

## **The role of waste recycling and the products received as a result**

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Over time, the number of the population increases, which is directly proportional to the increase in demand and consumption of this or that product, therefore more and more industrial and household waste will be produced. Increased demand for manufacturing of various products requires more resources. At the same time, it is worth noting that today while manufacturing products, the most used resources are natural, which do not have the ability to self-restore, such as: oil, ore, etc. Taking into account all this, after a few hundred years, we may get a collapse of resources on earth, as a result of which the population may be left without certain natural resources. Therefore, it is necessary to recycle the waste.

People became familiar with the possibilities of waste recycling a long time ago. Ecologists and ordinary citizens, who are concerned about maintaining an ecologically clean environment, are actively interested in this issue. Therefore, productions that specialize in waste processing have appeared.

Processing of waste in scientific language is called recycling. Recycling comes from the English word “Recycling” and refers to the processing of waste and garbage in order to obtain raw materials, that is, the use of waste as a resource or obtaining a new product from waste through technological processing.

The goal of recycling is to not lose any useful part of the waste, reduce the consumption of new raw materials and resources, which in turn saves energy, reduces air and water pollution. Recycling helps to save landfill space by removing useful materials. The amount of energy and natural resources required for the production or collection of raw materials is reduced.

As practice has shown, waste recycling is a very profitable segment in the modern business environment.

Production from waste is a promising business idea that one can develop to become a successful businessman. There are many examples of the realization of such an idea in practice.

Everything depends on the amount of investment we have and how large-scale our production will be. In the modern business environment, this is a popular direction. People in Europe and the USA are interested in this issue; Every year enterprises are established that produce raw materials from waste.

Secondary raw materials obtained from waste processing are not inferior in quality to primary materials. It is worth noting the fact that this direction allows us not

only to make money (have a profitable business) and a quality product from waste, but also to take care of the ecology.

The increased amount of waste increases the number of landfills on Earth. The soil, air, and water become polluted, which in most cases becomes the cause of various diseases, epidemics and cataclysms.

Six most recyclable wastes are allocated. These are: paper, glass, aluminium, plastic, car tires and polyethylene bags.

Paper waste, known as waste paper, is one of the most sought-after raw materials for recycling. It is processed in factories into secondary products, such as: office or printing papers, cardboard packaging boxes, paper bags, toilet paper.

Why should a tree, a natural resource, be cut down to create new paper, when we can get the necessary products from recycled paper? It is known that using 1 ton of waste paper saves 4 m<sup>3</sup> of wood, as well as electricity, water, fuel and other resources.

Glass is one of those materials that can be recycled without compromising 100% quality. Accordingly, no matter how many tons of glass we recycle, as a result we save the same amount of raw natural resources. In addition, glass recycling is 40% cheaper than new glass production.

Research shows that it takes 200-500 years for an aluminium to completely decompose in a landfill, while aluminium, like glass, is a recyclable material.

Aluminium is found in the largest quantities in solid household metal waste. It is widely used as a construction material. By processing it, they make cans for various drinks and preserves, confectionery and household packaging materials. Aluminium is used in the production of electric wires, in heating installations.

Every day, millions of plastic bags end up in landfills around the world. As it is known, polyethylene bags are made from petroleum products, therefore increasing the release of CO<sub>2</sub> gas accelerates global warming. Plastics from landfills end up in seas, lakes and rivers, harming aquatic life. When used to transport food products, fruits, vegetables, it has a negative impact on human health.

We should try as much as possible to reduce the use of single-use polythene bags. It is better to replace them with paper bags or biodegradable and compostable bags.

In Georgia, in 2016, LLC “Zugo” started processing waste from polyethylene bags, with the support of the USAID program Waste Management Technologies in the Regions. The company recycles approximately 80 tons of polyethylene bags per year, thereby reducing the number of bags ending up in landfills in the country and saving natural resources and energy.

One can find millions of car tires in landfills. The tire is difficult to recycle. There was no tire processing company in Georgia. In 2017, the tire processing company “TRC” was opened in the outskirts of Tbilisi. It is the first company that started tire recycling. The company wrote a project related to tire recycling and with the financing of “Startup Georgia” and won a grant in the amount of 100,000 GEL. In general, tire

recycling is a less profitable activity, in all successful countries it is subsidized by the state or by importers. From 2020, Georgia introduced a law on the extended obligation of the manufacturer, according to which the imported company itself will be obliged to pay the amount of disposal. The company has been collecting tires from landfills for three years.

Tire recycling produces textile and steel fiber as well as rubber granules. Rubber granules are used for improvement of sports infrastructure, as well as for production of modernized asphalt and recovery of rubber. Steel fiber is used to obtain high-quality concrete conglomerate, which will then be used in the construction of bridges and hydroelectric power stations. Textile fiber is used for thermal insulation.

In January 2023, USAID provided the TRC with a facility that will allow for a four-fold increase in tire and rubber waste recycling capacity, thereby reducing the amount of waste.

Different methods of waste processing are distinguished. One of them is the burning of waste, as a result of which additional energy is obtained, which can be used for central heating and electricity.

In Sweden and Norway, this method is successfully used, they heat apartments and water with the received energy, the population consumes the electricity obtained as a result of waste processing.

Using the right waste recycling and disposal technology, islands can be built. A clear example of this is the artificial islands in Japan.

In the maritime city of Kobe, you will find the artificial island Port Island, it was built between 1966 and 1980 (Phase 1) in the Port of Kobe. The whole island is canned garbage. The port spans 8.33 km<sup>2</sup>. Here you will find various universities: Kobe Women's University and Gakuin University, hospitals, many hotels, an airport for helicopters, museums, a large IKEA store, the third largest in Japan, leisure parks and bars, and also has a large housing complex with about 15,000 inhabitants. It is possible to connect to the island by road bridges. There are small trains on the island for tourists, with the help of which they can explore the whole island.

In 1987-1989 (Phase 2) a second artificial island was built, exactly on the same principle as Port Island. The island is 4 kilometers long and the entire area is occupied by the airport. Here you will find the airport building and two runways.

The island is built by specially invited engineers who exclude any destruction and cataclysms on the island.

The Japanese, in addition to artificial islands, also make sportswear, school uniforms, stationery, office furniture, etc. from waste and plastic bottles. In the city of Kavkasika, restaurants, cafes and school canteens make soap from the fat left over, which is said to have an aromatic scent.

It is interesting to see the attitude of the population of Georgia towards second-hand products.

I conducted a study related to waste management. Two questions in the questionnaire were about the products obtained by waste processing and how acceptable their use is to the population?

120 respondents took part in the survey. When asked whether they know what products can be recycled, they gave different answers:

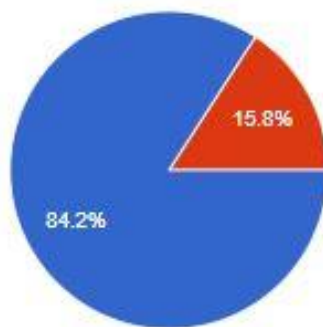
By recycling, we can get:

- 1) paper;
- 2) gas and water pipes;
- 3) plastic dishes
- 4) gas and electricity;
- 5) household furniture;
- 6) synthetic thread;
- 7) organic fertilizer;
- 8) glassware

3.33% of respondents did not know what products can be obtained from recycled waste.

As for the population's attitude towards obtaining a new product by recycling waste, it is positive. It is acceptable for 84.2% of respondents, and for 15.8% - not acceptable.

120 responses



In my opinion, as the awareness of the population about waste recycling increases, the companies involved in waste recycling will provide more information to people about the importance and necessity of their work, and more and more people will favor the use of second-hand products.

In Georgia, there is a social enterprise called “Green Gift”, the main activity of which is the collection of waste paper and the production of various products from the paper obtained by recycling waste paper. Various products are made from recycled waste paper - paper bags, envelopes, wrapping papers, notebooks, printed products (business and greeting cards, brochures, flyers), gift boxes of various shapes, stationery products (calendars, title sheets, certificates, flipcharts, etc.)

Today, “Green Gift” has about 20 friendly organizations. I think that more companies should be involved in waste collection campaign, as a result we will get less waste in landfills, we will save natural resources.

In Georgia, there is a company “Polyvim” LLC, which collects and separates used plastic bottles, recycles them, and PET bottle waste is transformed into PET flakes. The flakes are transported to a second plant where they are processed to reduce them to raw materials at the polyester fiber production facility. Polyester fibers are used in the manufacture of many products, including clothing, household products, industrial textiles, filters, rubber fabrics and non-stretch fabrics.

“Polyvim” LLC is launching a campaign called “Be the first” to encourage sorting and recycling of recyclable materials. Individuals will be able to hand over a plastic bottle, in return for which they will receive monetary compensation. Also, companies, startups are encouraged to collect plastic throughout Georgia, and "Polyvim" LLC is ready to buy the collected waste, the value of which will depend on its source (where it is obtained), color (separated or mixed) and other details.

One of the Georgian eco-friendly companies “Tene”, which makes telephone cables, adapters, car adapters, power banks, waste sorting/separators from second-hand waste, offers Georgian residents to hand in solid household waste, collect points and exchange it for the product they want, to encourage recycling.

As we learned above, the business segment related to waste processing has already become popular in Georgia. I studied the main directions of their field of activity and share with you the main advantages and disadvantages of the waste recycling business as a conclusion.

The following points can be defined as advantages:

- Production from waste - as practice has shown, it is a profitable and unconditionally useful business.
- Helps the environment - therefore it is in the state's interest to support such businesses, both at the legislative and practical levels.
- This type of production requires a complex organizational structure, but we emphasize again that it is profitable.
- The basic raw material for this type of production is free because it is waste/garbage;

As for the disadvantages:

- To organize this type of production, a large amount of capital investments is needed, the main part of which will be spent on the purchase of special equipment;

In my opinion, as more companies start encouraging measures in terms of waste sorting and recycling, the population's interest and awareness in this regard will increase. They will start separating/diverting the waste, therefore the waste in the landfill will be reduced, we will save natural resources and the risk of environmental pollution will be reduced.