Other effects have been researched for example by Waller et al. (2010). They find that when shelves layout is bound to the size of shelf ready packaging, i.e.

the dimensions of the carton shape the contact line to the consumer, the market shares of manufacturers evolve accordingly. Here, we did not research the effect on sales.

#### 4. CONCLUSION

We described a case on the introduction of shelf-ready packaging in the consumer goods retailing industry. We found that the economic effects regarding cost of packaging are offset by the savings in in-store handling. This is in line with the theoretical literature. Effects on sales are not considered.

The savings in the supply chain are not distributed between manufacturer and retailer. However, in the future as we know from quite competitive markets, like in Germany, the bargaining power of the retailers will extract these savings from the manufacturers. Then, potential effects on better in-store presentation and fill-level of shelves can still generate a positive net effect for the supplier. Also, the supplier having shelf-ready cartons is ready to export his products in many European markets where shelf-ready packaging became a standard.

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