



How Consumers Evaluate Environmental Friendliness

Results of an International Comparative Study on Consumer Preferences

What kind of packaging do consumers evaluate as environmentally friendly? A study conducted in seven countries shows that consumers pay particular attention to the last stage of the packaging life cycle, e.g. compostability or recyclability. There are important differences between individual countries.

Today, plastics are mainly used in packaging – 40% of plastic production in Europe goes into this application[1]. Packaging waste, in turn, with a total quantity (not only plastic) of about 160 kg per cap-

ita per year in the EU [2], has been the subject of political countermeasures since the 1990s because of the environmental problems associated with it. The 2016 agreement on the obligation to pay

for plastic carrier bags in retail is just one recent example. In addition to legal and other political measures on the part of the state, manufacturers of consumer goods, packaging manufacturers and, ul-

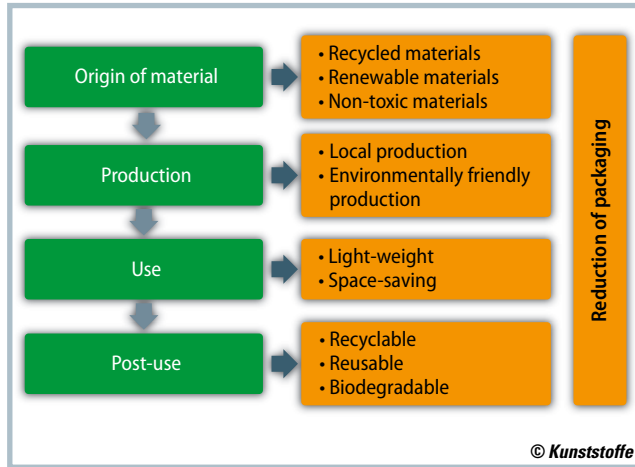


Fig. 1. Environmentally friendly properties of packaging (yellow) and their correlation to the life cycle of packages (source: HfWU)

consumers perceive packaging. The latter is not only a side aspect of the actual product, but is a pivotal part of the “marketing mix” [3], which can account for up to a third of the customer’s utility of a product [4] and thus can decide on success and failure in the market.

Bio-Based Packaging

Consumers are increasingly choosing products that they perceive as environmentally friendly or, in a more comprehensive sense, sustainable, and are also considering the packaging. At the same time, 86% of all Germans are concerned about the environmental impact of plastic products in everyday life [5]. Consumer goods manufacturers are increasingly responding to this by using environmentally friendly and, in some cases, biobased materials that can be produced from renewable raw materials such as soy beans, corn or rice or other biomass (e. g. organic waste). Biomethane has been available as a new option for some time (see Box p. 8).

However, biobased plastics are still a niche product. If the established materials natural rubber and cellulose are subtracted and the analysis focuses on the “new” biobased plastics, their share in global plastics production is still below 1%. Over the next five years, however, capacity is expected to more than quadruple [7].

Ultimately, however, environmentally friendly and, as part of it, biobased packaging has to find consumer acceptance in order to be successful. This raises the question of how consumers evaluate different packaging materials in terms of environmental friendliness and why. By answering these questions, manufacturers can gain important information for the design of their packaging, but also with regard to communicating the environmental benefits.

Study in Seven Countries

Nürtingen-Geislingen University (HfWU), Germany, together with several partner universities, has therefore investigat- ➤

timately, plastic producers must also address the issue. This is why packaging that is perceived as environmentally friendly is becoming increasingly important in these sectors. However, it is decisive how

Packaging options	France	Germany	USA
1. Made from recyclable material (e. g. paper packaging on consumer products; material has to be processed)	4.08	3.80	4.23
2. Made from reusable material (e. g. plastic bag or glass bottle; material just has to be cleaned and re-labeled to be used again)	3.97	4.17	4.07
3. Plastics made from non-renewable resources (e. g. oil) that are biodegradable (can be decomposed by bacteria after use)	2.75	2.80	3.16
4. Plastics made from bio-methane (upgraded biogas produced from fresh organic matter such as plants or manure or bio-waste) which are renewable but not biodegradable (cannot be decomposed by bacteria after use)	2.47	2.23	2.87
5. Plastics made from renewable resources other than bio-methane (e. g. soy protein) that are biodegradable (can be decomposed by bacteria after use)	4.04	3.72	4.15
6. Plastics made from renewable resources other than bio-methane (e. g. corn starch) that are not biodegradable (cannot be decomposed by bacteria after use)	2.51	2.41	3.04

Table 1. Median values of the perceived environmental friendliness of packaging alternatives in three countries (scale: 1 = not environmentally friendly to 5 = very environmentally friendly). Green is the most environmentally friendly option from the consumer’s point of view, red the least environmentally friendly (source: HfWU)

Bioplastics from Biomethane

Biomethane is produced in biogas plants from waste or renewable raw materials (energy crops) by upgrading the biogas produced in the fermentation process to natural gas quality and feeding it into the public natural gas grid. Companies in the chemical industry can purchase corresponding guarantees of origin from biomethane producers and use these to prove the attribute "biobased" for certain basic materials for producing plastics. For example, BASF has developed such a mass balance-based certification system together with German certification company TÜV Süd and offers biomethane-based materials for plastics production [6].

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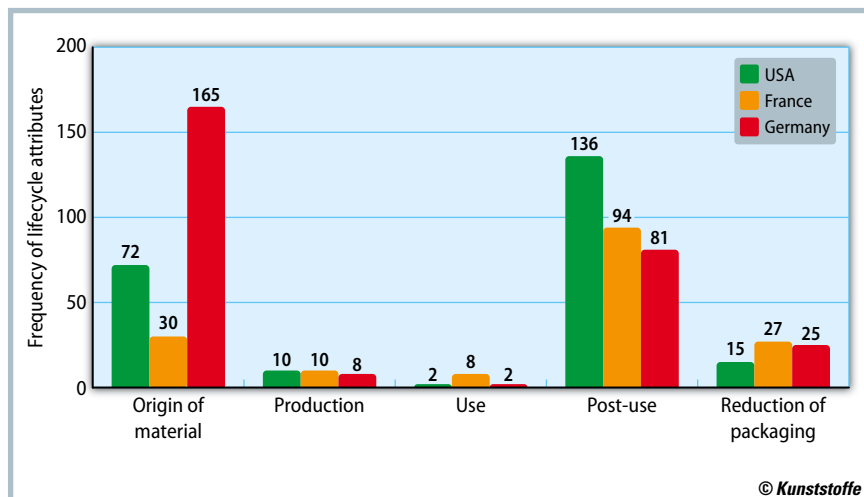


Fig. 2. Frequency of attributes per life cycle phase: number of answers to open questions, standardized to 100 respondents per country (source: HfWU)

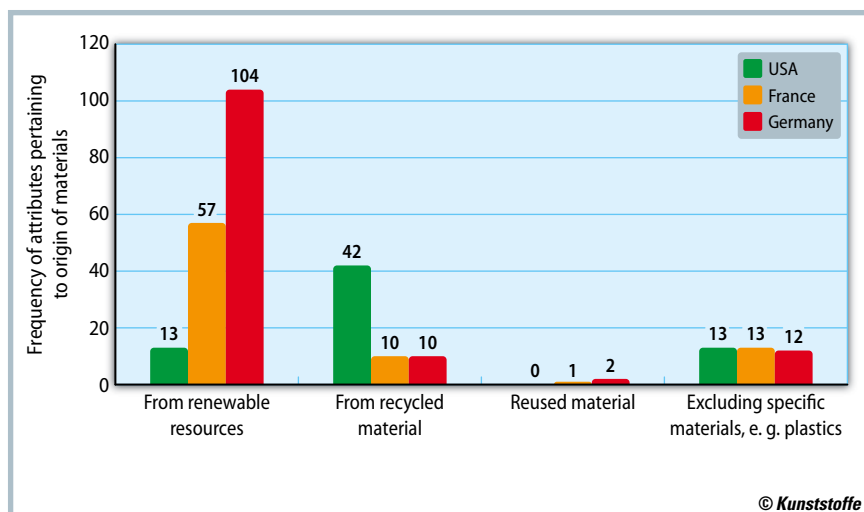


Fig. 3. Frequency of attributes for material origin: number of answers to open questions, standardized to 100 respondents per country (source: HfWU)

ed the attitudes, perceptions and preferences of consumers in seven countries. Only the results for the USA, France and Germany are presented here for space reasons. A part of the survey was conducted in person, another part online. In the three countries considered here, approximately 2000 returns were collected. The questionnaire consisted of closed and open-ended questions and was based on the life cycle concept of packaging (Fig. 1).

Consumers Focus on the End of the Packaging Life Cycle

Table 1 shows that French and US consumers rate recyclable packaging as the most environmentally friendly. German

consumers, on the other hand, consider reusable packaging to be the most environmentally friendly option. Packaging based on material derived from biomethane was rated the worst option in all three nations. It is also interesting that biodegradable fossil materials (option 3) are classified as more environmentally friendly than biobased materials that are not biodegradable (option 6). This already shows a strong orientation of consumer perception towards the end of the life cycle, i.e. disposal.

In order to better understand why consumers judge the above options as described, an open question was asked: "What makes packaging environmentally friendly for you?" The evaluation of all open answers from the three coun- ➤

tries led to a total of over 5000 individual items, which were obtained from the respondents' answers. These were then classified into categories, which in turn were assigned to the stages of the life cycle. **Figure 2** shows that German consumers place more emphasis on the origin of the packaging material, whereas consumers in France and the USA pay more attention to the end of the packaging life cycle. Aspects such as packaging production (e.g. energy consumption in production) or use do not play a major role in any of the three countries. The reduction of packaging, e.g. the avoidance of secondary packaging or the loose sale of vegetables, was also surprisingly rarely mentioned as an answer to the open question.

There were also differences within the phases of the life cycle (**Fig. 3**). For example, German consumers mainly mentioned renewable raw materials in the origin of materials section, while US consumers more frequently referred to recycled materials. Paper, cardboard and glass have often been named by German consumers as environmentally friendly materials, whereas plastics have often been excluded as non-environmentally friendly. Consumers were divided on the new biomethane option: In France and the USA, around half of consumers could imagine using biomethane-based packaging, while in Germany over 60% refused to consider this option. However, this was largely due to the fact that the material was presented in the study as non-biodegradable, which need not be the case. Another negative factor for German consumers was that the cultivation of energy crops for use in biomethane production competes with the production of food.

In a subsequent closed question, the study participants were asked to select three out of nine attributes that make packaging environmentally friendly for them. The results of the open question were largely confirmed: attributes such as "reusable", "biodegradable/compostable" and "recyclable" were selected much more frequently than the attribute "from renewable resources" (**Fig. 4**). It is also interesting that German consumers still had a strong focus on the beginning of the life cycle in the open question, while in the closed question – like consumers from France and the USA – they more frequently chose attributes from the end of the life cycle. In the closed question,

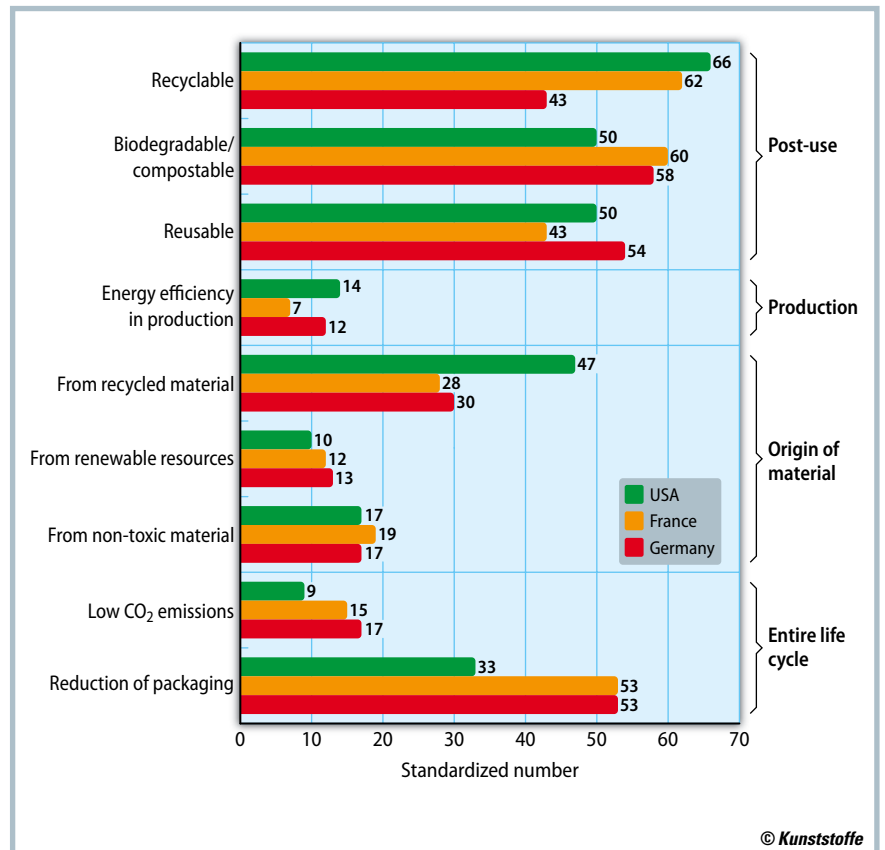


Fig. 4. Number of consumers who have selected the respective attribute as one of their three favorites in a closed question (standardized to 100 respondents per country) (source: HfWU)

consumers – now that they were explicitly confronted with this option – also attached greater importance to reducing packaging, although US consumers found this point far less important than Europeans.

The strong focus on the end of the life cycle may be due to the fact that consumers have to make an active decision about disposal at this point in time. In addition, it may be influenced by existing recycling systems and public and private sector communication. The strong presence of "recyclability" among German consumers certainly can be related to the German deposit system.

Implications for Manufacturers

Manufacturers of consumer goods as well as packaging and plastics manufacturers can draw various conclusions from the results:

First, a strong emphasis on attributes such as recyclability, biodegradability or reusability of plastic packaging can be useful in the short and medium term to meet the subjective evaluations of the majority

of consumers – provided, of course, that the respective packaging actually fulfils these attributes. For those biobased plastics, which on the one hand come from renewable raw materials but are also biodegradable, it is recommended in the short term to place the latter attribute in the foreground in communication.

Secondly, however, it is also necessary to inform consumers comprehensively about the environmental impacts of packaging along its life cycle and also to address the options of renewable raw materials as a basis for plastics. This allows consumers to gain a more balanced picture in order to make their purchasing decisions.

Thirdly, it became clear that the perceptions of consumers in the three countries under consideration sometimes differ significantly. And this despite the fact that the USA, France and Germany are equally industrialized Western countries. This suggests that the selection of packaging materials and the related communication should be country-specific in order to take account of different consumer preferences, but of course without losing sight of economies of scale. ■