



BRIEF CONSIDERATIONS ON THE ENVIRONMENTAL ISSUES IN THE TEXTILE INDUSTRY AND THE RELEVANT EUROPEAN LEGISLATION IN THIS FIELD

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Abstract: *In the modern society, environmental protection is a widespread, but still a sensitive topic. The textile industry is one that still generates environmental problems, starting from the production of raw materials used to make various products to the stage when some textiles become waste. This paper outlines the main environmental issues in the textile industry in the European Union, as well as the measures taken by the European authorities to implement the Waste Framework Directive, which sets the basic concepts of the waste management. Regarding the environmental issues, several aspects have been identified, such as the water problem from the double perspective of the huge quantity being used in the production of different textile items and the pollution generated, the gas emissions problem and also the waste problem. All of these issues are being connected, as the more items are produced, more water is used and ultimately, going through all the stages, a larger amount of waste is produced. This is the reason why, at the European level, the authorities are trying to implement a circular economy model in the textile industry. The main goal of the Waste Framework Directive is to reduce the quantity of waste, including the one that comes from the textile industry, by following a five-step plan, including prevention, re-use, recycling, recovery and disposal.*

Key words: *water, gas emissions, waste, recycling, circular economy.*

1. INTRODUCTION

The textile industry is one of the most important and largest industries in the world, providing the society the so-needed textiles in many aspects of our lives and also numerous jobs. Despite the existing positive facts, there is also a significant negative side, because of the significant environmental issues that are connected to the textile production and consumption, regarding the use of resources, water, chemicals and also the resulted waste.

2. MAIN ENVIRONMENTAL ISSUES

According to the official dates, Europeans consume on average 26 kg of textiles per person per year [1] and, on the other hand, approximately 11 kg of textiles is the amount being discarded by each person per year. Even though the COVID-19 health crisis has affected the textile industry economy, resulted in the decrease by 9% of the textiles turnover, as a whole [2], it still had the fourth highest impact on the environment and climate change from a global life cycle perspective.

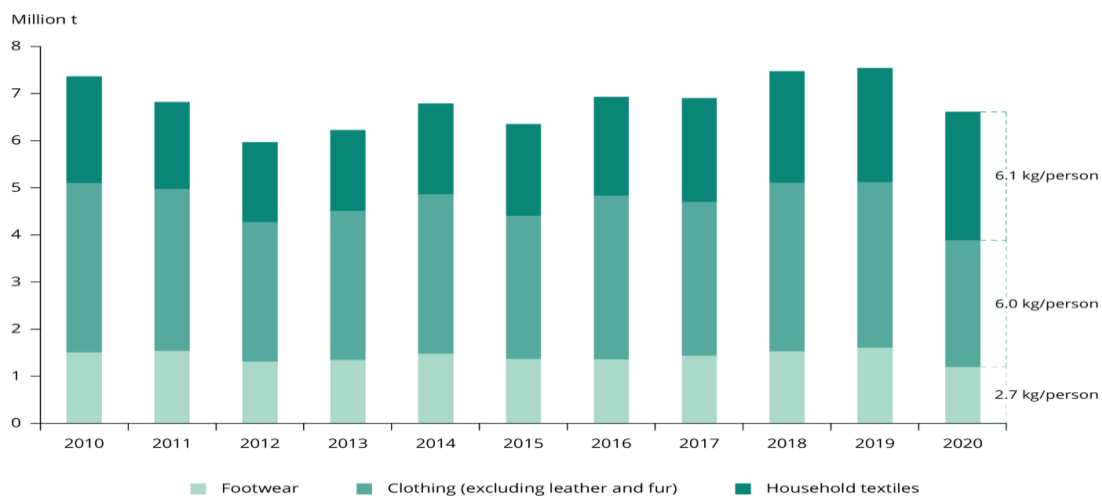


Fig. 1: EU-27 estimated consumption of clothing, footwear and household textiles (excluding fur and leather clothing) for the period 2010-2020 (million tonnes and kilograms per person) [2]

2.1. The use of water and water pollution

In the field of the textile industry, one of the well-known environmental issues is the use of water. For example, it has been estimated that the at the global level, this industry uses almost 80 billion cubic metres of water per year [3], and just for the making of a single cotton t-shirt there are needed 2,700 metres of fresh water, which is the amount that a person would drink in 2,5 years. Another relevant example showing the great amount of water used in the textile industry is that in order to produce only 1 kg of fabric, there are normally necessary 200 litres of water [4], which implies the processes of washing, bleaching, dyeing and cleaning the items. Although there are large amounts of water that are used, another worrying situation arises, consisting in the pollution that occurs when the untreated water is discharged into the environment.

A lot of water is used in the process of washing the synthetic fibers, a process which generates pollution, being estimated that 0,5 million tons of microfibers are released in a year into the ocean. Studies have shown that approximately 8% of the European microplastics that are found in the oceans come from synthetic textiles [5]. Usually, microplastics that come from textiles have a fiber shape, which is why they are called microfibers. Even though there are textiles that are not synthetic, these items can also be considered as a source of water pollution, due to the fact that they shed microfibers as well. Studies also take into consideration the fact that nowadays fast fashion has an important role in the use of water and consequently in the release of microfibers in the environment, as the items contain high levels of synthetic fibers. Moreover, it has been shown that the first machine washes are the ones that generate the greatest release of microfibers, which is another argument from which it is quite clear that the products produced in fast fashion are quite dangerous for the environment, as they are not being used for a long period of time [5].

Another problem can be encountered in the process of the production of raw materials and converting them into fibres, that also means the use not only of the water, but also of pesticides and other chemicals. Chemicals are commonly used in the textile industry, starting from the phase of growing raw materials, such as cotton, and then in the process of dyeing and different treatments [6].



2.2. Air pollution

10% of the global greenhouse gas emissions is caused only by the fashion industry, even more than the international flights and maritime shipping together. Official dates show that in 2017, textile purchases in the European Union generated approximately 654 kg of CO₂ emissions per person. Improving the way cotton and polyester (these being the mainly fabrics used) are produced could have a huge impact on the reducing of the emissions.

In 2015, it was estimated that over 706 billion kilograms of greenhouse gas were released in polyester production in textile industry [6], as polyester is made from oil and processing the raw material requires a lot of energy. In the case of the cotton, the use of the fertilizer releases nitrous oxide, which is a greenhouse gas with 300 times more warming power than CO₂.

2.3. Textile waste

Another modern problem, which is very spread nowadays due to the great number of textiles that people buy and the existence of the fast fashion phenomenon, is the fact that the unused or unwanted items are being thrown away and not recycled or re-used. This generates huge amounts of textile waste, and the impact is felt especially in the so called third countries, where the waste is being sent. For example, recently, in February 2022, the Romanian Customs stopped a transport of 15 tons of textile waste, meaning clothes that were in an advanced state of degradation and were classified as hazardous waste.

Last year, border guards from the western and southern borders of Romania, together with customs workers and representatives of the National Environmental Guard, discovered on a container and 10 trucks, the total amount of 186,409 kilograms of waste, consisting of textiles, aluminium, polystyrene, glass, rubber and plastic, which were to be imported into Romania, without complying with legal provisions.

2. MAIN SOLUTIONS TO THE ENVIRONMENTAL PROBLEMS IN THE EUROPEAN UNION

The first step in trying to solve the shown environmental problems it is represented by the awareness that these problems really exist and that the environment is seriously affected, a fact that should be in the attention of the society and of the governing bodies of the states and of the European Union.

For example, regarding the problem of the microfibers released in the environment, it has been shown that this is a very complex issue, whose solution would require more knowledge on the release mechanisms and the impact on the environment. As this is a constantly evolving process, the European Union has considered putting into practice some policies in order to minimise the release of microfibers from textiles. In 2018, the European strategy for plastics has been adopted and it contained provisions for reducing microplastic pollution. Also, the European Commission implemented the so-called REACH regulation (number 1907/2006), whose aim is to improve the protection of the environment with the help of four processes regarding chemicals, which are the registration, evaluation, authorisation and restriction of chemicals [7]. This topic is also brought into attention in the EU economy action plan, in which textiles and plastics are among the key value chains.

Regarding the use of chemicals, one of the solutions would be reducing the need for them, especially in the process of producing the denim, as it often uses dyes and other chemical-based substances in order to create the final product [8]. Consequently, companies have taken into



consideration replacing dyes with digital printing, having a positive effect on both the use of water and reducing waste. Another solution would be the existence of dyes that do not contain hazardous chemicals or the use of lasers instead of chemicals, which were put into practice by some manufacturers [8].

As for the textile waste, there are a few solutions found even in the Waste Framework Directive, but it has to be mentioned that these solutions that are specified below can be the key to solve not only the problem of the waste, but can be linked to the other aspects shown above. For example, it has been shown that mechanically recycled polyester generates 70 percent less emissions than virgin polyester [6], and this would also imply reducing textile waste.

The achieving of the goal of reducing the environmental and climate impacts of the textile industry strongly requires a systemic change towards circularity, a fact which presupposes effective policies related to materials and design, production and distribution, use and reuse, collection and recycling in this industry.

3. THE CIRCULAR ECONOMY MODEL. WASTE FRAMEWORK DIRECTIVE.

The success of the circular economy model depends a lot on the policies and regulations regarding the quality and safety requirements of a certain item, from the very beginning of its production. The main goal is that of a longer use of the product, even its reuse or recycling.

Because it produces more than 2,5 billion tons of waste every year, the European Union aims to create a model named the circular economy [9], so the legislation in this subject plays a fundamental role. The main idea is to reach an extended life cycle of the product.

The shift towards circular business models is therefore essential, and there are a number of steps that need to be followed in order to achieve this. First of all, is important ensuring an increased period of use and reuse of the product. Also, the process of choosing the most adequate and eco-friendly materials, that could lead to the durability and longevity of the product. The whole process implies reducing waste to a minimum and also the diminution of the annual greenhouse gas emissions.

In order to accomplish the move to a circular economy, the European Union has included the principles for waste management and other aspects regarding a five-steps waste hierarchy, such as prevention, re-use, recycling, recovery and disposal, in the Waste Framework Directive, number 2018/851, which modifies the 2008/98/EC Directive on waste.

The targets which are settled by the Waste Framework Directive for municipal waste are the following [10]:

- preparing for an increase a minimum of 55% by weight of recycling and reuse of municipal waste by 2025;
- preparing for an increase a minimum of 60% by weight of recycling and reuse of municipal waste by 2030;
- preparing for an increase a minimum of 65% by weight of recycling and reuse of municipal waste by 2035.

The fundamental measures that need to be put into practice as soon as possible are the waste prevention and re-use of the items, which will have the immediate effect of reducing the total annual greenhouse gas emissions generated by the productions of materials. In order to achieve the waste prevention goal, the authorities could consider, as shown in the article 9 of the Directive, the promotion and support of the sustainable production and consumption models; encouraging the



design, manufacturing and use of products that are resource-efficient, durable (including in terms of life span and absence of planned obsolescence), repairable, re-usable and upgradable; targeting products containing critical raw materials to prevent that those materials become waste; encouraging the re-use of products and the setting up of systems promoting repair and re-use activities, including in particular textiles.

Regarding the hazardous waste, as the one mentioned above that was about to enter Romania, the Directive provides not only an additional labelling, but also the record keeping, monitoring and control obligations from the waste production to the final disposal or recovery. On the other hand, it also bans the mixing of hazardous waste with the non-hazardous one.

4. TEXTILE RECYCLING IN ROMANIA

Romania is one of the countries in which the recycling rate is low, of only 13,7% in 2020 [11]. A series of factors have been identified [12] for this low rate, including the insufficient implementation of the separate collective service and the lack of the necessary infrastructure for the recycling process. In Romania, as in other European countries, there is a significant number of textile waste, which results not only from the degradation of some items, but from the idea that some clothes are no longer considered modern or trendy. Consequently, people usually throw and consider these items as household waste, although they could be recycled. Textile recycling is not a very known and spread process in Romania, though it would be an important part of the circular economy business model.

The top 10 European countries in which recycling clothes is very popular are Ireland, Germany, the Netherlands, France, Spain, Poland, Italy, Denmark, Sweden and Czechia. Romania ranks 19th in the European Union [13]. The Waste Framework Directive sets the obligation for all member states, including Romania, to set up separate collection for textiles by 1 January 2025.

5. CONCLUSIONS

Although the textile industry raises some environmental issues, they are not irreparable ones, being in an interdependent relation, which implies that the solutions to fix them are mainly common.

Prolonged use of textiles, reuse or recycling could be the key to solving many of the problems identified, leading to the use of smaller amounts of water and, consequently, a lower level of pollution and leading to lower gas emissions and it might also handle the waste issue. Of course, in order to be put into practice, these solutions must be made aware by the authorities to the society, through legal regulations in this field, which is the purpose of the European Waste Framework Directive, and the Member States must achieve the goals via their own laws.

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