
FURTHER APPLIED TECHNIQUES ON FOOD PACKAGING AND LABELLING

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Abstract

In the generation of new concepts for food packaging, the importance of food quality and safety is crucial for the consumer. The future of food packaging through visionary models contributes to the development of the international market.

Therefore, the present study begins with highlighting the importance of Food Law regulation, international trade and packaging directives set to inform the consumers in an accurate manner.

The second part of the research presents both food packaging and labelling innovative techniques and details the relation between technical and marketing function of Packaging. Furthermore, using the combination between numerous integrated systems such as packaging techniques and electronics to interact between the package and food product, the research presents the current model of Visionary - Smart Packaging and shows the consumer benefits brought by this model.

The research concludes with the report findings on global packaging development through innovation performed by Euromonitor International in 2015.

Keywords

Visionary packaging model, smart packaging techniques, modern consumer needs, innovative labelling, packaging development

JEL Classification: L66, O31, Q55

Introduction

Since decades of the food industry evolution, packaging has grown substantially in importance to product marketers and consumers. As nowadays consumers' mobility increases, they are seeking valuable packaging solutions that can cope with fast pace living standards. This is where functional packaging or "smart" packaging comes in, progressively becoming a consumer expectation.

Therefore, in this context the main objectives of the paper are to identify the legal framework of food packaging and labelling in the European Union and International Trade. Moving forward to detailing innovative food packaging and labelling functions and

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techniques and last but not least to highlight the consumer benefits of a current model of Visionary - Smart Packaging using the latest industry techniques.

The paper presents the main aspects of food regulation regarding packaging and labelling to gain a broader view on the legal framework and afterwards showing the main functions and techniques of packaging which show a clear link between technical and marketing function of Packaging. The paper therefore analyses most innovative developments of labelling and importance to the consumers and food industry.

Using the combination of packaging techniques and electronics to interact between the package and food product, the research methodology consists of detailing the current model of Visionary - Smart Packaging. The research highlights the consumer benefits brought by this model and concludes with the report findings on global packaging development through innovation performed by Euromonitor International in 2015.

1. Legal framework – food law regulation

Nowadays, the importance of Food Law Regulations is critical as a result of increased international trade of goods requiring merchandising know-how, the government development of laws on food packaging and labeling, standardization, the indication of ingredients and environmental issues. (Dima, 2000)

The European Parliament and the Council of the European Union General Food Law is the parent legislation covering all aspects of food production, preservation and storage (Food Research Association, 2007). Two of the primary functions of packaging are to protect food from contamination and to preserve the integrity of the product. These are requirements of the packaging material itself. The materials may contain substances which are able to migrate into the packaged food.

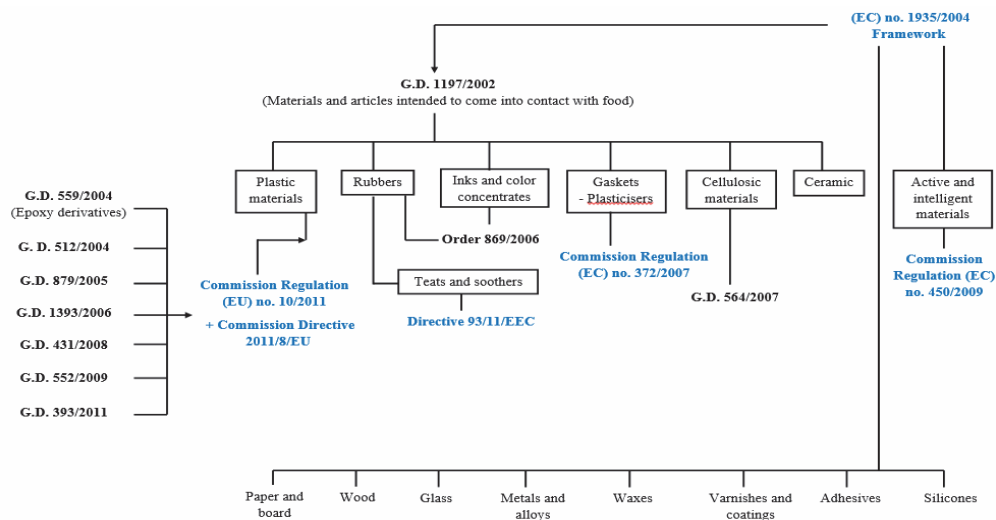


Figure no. 1 Own representation based on European Commission Regulation (EU) no. 10/2011 <http://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX%3A32011R0010>

To protect consumers against potential risks of oral packaging exposure the EU legislation has five main instruments: Regulations, Directives, Decisions, Recommendations and Reviews. The safety of food packaging is based generally on the loss of potentially toxic substances and the absence of migration of such substances. Materials covered by the EU legislation such as: plastics (including paints and coatings); regenerated cellulose; elastomers and rubber; paper and paperboard; ceramics; glass; metals and alloys; wood (including cork), textile products, paraffin and microcrystalline waxes - as shown in the figure above, in contact with food must satisfy these requirements.

The EU Regulation ensures the quality of food for human consumption and animal feed. It guarantees the free movement of safe and healthy products in the EU market. In addition, food legislation of the European Union (EU) protects consumers against fraudulent or deceptive commercial practices. Safety regulations stipulate the following provision: any food product hazardous to health and / or unfit for human consumption must not be marketed. To determine whether a food product is safe or not, the following aspects should be taken into consideration:

- normal operating conditions;
- information conferred to the consumer;
- immediate or delayed health effects;
- cumulative toxic effects;

Other International Food Regulations are as follows:

1. The Code of Ethics for International Trade of food items adopted by the Codex Alimentarius Commission on its 13th session (December 1985)
2. The General Agreement on Tariffs and Trade (GATT) as an appropriate instrument to regulate international trade.

Food producers must enforce food law at all stages of the food chain, from production and processing to transport, distribution and supply. If the manufacturer believes that a food product or packaging is harmful, immediate withdrawal shall be initiated from the market.

2. Innovative Food Packaging and Labelling Functions and Techniques

Packaging is a coordinated system of preparing goods for transport, distribution, storage, sales and consumer use. Packaging is a service and business function which in its most fundamental form contains, protects/preserves, transports and sells a product. (Soroka, 1996 pg 3)



Figure no. 2 The Three Levels of Packaging

Source: own research

When discussing packaging functions it is mandatory to know that there are three different levels of packaging as described in the figure above.

1. Primary (sales) packaging is the packaging which surrounds the product when it is sold to the final consumer, having direct contact with the product and other packaging to complete the sales unit such as label, leaflet in a printed carton or tray, lid in a printed sleeve.
2. Secondary (grouped) packaging is used to group sales units and eases handling in the selling environment at point of sale to the consumer such as corrugated outer case, thermoformed plastic tray.
3. Tertiary (transport) packaging such as pallets, stretch wrap is used to facilitate handling and transport of sale units or secondary packs in order to avoid physical handling and transport damage. (Soroka, 1996)

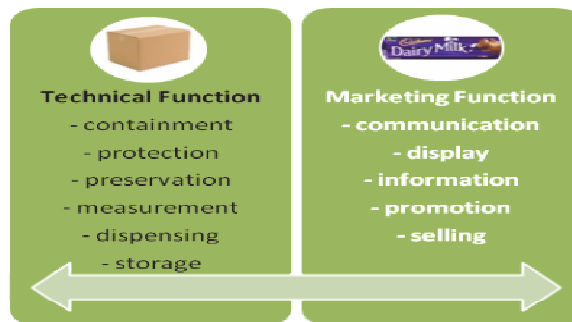


Figure no. 3 The relation between technical and marketing function of Packaging

Source: based on Soroka, W., 2006. Fundamentals of Packaging Technology, The Institute of Packaging

Packages fulfill a number of vital functions in the process of sourcing from the manufacturer and reaching the consumer. Among the range of functions that packaging includes as shown in the figure above are the following:

- protection and preservation - preventing physical damage and stopping or inhibiting chemical and biological changes during transport, handling and storage;
- Information / promotion - providing company and product information, instructions for use, storage and handling, machine-readable barcodes or man / attracting sales, branding and image;
- rationalization / efficiency - to facilitate the distribution and storage of a certain quantity of product ;
- Security - highlighting tamper packaging, anti - counterfeiting;
- Convenience – re-closable packaging, distribution.

Such as packaging, labelling also has got many requirements which need to be considered from the beginning of product development which are closely linked to advertising and marketing of the product. The food product label must be clear and easy to read, permanent, easy to understand, easily visible and not misleading. It must also show the list the ingredients and certain warnings such as allergen information as follows:

- The name of food on the label must accurately describe the product, reflecting consumer’s expectations, for example milk and dairy cannot be used for non-dairy products.
- the list of ingredients need to be listed in descending order by weight of the product taking into account tolerances for ingredients which are used in variable proportions
- health and nutrition claims must be very accurate, for example when expressing “low fat” the product must be qualified as low in a certain nutrient
- allergen labelling is extremely important as of when the product contains certain ingredients known to cause allergic effects, these ingredients must be highlighted in the labelling. (CCFRA, 2007)

Table no. 1 Main functions and types of packaging labels

MAIN FUNCTIONS	ID Traceability Identificati on Safety	DECO Decoration Premium	INFO Multipage Use instruction Legal information	PROMO Promotion Amusement Gadget	PERFO Industrial advantage Efficiency	ERGO Advantage Practicality
LABELS						
Coupon light			✓	✓		
Double view		✓	✓		✓	
Neck label		✓		✓	✓	
Anti – theft	✓				✓	✓
Digi label				✓	✓	

Source: Own representation based on www.autajon.com

As seen in the above table no. 1 the main functions of packaging labels are: traceability and identification, decoration, information, promotion, efficiency, industrial advantage and practicality. The column on the left shows different modern types of packaging labels. For example the double view label is printed with images to be seen from both sides requiring transparent packaging of the product. Its main functions are visual effect of the image, information about the product such as ingredients and efficiency due to automatic application, environment friendly and increased communication space. The digital label on the other hand is printed digitally as the name suggests with a very high print quality, being directly transferred from the computer to the material and it is very useful for variable data printing thus providing traceability.

3. Consumer benefits from Smart Packaging Technologies- Case Study

Packaging innovation often involves greater functionality. Nowadays consumers live at fast pace hence they are seeking valuable packaging solutions that can make their lives easier. Smartphones and apps like QR scanning now offer instant access to information and individual lifestyle statistics. This is where functional packaging or “smart” packaging comes in, progressively becoming a consumer expectation.

The present case study focuses on presenting some of the most recent and visionary packaging techniques that bring consumer benefits and brand awareness. Starting with the state of the art in smart packaging technologies, the case study shows recent innovations performed in the Packaging industry and concludes with the findings of a recent report

developed by Euromonitor International on the smart packaging industry as shown in the report finding section c) of the Case Study.

a) Smart Packaging Technology

Smart Packaging is the result of the combination between numerous integrated systems such as chemistry and electronics to interact between the package and food product to obtain increased shelf life or sensory properties. (Han, 2014) According to Jung Han, in a study about packaging performed in 2014, the four most essential smart packaging technologies for food products designed to meet consumer expectations are the following:

- Conventional Packaging - Custom functional packaging focused on design and technology integration into packaging; materials and decoration capabilities for products on shelf and deliver on the brand;
- Hybrid Packaging - Combines rigid and flexible materials in order to create custom solutions that build value for both brands and consumers. The main advantages of this technology are the following: improved economics, shelf presence, convenience, and sustainability;
- Active Packaging - Advanced materials and electronics to enable additional function and protection to new package and device platforms
- Intelligent Packaging - Custom package platforms offering dynamic and immersive experiences that enable interaction between brand, consumers, and retailers.

b) Smart Packaging discoveries – temperature sensors

Companies such as Ripesense™ and Thinfilm™ are producing high quality smart packaging technologies which include sensors that are activated to detect product temperature, motion (traceability of the product), consumer touch (facilitating sense for blind customers) and proximity of the customer through GPS tracking.



Figure no. 4 Intelligent packaging through temperature sensors

Source: Ripesense™ (http://www.ripesense.co.nz/ripesense_howitworks.html)

The Ripesense™ temperature sensor is one example of intelligent packaging that can detect the juiciness of the fruit product according to the number of days at room temperature. The RipeSense™ label, gives a colour change based on the levels of ethylene in the package, after appropriate calibration According to the sensor, up to two days the fruit is turning from crisp to firm and in the following five days it becomes juicy as shown in the graph above. The concept of sensory food design is what dominates this decade. It is shown by “The Brand Sense Study” by Martin Lindstrom, that taste, smell and appearance of a

product are ranked together on the scale of importance to the consumer, therefore creating new levels of sensor preference (Lindstrom, 2015).

c) Report findings on Global Packaging Development – bringing consumer satisfaction through innovation

Focusing on visionary/smart packaging, according to a recent the study conducted by Euromonitor International -the world’s leading independent provider of strategic market research.- performed in 2015, consumers are demanding to both brands and the packaging industry to innovate and to focus on reducing costs and increasing revenues while driving brand awareness, sustainability, competitiveness, food safety and consumer satisfaction, shelf life, and consistency.

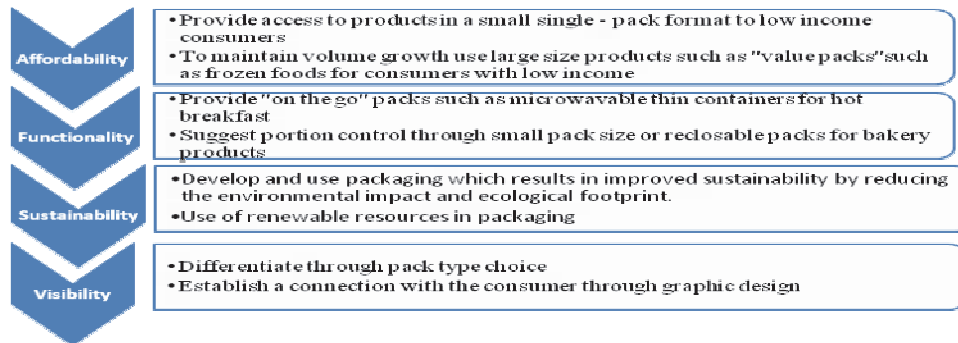


Figure no. 5 How packaging innovation can help achieve consumer satisfaction

Source: adapted from Euromonitor International report, <http://www.euromonitor.com/global-packaging-developments-building-brand-success-through-innovation/report>

As summarized in the above figure, the Euromonitor study concludes that smart packaging innovations brings consumer benefits and helps achieve brand success through four main characteristics: affordability, functionality, sustainability and visibility each characteristic being linked to a smart packaging solution.

Conclusions

In the last decades, packaging has grown substantially in importance to product marketers and consumers. The importance of food law regulations is critical as a result of increased international trade of goods requiring merchandising know-how, the government development of laws on food packaging and labelling, standardization, the indication of ingredients and environmental issues. Packaging innovation often involves greater functionality therefore packages fulfil a number of vital functions in the process of sourcing from the manufacturer and reaching the consumer.

Such as packaging, the research shows that labelling has also got many requirements which need to be considered from the beginning of product development which are closely linked to advertising and marketing of the product. Nowadays modern labels offer both information, industrial advantage and efficiency as well as innovative solutions such as anti-theft, digital labels and double view.

The research focused on the most innovative – visionary developments in packaging and labelling providing insight of the four most essential smart packaging technologies for food products designed to meet consumer expectations: Conventional Packaging, Hybrid Packaging, Active Packaging and Intelligent Packaging. The paper highlights the findings of a case study focused on intelligent – smart packaging starting with the concept of sensory food. The Ripesense™ temperature sensor is one example of intelligent packaging that can detect the juiciness of the fruit product according to the number of days at room temperature.

The research methodology continues with the Euromonitor International report from 2015 on Global Packaging Development. This report finds that smart packaging innovations brings consumer benefits and helps achieve brand success through four main characteristics: affordability, functionality, sustainability and visibility each characteristic being linked to a smart packaging solution.

Therefore the paper concludes that visionary techniques of food packaging and labeling are a must have in today's emerging markets and must bring functionality to the packaging industry and ensure consumer safety and satisfaction.

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