

## PACKING INNOVATION FOR FOOD – ATTRACTIVE FOR EYES, EASY TO CARRY AND ENVIRONMENT FRIENDLY

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### ABSTRACT

One purpose of cognitive ergonomics is to present products in such an innovative way that the customer brain is influenced during the shopping in supermarkets and retail.

Packing innovations can increase a longer shelf life for fruits, vegetables and at home use. The design of the packing however makes the product virtually enjoyable. Our potential consumers can be educated from start of their life to love brands for a life time.

Some designs may make known food products friendly, sensual and bond with personal connection. New laws in EU for lifting in retail demand appropriate shelves solutions and EU laws for environmentally friendly products force industry to develop new products that will reduce the use of plastic shopping bags.

This paper discussed the use of a new packing material and technique as a packing solution for some products like eggs and champagne.

**Keywords:** ergonomics, retail, innovative packing designs

### INTRODUCTION

Reason to study ergonomics for agriculture, food products, retail and international food trade is in fact to design innovative packing solutions that are made in accordance with guidelines often easier for use and has physical capabilities for young and elderly population. Ergonomics has become an important pillar for product development and industrial design engineering in particular (DIRKEN, 1997). Product ergonomics is young discipline connected with industrial innovations and multiplies science disciplines. Ergonomics products is or not in connection with effectiveness and efficiency, safety and more comfortable for use by the targeted group of users. Effectiveness is measured by how much one product can be in use and if less than 100%, the product is less effective. Comfort is measured with discomfort of use. Safety and security of the product speak by itself. Efficiency might be measured for example with time: how much time is needed for opening or similar till moment of use. Elementary factors by product ergonomics are: people, product, interaction, and surrounding (space). One product can have several meanings and functionality, the physical use, help middle, informative, prototype, for one way or multiply use, optimal (DAAMS, 2011).

There are three kinds of ergonomics:

- 1) **Sensory**-connected with human sense for to see, listen and taste;
- 2) **Cognitive** – is in connection of understanding, decision and use;
- 3) **Physical** –is in connection with a body shape, movement, power and resistance.

Daams points that product ergonomics combine disciplines like work; consumer's and design developing ergonomics to produce products for large group of people. Technical with functionality use defined modern product in categories. The first ergonomics products date from *Paleolithic* Era (in old Greeks: *Palaios*-old and *Lithos*-stone) "Old Stone age", when first human – *Homo erectus* and *Homo habilis* began to use first stone tools for their living and to survive (GUISEPI, 2000). From that time till today, many natural materials

have been used to catch and store food, for transport, packing. Use of two stones to make fire; enabled humans to reduce illness by cooking and frying. People started to copy each other and make new standards for use of food. Industrial revolution made possible to put researcher, designer, producer and user in strong connection. In the half of 20<sup>th</sup> century tree disciplines try to cover ergonomics:

- 1) **Psychology,**
- 2) **Work psychology,**
- 3) **Technical science.**

The establishment of ergonomics society became after Second World War: Ergonomics Research Society and Institute of Ergonomics and Human Factors (ENGLAND, 1947), Human Factors and Ergonomics Society (USA, 1957), International Ergonomics Association (IEA, 1961), Dutch Association for Ergonomics (De Nederlandse Vereniging voor Ergonomie, 1962) and the worldwide organization IEA ([www.iea.cc](http://www.iea.cc)). Ergonomics contribute to design and evolution of tasks, jobs, products, environments and systems in order to make them compatible with the needs, abilities and limitations of people (DAAMS, 2011). Ergonomics is about designing for people wherever they interact with products, systems or processes ([www.ergonomics.org.uk](http://www.ergonomics.org.uk)).

## MATERIAL AND METHOD

In packing, new technologies can lead to innovative applications which offer valuable improvements compared to existing packing. One recent innovation concerns the invention of a new bio-based material which is made from industrial starch (potato), natural fibres, water and “pre mix”. Products are made of this material via a patented injection moulding process and can be composed. The mixed foam is pressed in the machine under high temperature to obtain the desired packing form. This contemplates the performance bio-based material in two different packing applications: egg packing and a champagne or wine bottle packing.

## RESULTS

### **Eggs packing**

Eggs belong to the products in the supermarkets customers favour in their shopping basket. This equally appears for the milk, bear, or brad. Worldwide sales of packing design for individuals or “take away” products for single use, is only possible if the popularity of such a product increases. On the other hand, packing these products in packaging which appeals more to the customers than to the present packaging.

Eggs are traditionally typically packed in a tray made from either carton or plastic and available in different types to hold six, twelve, fifteen and eighteen eggs. Requirements to egg packaging are that the breakage rate is minimised in transport and sufficient sturdy construction to absorb shocks. Functionality is second priority. With eggs, which are part of daily food, packing must be surprisingly simple to use. What is the usual perception of consumer when buying dozen eggs? Can the buyer be tempted to make another decision then usual? Eggs are very sensitive to pricing and most of the shoppers will make rational decisions often based on the lowest price. Until now, other factors like appearance and usability of egg packing are not deployed to the advantage of egg sales. Hence, with a new packing innovation, it may be possible to tempt the consumer with beautiful, easy-to-use egg packing to change their usual buying pattern. Other features to support this strategy

may be to reduce the price initially, to offer seven eggs for the price of six, or retail might add package of three eggs to the standard choice of egg packing.

An aesthetic, easy usable and pleasurable packing improves the beauty of product-packing combination and thus adds to the experience of the products. Nice colourful product may for example change the attention for familiar but dull package. When there are many attractive items in the same group of products, functionality of packing plays important role. The consumer may associate the sound that is heard when opening a product, with positive or negative emotions. The opening of a well known product in a new package can bring about new and wonderful feelings. Sound, colour, or light bring cognitive emotions and impact the customer to the point that he will buy products, even though they are unnecessary to him. Good light exposure of the product on the shelves, with advertency for sale and pleasant music in the shop, will relax the shopper even in the times of economy crises. After first buy of the innovative product, the customer is building trust with this design. Even if design is not perfect, the decision for the next buy is already made.

**Table 1. Overview and ergonomics comparison of various egg boxes**

	1	2	3	4	5
Characteristics of egg carton box					
Safety and security of eggs	++++ 2 side closing	++ 2 side closing	+++ From top	+++ 1 central closing	++++ 2 side closing
Stability of box and on shelves	+++	+++	+++	+++	++
Weight	+++	++	++++	++++	+
Number of eggs	7	7	6	6	3
Production costs	++++	++++	+++	+++	++
Environment friendly	Yes	Yes	Yes	Yes	Yes

Source: author's collection from Paper Foam B.V and Albert Hein retail

Switching from unattractive packing in ordinary cartons or plastic to smooth colourful new ecological bio-based material we might bring new emotions about. With an innovation packing design, more attention is giving to details like shape, size and more peaces for lower price. For special events like Easter an extra colourful box will be attractive gimmick, especially when packed with colourfully matching fresh eggs. Looking at box from an ergonomic point of view, the box perfectly closes on two sides, and inside the box has not only good size or whole, but also the cones holders from the top insure safety and stability of eggs during their transport and storage to the shop shelves and caring them home. With redesigned packing with few open "windows" on the box, an ordinary food product like eggs, became an interesting new item (Table 1, Figure 2). Suddenly, traditionally modelled egg box, can be easy changed with a new under private label. Marketing messages can give a new imago to the simple egg box. Satisfying the first basic need of consumer for hunger, surprisingly new innovative package became competitive on the shelves. To improve sales, there is not much we can change about eggs, but there is much that we can do for the package. Good behavioural design with a motto that focuses on the target group (religious, natural and nutritionist) has to be fundamental. Once is the

design is completed, new boxes with innovative solution will encourage people to share opinion and emotions at work, home or holiday.

### **Egg carton construction**

The standard molded egg carton structures consist of a top or cover section and the bottom cellular section. The bottom cellular section consists of different number of cells which house the eggs. These cells are arranged in parallel rows, although the number of cells and row may vary. Dozen cells arranged in two parallel rows of six cells or like in *Table 1, Figure 3* and *4* six cells in parallel rows of three cells.

([www.google.com/papents/US3337110](http://www.google.com/papents/US3337110)).

In new innovative bio-based carton, seven cells are placed in a round box with two rows for two eggs and in the middle row with three eggs (*Table 1, Figure 1* and *2*). Instead of pillars dividing the egg cells in previous well known patents, the new egg box has round shape and when two halves from the top and bottom close, they form a circle round the eggs, following their size. The last egg box in *Table 1* has three holes for eggs in a triangle shape, which is atypical for egg boxes, but handy for a single person wanting to buy eggs for a few breakfasts. Usual the structure of egg boxes is made of molded paper, paper pulp, plasterboard, plastic and thermoplastic foam such as foam polystyrene, polyethylene, polypropylene and polyvinyl chloride. The new egg carton is produced by vacuum moulding or match moulding techniques, pressing foam of pre-mix material, potato starch, fine natural fibres and water under high temperature. The egg carton has wall thickness of 2-2.5 mm, which gives sufficient protection to the eggs packed in the container and to avoid breakage egg shells. The pairs of cells from bottom and top part of the box have similar ribs and oval half egg shape, connect each pair of cells. These enable a limited amount of deformation resistance to the cellular carton section due to the forces which are applied to the carton during handling and, for example, when it is being opened and closed. On two sides the boxes has an alternative locking flange arrangement with interconnecting reinforced ribs. These enable the carton to lock and unlock or close and be reopened. Such locking arrangements have some resistance to deformation. The cell rows divide all eggs in individual cells with triangle shape support safe power portion to avoid crushing of the eggs contained therein and from compressive forces applied to the top. The new carton for seven eggs is very light in weight, so much that it is superior to ordinary carton constructions. The egg carton is strong, has a streamline design, distinguishes itself by its round edges and compact feel, and features an eye catching design available in a variety of colours. This makes the product stand out on the shelf.

The egg sample box is tasted by quality certificate compliance to regulation (EC) No 1935/2004 of the European Parliament on materials and articles intended to come into contact with dry food and may stand in contact with moist and fatty foodstuff. The product is awarded with USDA certification for bio-based material and Vinvote S349 standard for 100% bio-based and composed material.

### **Champagne packing innovations**

Some drinks evoke memories. One of them is champagne. Bubbles in the wine with lovely one, for a birthday, a New Year eve, religious holiday, or sharing glorifying sport moments, bring our sentiments to non-rational decision. Some brands of champagne are expensive. In Europe, it will be difficult to find someone over 18 years old who has never tasted champagne. The occasions for champagne are most often connected with personal experience. For drinking French champagne or German *methode Champagnoise*, it is not necessary to visit Paris or Berlin. What is more important, during opening the bottle, moments of wellness and surprises are shared with lovely ones.

The packing of champagne plays an important role in the “champagne experience”. Some people buy a bottle and wrap it in the paper to give it away. Some like it in a beautiful shopping bag. Later on the table, without appropriate shopping bag, a bottle might be less attractive. The solution might be in a user-friendly packing, which is smooth and light. An innovative champagne packing made from Paper Foam is easy to use and with hand-carry safe solution (Figure 2 and 3), with visual label in the middle and under. The packing material is made from a mix potato starch, natural fiber, water and pre-mix. The sludge is moulded in water and later, under the pressure and high temperature formed in the bottle shape. Two identical and symmetrical pieces (Figure 1), close the bottle around perfectly (Figure 2). In the upper and lower place of the bottle a round label is placed with a champagne or wine name printed on it. In this way, the handy packing is 100% safe, easy for carrying from shop to desirable place for consuming. The bottle stand good on the table, with an aesthetical nice shape (Figure 3).

Figure 1



Figure 2

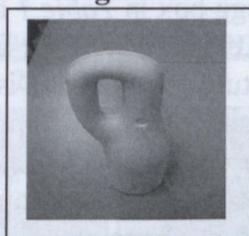


Figure 3



Source: author's photo collection

#### Packing has several objectives:

- 1) **Physical protection**-The bottle enclosed in the package may require protection from: compression, temperature, etc.;
- 2) **Barrier protection** – Keeping the contents clean, fresh and safe for intended shelf life is a primary function
- 3) **Information transmission** – Package labels communicate how to use, transport, recycle, or dispose of the package or product. Some type of information is required by governments.

Table 2. Shelves by HEMA for champagnes and wine

	1	2	3
Ergonomic analyse of shelves by HEMA			
Placement	Entrance- in the middle of the shop on the pallet	Display-in front of the section for wine and alcohol	On the top of the shelf
Height	90-115 cm (3 layers of carton)	120-160 cm	150-180 cm
Stability	+	++	+++
Costs	+	++	+++
Weight	+++	++	+
Lifting the product	+	++	+++
Product information (price)	low	middle	high

Source: author's photo collection, place HEMA, Utrecht, 1.02.2014.

In *Table 2*, several types of shelves for champagne and wine are presented. The first picture shows three layers of original cartons, placed on the light weight plastic pallet. First lines of cartons are closed, the second are half opened and the third is open for shoppers. The champagne is easy to pick and on the comfortable height. The second shelf is a display positioned in front of all wine section on desirable height for shoppers. The last presented shelf with champagne is much higher positions, for some shoppers not easy to take and with a highest price. Champagne with distinguished looking packing can hide the price and the cheaper product might look as expensive one. The moment that is appears on the table, they certainly present a surprise. Great packing designs might help brands to survive. Design includes several disciplines like: good production solutions, marketing and estate presentation. A glass of good vine from one region can carry personal status symbol, character, trend, style and popular identical taste.

Some of these moments became portraits in the very special room on the very special place. So, who care about the price?! Everything is in innovative packing. Glass of good wine from one region can carry personal status symbol, character, trend and style, popular identical taste. It's almost impossible to share such special moments with glass of water or bier. Some champagne with a distinguee packing can hide the price and cheaper might look as expensive one. The moment that appear on the table, they certainly present the surprise. Great packing designs might help the brands to survive. Design includes several disciplines like: good production solutions, marketing, ecstasically presentation. Everything meaning of the product can be conveyed by innovative packing.

## CONCLUSIONS

New innovative packing solutions reduce the amount of waste, are light in weight, and present perfect marketing tool for the possibility to sell more eggs and champagne or wine to the customers. Ecologically friendly, very demandable in western EU countries, might be solution for export similar products from Central and South East European countries to the EU market. Expanding western retail chains in the world with own standards for environment and consumers health, can offer local product in a global packing to the customers worldwide. Functional design for food packing demand that production must be in strong connection with packing and marketing and that single sample design will satisfy everyone. Packing film with perforation might help to keep fruit and vegetable fresh. The plastic tray under is an optional solution, because of the low costs and stable structure of inside of the product when transported and when on the shelves. In 21<sup>st</sup> century, laws for environment and compostable materials make distinction between functional and standards to reduce waste. The outcome is innovation in new materials that can harm our nature less and after some time to be decomposable.

In revenue packing contribute in growth for sale. The massive rush all round the world to urbanize create several problems: two or three times as many brands on the shelves make competition ferocious. Some good brands with advantageous position in the world retail market are now with new generation of consumers considered as product from the past decade. Arrival of cheep low cost travelling has made shoppers more movable and the time to "discover" a new product is shorter, compared to previous generation. Some expensive wine and cognac producers can invest little in their marketing, but they do put more efforts in new materials for packing, targeting "post-luxury" elites. Cultural background might be with mix feeling in touristic visit to France, land of champagne and wine, but on-line shoppers make world simple, clicking on their computer mouse, enabling them to buy via internet connection what they dream to taste. That put marketing of some multinational companies in weak position. New generation doesn't watch much TV. Use of smart phones

and individual search for producers in the “cloud” became so simple. Local brands commercials can be fast comparable with multinational products prices in the retails and paid by internet banking system. Young cosmopolitan generation may tech their parents to change shopping decisions, before stepping out of home.

Pleasure for shopping must be accompanied with packing innovations. Packing innovations can increase a longer shelf life for fruits and vegetables and at home use. The design of the packing however makes the product virtually enjoyable. Can we condition the consumer brain to shop with attractive packing and strong “Avatar” or metallic colours and with spoken message? Our potential consumers can be educated from start of their life to love brands for a life time. Some of them can emphasize slogans like: “House of best”, “Panonia green”, “Blue Danuba taste”, “Vajdasági yellow star”.

### ACKNOWLEDGEMENTS

The author would like to thank to Paper Foam B.V., for providing the possibility to attend one day seminar and to introduce new innovative products for food packing and enable its publishing. Also author would like to thank dr.ir. Brecht Daams, from Uitgeverij Undesigning, for editing this paper.

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