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ARTICLE

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ADVANTAGES AND DISADVANTAGES OF USING PAPER, BIOLOGICAL AND PLASTIC PACKAGING IN THE FOOD INDUSTRY

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Summary. This paper discusses the issues related to the use of paper, biodegradable and plastic packaging in the food industry. The advantages and disadvantages of each packaging material were presented and a comparative analysis was developed. Both environmental friendliness and ease of use in different situations and areas related to the food industry were touched upon.
Key words: paper packaging, plastic packaging, biodegradable packaging, advantages and disadvantages, environmental friendliness.

Packaging has always carried the same meaning – to protect the goods from damage and minimize losses at different stages of distribution. It also has an even simpler goal – to convey to the consumer such information about the product as color, weight, composition, size and content.

Since packaging is an integral part of our life, it is very difficult to imagine our life without plastic and plastic containers. To a greater extent, plastic packaging is used in the food industry, about 50% of the total production is sent there, then mainly 25% is used in the chemical industry, due to its strength properties and resistance to chemical reactions, and another 25% is distributed to other industries. But along with this, the amount of waste is also increasing, which is not always properly disposed of and does not lend itself to natural biodegradation in a short time, and therefore we have such a phenomenon as, for example, the Great Pacific Garbage Patch.

All this has led to the fact that a huge amount of plastic containers have accumulated, which does not decompose. New government regulations and growing consumer environmental awareness have forced so many companies to focus on the environmental aspects of packaging. For example, in 2015 England introduced a recycling fee. And the results were quite staggering – in a year, the number of plastic bags that consumers bought decreased by 85%. The money saved went to the fight against environmental pollution.

Currently, the issue of packaging without the use of plastic containers is very relevant, given the topics of population growth and pollution of the planet. Fortunately, modern technology allows us to develop alternative materials that will be just as good as plastic. But in the manufacture of this type of packaging, it is important to consider both advantages and disadvantages.

In order to make sure which packaging remains the most popular, it is enough to visit any supermarket nearby and see what exactly 90% of the products are packed in. It makes sense to use plastic containers when the goal is to protect against environmental influences. This type of packaging in the food industry meets sanitary and hygienic standards and does not require any additional measures to protect products.

The danger of using this type of packaging is that all polymers eventually begin the aging process, characterized by the release of particularly toxic elements that have a high chance of getting into our food. For example, such processes as long-term storage of plastic containers in the refrigerator or its heating are especially dangerous. For this, many countries have adopted labeling standards for plastic containers, and if a manufacturer uses containers for packaging products that are not intended for this at all, this can lead to big problems for the health of the consumer [2]. It should also be taken into account that the volume of plastic waste

is approximately 9 billion tons per year and only 10% is recycled, while others end up in the environment.

If we talk about the pros, then there are no less of them. Firstly, plastic containers are allowed for repeated use, subject to industrial washing using the necessary chemicals. The temperature range in which this type of packaging can operate is also quite high. The safest material for the manufacture of plastic containers today is considered to be PEHD (HDPT) or PVD - high-density polyethylene. It is commonly used to make milk and water bottles and bags, some food packaging containers, and more. Packaging from this type will be resistant to various oils, acids, alkalis and other aggressive substances. And in addition, high-density polyethylene has such a temperature range as -80°C and up to +110°C [2].

Fortunately, today we have the opportunity to work with many materials of any properties and shapes. At the forefront of environmental friendliness, the use of paper and cardboard containers is now in full swing. They are widely used in the food industry (confectionery packaging), and especially in fast food chains. This type of packaging is characterized by low weight, compactness and, above all, environmental friendliness. It is used for the manufacture of wrappers, labels, glasses, plates, boxes and much more.

Such packaging has a fairly large number of advantages:

– there is a possibility of a repeated recycling cycle, which allows producing packaging from existing ones. Also, the recycling time in the environment is hundreds of times less than in plastic;

– paper packaging has such a property as air permeability, which allows it to be successfully used in food packaging;

– this can also include presentability, due to the possibility of a wide product of the material, you can make the packaging exclusive.

A significant disadvantage is that the paper is susceptible to moisture and has a fairly short life. If there was contact with water or a sharp enough object, there is a very high chance of packaging deformation or even the impossibility of its further use. Also, the use of plastic in the manufacture of containers is a cheaper option than the use of paper materials.

Since it is currently impossible to completely abandon plastic containers, the use of biodegradable materials in the manufacture of packaging is becoming very relevant. This is a type of material that decomposes when interacting with various kinds of bacteria, fungi and algae. Biodegradable packaging can be made from materials of organic origin - biopolymers, which can be obtained in two ways: from materials of organic origin, such as cellulose, rubber, grain, milk, and also using biotechnology - this is how vulcanizate, fiber, celluloid and other materials are obtained [4].

This type of packaging is also called the packaging of the future, because it is a very effective alternative to plastic, as it takes a big step forward in the fight against waste. An important advantage is the safety of disposal and the absence of toxicity. Biodegradable packaging does not accumulate in nature like plastic, so it is more environmentally friendly. The most important benefit of biopolymers is their impact on reducing dependence on oil and carbon emissions, which is an important step towards reducing the impact on climate change.

Although biodegradable packaging has some downsides, it is a promising alternative to plastic. One of the challenges associated with the increasing use of biopolymers in the future is the need for more plant material for their synthesis. Unless a more efficient synthesis method is developed, more land for agriculture may be needed to provide the required biomass. Another issue is the need to build new processing plants for the production of biopolymers, which can be a costly and time-consuming process. In addition, the composting of biopolymers requires special composting plants. Despite these issues, biodegradable packaging is an environmentally friendly and renewable alternative to plastic.

Conclusion. The issue of using plastic, biodegradable or paper containers in the food industry is quite complicated, since each material has its own advantages and disadvantages. Plastic containers can be cheap and easy to use, but their production and waste can be a significant environmental pollutant. On the other hand, biodegradable packaging is a cleaner alternative, but its production may require more resources and recycling infrastructure. As for paper packaging, it has less negative impact on the environment, but may be less durable and less efficient in food storage.

Therefore, the choice of packaging for the food industry should depend on specific needs and circumstances. It is important to consider all aspects of the production, use and recycling of each material in order to achieve a balance between efficiency, economy and environmental protection. In addition, it is necessary to continue research and development of new materials that would be more efficient and environmentally friendly.

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