# SELECTION OF ECO-FRIENDLY MATERIALS FOR GROCERY STORE PACKAGING

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As the volume of production of various products increases, more packaging is needed. This trend is one of the most important causes of environmental damage.

Attractive, resistant and informative packaging is not only used to protect products, but is also an essential attribute of marketing promotion. Almost all products on store shelves are wrapped in many layers of paper, film, and plastic, which are thrown away by consumers immediately after use.

The problem of recycling packaging products and the lack of such habits as "eco-friendly consumption behaviour", i.e. neglecting the concept of reuse, leads to an increase in the number of landfills. Every year, more than 2 billion tonnes of waste are generated globally, and 40% of it is disposable packaging [1].

When designing any packaging, it is worth remembering that it is a temporary material, so the issue of its environmental friendliness is probably the most pressing. Eco-friendly packaging should not only be easily biodegradable in order to reduce the negative impact on the environment, but also have a low cost.

The results of the study conducted in this article were interesting.

Based on the study of similar eco-friendly products and the fact that "eco-oriented design" is becoming more popular, it was assumed that consumers today prefer packaging made from eco-friendly materials with a laconic design that emphasises the naturalness of the product or product.

The article compares eco-friendly packaging materials, identifies the advantages and disadvantages of each type, compares materials in terms of environmental friendliness and printing, and provides options for replacing plastic packaging with packaging made from natural materials. Based on the results of the data obtained, it was determined which packaging would be the best for development and use.

The study of the use of eco-friendly materials for the manufacture of packaging and the justification for choosing the best options for developing a set of packaging was carried out for the Terroir gastro studio, taking into account the features of eco-design and the principles of the Zero Waste programme [2].

Currently, many materials are used for product packaging: paper, film, foil, fabric, plastic, metal, glass, etc. These materials are printed using different printing

methods and different inks. Not all of these materials comply with the principles of the Zero Waste programme, i.e. they are safe, environmentally friendly, recyclable and reusable. Therefore, the main objective of this study is to determine the main environmental requirements for these materials, taking into account the principles of eco-design and consumer preferences.

After studying the main requirements for materials that can be used for packaging and the principles of the Zero Waste programme and eco-design, the main criteria for comparison were selected:

– material safety – both its safety in production and processing and its safety for the packaging product are considered;

– recyclability – this is the main principle of the Zero Waste programme, so only materials that have this capability will be used;

– versatility of use – we consider both the possibility of using materials for packaging different products and the reuse of the proposed packaging;

– print quality – we consider the possibility of implementing the developed design solutions with high quality on the selected eco-material;

– eco-inks – the possibility of using eco-friendly inks to print the designed packaging using the chosen printing method;

– price – the price-quality-environmental friendliness ratio should be taken into account.

The range of materials was narrowed down at the preparatory stage. To do this, a group of experts working in the field of packaging manufacturing and representatives of a gastronomy studio who promote the principles of the Zero Waste programme and have a good understanding of the products that will be sold to the establishment's customers were interviewed. The expert group consisted of 7 people. They were presented with the products that will be on sale in the gastro studio and chose the most popular materials for packaging these products. The survey took into account the following main criteria: environmental friendliness, recyclability, price of the material, versatility of use, and print quality (fig. 1).

| Material | Expert 1 designer | Expert 2 technologist | Expert 3 manager 1 | Expert 4 manager 2 | Expert 5 marketer | Expert 6 director | Expert 7 production manager | Total | Rank |
|---|---|---|---|---|---|---|---|---|---|
| kraft paper, cardboard | 11 | 11 | 11 | 11 | 10 | 11 | 10 | 75 | 1 |
| adhesive paper | 4 | 10 | 10 | 10 | 4 | 4 | 9 | 51 | 3 |
| specially coated parchment paper | 10 | 4 | 9 | 3 | 11 | 3 | 11 | 51 | 3 |
| bamboo | 6 | 5 | 8 | 4 | 5 | 10 | 8 | 46 | 6 |
| plastic | 5 | 3 | 3 | 2 | 3 | 5 | 4 | 25 | 9 |
| cardboard | 9 | 6 | 4 | 7 | 8 | 8 | 3 | 45 | 7 |
| fabric | 8 | 9 | 7 | 8 | 9 | 9 | 7 | 57 | 2 |
| glass | 7 | 8 | 6 | 9 | 7 | 7 | 6 | 50 | 5 |
| food wrap | 3 | 7 | 5 | 5 | 6 | 6 | 5 | 37 | 8 |
| foil | 2 | 1 | 2 | 5 | 2 | 2 | 2 | 16 | 10 |
| metal | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 8 | 11 |

Figure 1 – Results of the survey on the choice of material for the study

After a preliminary analysis, the top five materials were selected: kraft paper, adhesive paper, specially coated parchment, fabric, glass and bamboo. However, although parchment is safe and convenient for food packaging, it is not fully recyclable, so it was decided to replace it with kraft paper, which is in the first position and meets all the requirements. The glue paper will be used for labels and will not come into contact with the products, and it can also be used to create high-quality eco-designs. Metal was unanimously rejected by all the experts as an expensive material that does not meet the intention of creating a gastronomic studio.

All these materials were further analysed using the analytic hierarchy process to select the best options for different types of packaging for the gastro studio's products, considering their safety and environmental friendliness (fig. 2).

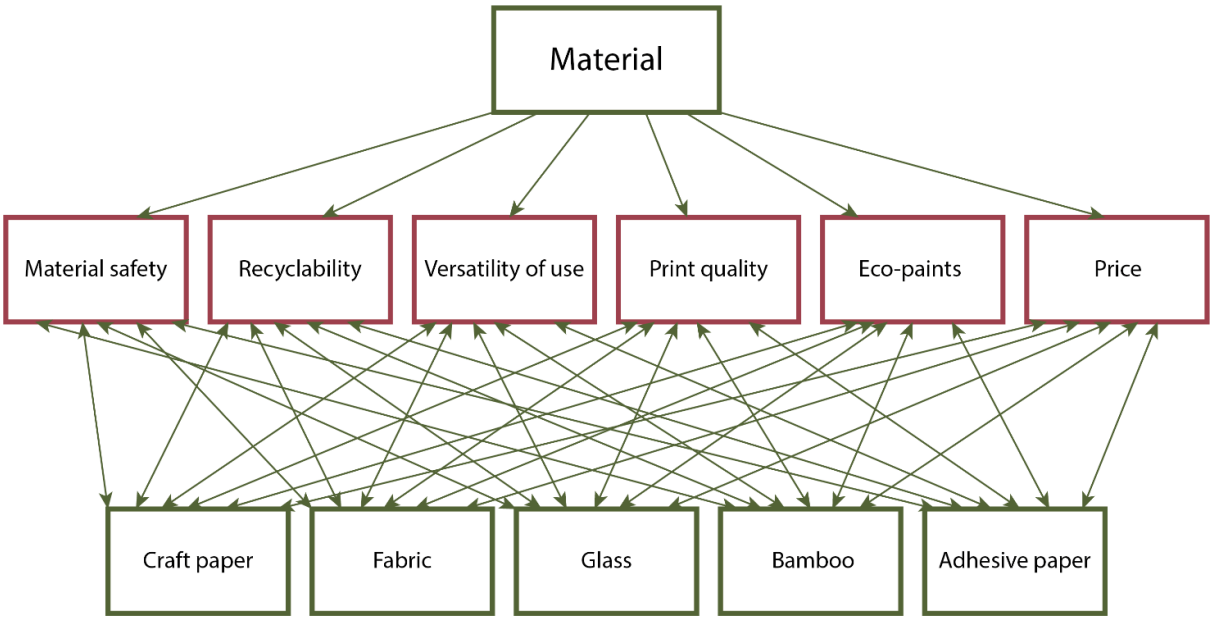


Figure 2 – Selecting materials for packaging using analytic hierarchy process

Next, a matrix of pairwise comparisons of criteria and alternatives by criteria was built. Based on the results of the analysis of the matrix of pairwise comparisons by the defined criteria, the following conclusion can be drawn (fig. 3).

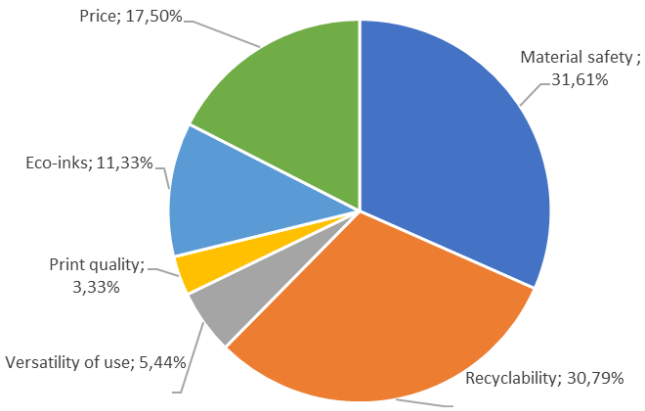


Figure 3 – The importance of criteria for selecting eco-friendly materials for packaging

In terms of meeting our goal, the most important criterion is "Material safety" (31.61%). This is due to the increased requirements for the materials used to make the packaging, both in terms of safety of its production and safety for the products being packaged. The next criterion is "Recyclability" (30.79%). It is almost as important. This is due to its relevance to the goal of adhering to the principles of zero waste for packaging. This is followed by Price (17.5%). This also meets the requirements of consumers. The price of eco-materials is higher than that of conventional packaging materials. This is due to both the technology of their manufacture and the raw materials used for their production. Consumers are willing to pay this price for quality products, but manufacturers should consider reducing this figure through technological innovation. The "Eco-paint" criterion is lower than the previous ones (14.91%). This is due to the fact that many conventional paints are also unsafe for the manufacture of packaging products. The "Versatility of use" criterion gained only 5.44%. This is because packaging is perceived by both producers and consumers as a consumable. Zero Waste aims to change this perception and make packaging an independent product that can be reused repeatedly. The last place was taken by the Print Quality indicator (3.33%). This can be explained by the fact that almost all materials in the list of selected materials can be printed using offset or screen printing, and these technologies ensure high-quality printing.

Further analysis allows us to obtain the weights of the alternatives in terms of achieving the goal (fig. 4).

| | Matrix of weights of alternatives for each criterion | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | Material safety | Recyclability | Versatility of use | Print quality | Eco-inks | Price | |
| 1 | kraft paper | 0,307 | 0,285 | 0,397 | 0,508 | 0,201 | 0,279 | **0,295** |
| 2 | fabric | 0,269 | 0,225 | 0,083 | 0,048 | 0,229 | 0,115 | **0,206** |
| 3 | glass | 0,128 | 0,332 | 0,226 | 0,100 | 0,059 | 0,034 | **0,171** |
| 4 | adhesive paper | 0,062 | 0,063 | 0,265 | 0,303 | 0,339 | 0,521 | **0,193** |
| 5 | bamboo | 0,234 | 0,095 | 0,028 | 0,041 | 0,171 | 0,051 | **0,135** |

| | Matrix of criteria weights | |
|---|---|---|
| 1 | Material safety | 0,316 |
| 2 | Recyclability | 0,308 |
| 3 | Versatility of use | 0,054 |
| 4 | Print quality | 0,033 |
| 5 | Eco-inks | 0,113 |
| 6 | Price | 0,175 |

| | | Weight in shares | Weight in percentage | Rank |
|---|---|---|---|---|
| 1 | kraft paper | 0,295 | 29,49% | 1 |
| 2 | fabric | 0,206 | 20,63% | 2 |
| 3 | glass | 0,171 | 17,10% | 4 |
| 4 | adhesive paper | 0,193 | 19,32% | 3 |
| 5 | bamboo | 0,135 | 13,46% | 5 |
| | | | 100,00% | |

Figure 4 – Determining the weights of alternatives

All the materials used for the gastro studio packaging set have been selected after expert analysis based on the developed recommendations for their safety, environmental friendliness and recyclability.

The exception is PET plastic and its alternative, food wrap, which are used to cover food containers. They were not included in the list of selected materials by the

rating, but their characteristics allow them to be used for gastro studio. Printing on these materials is not possible.

Examples of branded products for a gastronomy studio using the selected materials are shown in fig. 5.


Figure 5 – Examples of branded products made from eco-friendly materials

The analysis of the results helped to create the most relevant set of packaging for the grocery store and, due to the eco-trend, increased sales of goods, emphasising the brand's authenticity and natural direction.

It is clear that the Terroir brand is an eco-friendly brand, as it not only sells eco-friendly products, but is also part of the natural cycle. By using appropriate eco-friendly materials in its packaging, the brand adheres to the essence of the rules of disposal, recycling and reuse, and its advertising campaign helps to encourage customers to comply with these rules.

**References**

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