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Attitude, Knowledge and Behavior of Romanian Consumers Regarding the Impact of Textile Industry on Human Health and the Environment

Luiela Magdalena Csorba*

Abstract

The textile industry is not only one of the largest industries in the world, but also the most polluting one. This paper deals with the non-sustainable nature of this industry and the health care problems caused by the toxic chemicals used to manufacture clothes and provides an analysis of the textiles safety and its impact on both the consumers' health and the environmental equilibrium. Given that all countries (more or less) are involved in the textile industry, this field has to explore ways of becoming sustainable.

Having as starting point recent surveys, we developed our own research through questionnaire, which has raised questions not only regarding the environmental impact of textiles industry, but first of all regarding the hidden risks of wearing clothes manufactured by using hazardous chemicals. The purpose of the survey was to get an understanding of the Romanian consumers' attitude, behavior and knowledge regarding the textiles safety and the impact of the fashion industry on the environment. We found out that Romanian consumers have less knowledge about the health impact of potential toxins when simply wearing a piece of clothing. More than 75% of the respondents are not interested or not well informed regarding the non-sustainable character of the clothing industry. For most Romanian consumers, labeling, as well as the environmental and health impact, do not change their behavior.

An important result of the survey is that the environmental impact of the textiles industry is less recognized by Romanian consumers, which translates into a low environmental consciousness.

Keywords: textiles safety, sustainability, environment, label, toxins.

JEL: D18, I12, L67, Q01.

1. Introduction

Product safety is a hot legislative topic all over the world. One of the reasons for this situation is the fact that a growing number of chemicals with hidden or dangerous characteristics can be found in almost all the products offered on the global market nowadays. Such dangers, generated by the consumer society, were enunciated for the first time in the USA by philosophers like Marcuse (One-dimensional Man, 1964), economists like Galbraith (The Affluent Society, 1958) and Vance Packard (The Hidden Persuaders, 1957). Later,

* Assoc. prof. PhD., University "Aurel Vlaicu" of Arad, Romania

Kennedy, in his Special Message to Congress on protecting consumers' interests (1962) proclaimed officialy that consumers are the largest economic group in the economy, affecting and affected by almost every public and private economic decision. Two-thirds of all the spending in the economy are made by consumers. Also, they are the only important group, who are not effectively organized, whose views are often not heard. That's why marketing, generally, and consumer protection, in particular, is becoming increasingly impersonal.

Consumerism encourages the purchase of goods and services in high quantities. Misleading, fraudulent or unhelpful practices are incompatible with the efficient and equitable functioning of a free competitive economy. Fair competition aids both, business and consumer.

While consumer choice is influenced by mass advertising using highly developed arts of persuasion, the consumer typically cannot be certain whether a product meets minimum safety, quality and efficacy standards. For example, consumers usually do not know how much they pay for a consumer credit, whether cooked food has more nutritional value than other type, whether, or not, the substances used in personal care products are industrial chemicals, including carcinogens, pesticides, reproductive toxins and hormone disruptors, whether there is a risk of developing brain tumours from the use of mobile phones, whether clothing or a textile product contains substances, colors or chemicals which can harm both the consumers' health and the environment, and so on.

In the consumers' mind, all the product safety concerns started with the toxic and unsafe food. People became concerned about the aditives they are consuming daily. Then they started worrying about the impact of their food purchases on the environment. That is why, the contemporary market offers food that has organic certification, is GMO and hormone free, free of additives and any harmful substances. Even if the consumers take care to eat organic food and to use organic cosmetics, this measures are not enough to live a healthy life. Toxins in clothes and footwear are also a cause for concern. The present paper deals with an analysis of textiles safety and its impact on both the consumers' health and the environmental equilibrium.

Under the European integration process that began in the 1960s, European governments have gradually established harmonized regulations to control or restrict the use of hazardous chemicals in textiles and clothing. From the early rules on azo dyes to the present comprehensive REACH directive (Registration, Evaluation, Authorization and Restriction of Chemicals) a long list has been compiled of potentially harmful chemicals that are routinely restricted from use in textiles and products made in, or imported into the EU. Many European companies have maintained Restricted Substance Lists (RSL) for years, to help control chemicals in their supply chains and to prepare for impending regulations. Product safety regulations in Europe seem to have been rigorous since the mid-1990s, especially the legislation regulating the use of harmful chemical substances. The current European Union legislation now requires all TCF (totally chlorine free) brands and retailers selling on the EU market to manage more than 300,000 harmful substances in their products. This program also sets maximum limits for TCF products that come into contact with human skin (independent.co.uk, 2018).

While Asian textiles manufacturers have become accustomed to the European regulatory progress and modified their processes by avoiding restricted chemicals

in order to comply with EU safety guidelines, U.S. textile and clothing companies exporting to Europe are sometimes dismayed when their products are rejected under European consumer protection laws. The trend of U.S. companies expanding their markets by selling in Europe, and European enterprises selling in the U.S., has made communications and comprehension of regulations a challenge. That way, the consumer protection issues become a forefront of thinking in many areas (portals.iucn.org/library, 2018).

NAFTA (North American Free Trade Agreement) had strengthened consumer product safety. Because of that, the North American countries use to operate like the European Union, coming together and establishing effective common product safety regulations throughout the region. Restricted substance lists are also maintained by many U.S. companies, and their use has grown over the last five years. For example, the American Apparel and Footwear Association publish and update regularly a restricted substance list and always release new versions of this list (portals.iucn.org/library, 2018).

Textiles are not the first thing that comes to mind when people think about living a healthier lifestyle, but it definitely should be considered, because many synthetic fabrics are teaming with chemicals and dyes that cannot be washed out, making them a potential health hazard.

The present study is not designed to identify the main determinants needed to identify the complete profile of the Romanian consumer concerned with environmental problems or textiles safety. It is just an attempt to explore the consumer's attitude, behavior and knowledge regarding the social and environmental impact of the textile industry.

Our research has been mainly addressed to a specific group of Romanians located in West Romania, without the intention to analyze the national culture impact on respondents' behavior, attitude and knowledge regarding the textiles safety and the impact of fashion (or not fashion) industry on the environment. Being a local analysis, this will be hard to achieve. That is why testing hypothesis and building factorial analyses is not necessary.

2. The impact of the textile industry on the environment and on the consumers' health

2.1. The negative impact of the textile industry on the environment

In the era of fast-moving industry, where textile producers do not produce only seasonal clothes, but also new collections, clothing purchases have become an activity often considered as being an addiction. People buy more clothes than they need just to keep up with the new trends. The increasing tendency in buying new clothes has generated an increase in the global market production and supply.

According to the newly released World Trade Statistical Review 2018 by the World Trade Organization (WTO), China, the European Union (EU28) and India remained the world's top three exporters of textiles in 2017. Altogether, these top three players accounted for 66.3% of the world textile exports in 2017, up from 65.9% in 2016. All the top three also enjoyed a faster-than-average export growth in 2017, including 5% of China, 5.8% of EU (28) and 5.9% of India. The United States remained the world's fourth top textile exporter in 2017, accounting for 4.6% of the shares, the same as a year earlier (shenglufashion.com, 2018).

China is the largest textile producing and exporting country in the world. Statistics shows that in year 2017 China was the top ranked global textile exporter with a value of approximately 109.9 billion U.S. dollars, which

means 37.2% of the global market share (shenglufashion.com, 2018).

The European Union, with 23% of the global market share and a market value of 69.3 billion U.S. dollars, is the second largest textile exporting region in the world. In 2017, the overall size of the textile and clothing industry in the EU-28 represented a turnover of €181 billion and investments of €4.9 billion. Italy, Germany, Spain and France are the leading countries in the clothing industry within the EU. There were over 170 thousand textile and clothing companies in the EU in year 2017. About 70% of them are clothing companies, 30% are textile companies, while man-made fiber companies account for less than one percent (euratex.eu, 2019).

India is also amongst the top textile producing countries in the world (being also a leading cotton producer, production in 2017 amounted to around 6.21 million metric tons). The Indian textile market was valued at 17.2 billion U.S. dollars in 2017.

The growing fashion industry all over the world has an impact not only on the global economy, but also on Planet Earth. The effects on the environment are devastating, textile industry being in the top five of the industries that pollute the most.

The impact of the textile industry on Planet Earth is huge and involves the whole product life cycle from the raw material supply, textile manufacture, shipping, retail and disposal at the end of life. This includes the use of pesticides in cotton farming (cotton accounts for 8-10% of pesticides and up to 50% of all pesticides used in developing countries), intensive water and energy use during textile production, the application of toxic chemicals in dyeing, as well as waste management (WWF, 2013).

Yearly over 100 billion new fiber cloth items are produced globally, the planet being unable to support that. Cotton is most commonly used in the garment industry, 43% of all clothes sold are made of cotton. Cotton production includes the use of pesticides in the agricultural process, toxic paints in manufacturing and a huge quantity of water. A large amont of toxic synthetic materials are also required in processing conventional cotton. Some of these chemicals include silicon waxes, petroleum scours, softeners, heavy metals, flame retardants, ammonia and formaldehyde. Just to grow cotton needed for a pair of jeans requires 1,800 gallons of water, and 2,700 liters of water are needed to produce a single cotton t-shirt. Manufacturing of synthetic fiber requires less water, though dyeing both cotton and synthetic fabric requires more. It is estimated that a single textile factory can use 200 tons of fresh water per ton of dyed fabric.

Documentaries about factory disasters, rivers polluted by textile mills, and exploited employees are nowadays common news in the mainstream media. For example, in Central Asia there is a cemetery of rusty ships in the middle of a desert that stretches for tens of kilometers. There was the Sea Aral, once the fourth lake on Earth. Since the 1960s, when cotton production started in that area, water resources have begun to shrink. At the same time, in 1960, the Soviet Union began massive irrigation and redirected the water supply to other areas, and the result was that Aral Sea declined by 90%. What was once a lively lake has now become a desert that produces sand storms (www.cotton.org, 2018).

Indonesia is another major cotton manufacturer. Near the Citarum River there are over 400 factories whose toxic chemicals reach the river daily.

The dyeing processes usually involve more than 1600 different chemicals, including formaldehyde, chlorine, lead and mercury. Treatment and dyeing of textile is accountable for 20% of the global industrial water pollution.

The effluent from textile industries carries a large number of dyes and other additives which are added during the colouring process. Water in rivers and other water sources in countries with developed textile industry (China, Bangladesh, the Philippines, Ecuador, Brazil and so on) are contaminated with numerous harmful chemicals which are difficult to remove in conventional water treatment procedures. Contaminated waste waters are discharged into our surface and groundwater. At the same time, dyes and additives used in manufacturing clothes can be highly toxic and carcinogenic. That's why the textile industry is the biggest industrial polluter of fresh water on the planet (ipublishing.co.in, 2018).

Besides water contamination, textiles are one of the main sources of microplastics in the world's rivers and oceans that match synthetic fibers, including polyester, acrylic, polypropylene, polyethylene and polyamide fibres, used in clothing.

Population is increasing. Nowadays the world population is higher than 7.7 billion people. As the world's population continues to grow, so does the amount of garbage that people produce. The most dangerous substance for the environment, the human beings and the animals which forms the greatest part of the waste production all over the world is not wood or glass, not iron or paper, it is plastic. Plastic is an incredibly useful material, but it is also made from toxic compounds known to cause illness, and because it is meant for durability, it is not biodegradable, that is why it has the potential to cause great harm to the environment in the form of air, water and land pollution. It takes 500-1,000 years for plastic to degrade, because plastic is a substance the Earth can not digest.

Over the last 10 years humans have produced more plastic than during the whole last century. 50% of the plastic we use is used just once and thrown away. 80% of pollution enters the ocean from the land. From 4 million to 12 million tons of plastic is discarded into the oceans annually by countries with ocean coastlines. Plastic in the ocean breaks down into small segments, able to kill one million sea birds and 100,000 marine mammals annually. Moreover, 50% of all plastics produced are not deposited in containers for subsequent removal to landfills, recycling centres or incinerators. Compared with materials in common use, plastics have a low recovery rate. People currently recover only 5% of the plastics produced.

According to a 2017 IUCN report, 35% of all microplastics in the oceans come from the laundry of synthetic textiles, making it the biggest source of microplastics before car tyres (portals.iucn.org, 2018).

The textiles industry is not only one of the largest industries in the world, but also the most polluting one. Because all countries are involved (more or less) in the textiles industry, this field has to explore ways of becoming sustainable. The future of sustainable textile largely depends on its ability to reduce the use of resources (land, water and oil), ensure the reuse and recycle of products to minimize waste, protect the environment and human health, improve the safety of workers, meet the demand of consumers for eco-friendly textile products and ensure the right of consumers to make an informed choice. A solution to mitigate the impact of this industry would be to change people's attitudes to buying clothes, in particular to motivate them to buy less clothing (independent.co.uk/life-style, 2018).

2.2. Textiles toxicity and its impact on consumers' health

A hundred years ago, clothing was made of natural fibers like cotton, flax, wool and silk. In the early 1900s synthetics were developed. Although rayon was introduced in 1924, the first truly synthetic fiber was nylon, made

by DuPont from the petro-molecule toluene. Nylon was followed by other synthetics: acrylic (1950), polyester (1953), spandex and olefin (1959). Nowadays, clothing industry is a seven trillion dollar/year industry that uses an astounding 8,000 synthetic chemicals. Consumers have the wrong understanding that synthetic fibers in clothing are safe. But wearing synthetic clothing means an important health hazard directly linked to fashion industry. At the same time, most people are unaware of the potential toxicity of textiles and they don't know that for over half a century people have been reacting negatively to chemicals interacting with their skin causing disorders like infertility, respiratory diseases, contact dermatitis, even cancer.

From a historical point of view, the safety of the products offered by the textile industry is not a new social problem. A humble pair of woollen underpants bought by a doctor in Adelaide in 1931 landed him in hospital close to death, and later in court. He had worn them without washing them first, and this caused a severe allergic reaction to the sulphites, used in manufacturing. The doctor won his case against the manufacturer and that event became the basis of Australia's first consumer law cases, Clement and Clement (2011).

Recently, a Victorian woman bought a pair of canvas and rubber ballet-style shoes from a large shopping centre in Melbourne. After she wore them in the rain, she developed what appeared to be chemical burns on her feet where the shoes had made contact. Other people had a similar reaction to the same brand of shoes, because they were treated with a chemical used as a fungicide and rubber accelerator (choice.com.au, 2018).

At the same time, in Sydney a mum bought a new school t-shirt for her 10-year-old son from the school uniform shop. He put it on and headed off to school. She says that by early afternoon he had a lump on his neck, and not long after that his entire back was covered in hives. When he arrived home in the evening his mother was shocked to discover he had hives all over his body, some being as big as his hand. He and his mother believed they were directly caused by wearing the new shirt without washing it first (choice.com.au, 2018).

In March 2014, the Australian Competition and Consumer Commission (ACCC) recalled two styles of children's jeans and a pillow case, which may have contained potentially harmful azo dyes. Independent Senator for South Australia, Nick Xenophon, has called on the ACCC to block imports of dangerous chemicals in clothing and for an urgent audit of garment and bedding imports (undergroundhealthreporter.com, 2018).

Such cases are not unique to Australia. They are global issues, because most synthetic fabrics all over the world, from towels to dress shirts and bed linens, are treated with chemicals during and after processing. Dr. R. Dixon, Head of the World Wildlife Federation (WWF) Scotland, said that the use of man-made chemicals is increasing, that is why a variety of wildlife and human health problems are becoming more prevalent. He is talking not only about clothes, but also about other consumer products. The chemicals that the WWF was warning about are perfluorinated chemicals (PFCs), which include the non-stick additive Teflon (PTFE). These chemicals are increasingly being added to clothing because it makes them last longer and also can make them wrinkle-free. These chemicals are not only impacting the environment (groundwater, wildlife, air and soil), but they also may be absorbed or inhaled directly by the consumers (independent.co.uk, 2018).

In 2012 Greenpeace International published a research study in the textiles consumers' protection field. Greenpeace tested 141 items of clothing from 29 countries, and found

that 89 contained nonylphenol ethoxylates (NPEs), which are toxic, bioaccumulative chemicals that have been identified as hormone disruptors. They also found high levels of phthalates in four pieces of clothing, and amines from azo dyes that have been identified as carcinogens. The clothing came from major international brands. This was a follow up to an August 2011 report that found similarly distressing chemicals in clothing (motherjones.com, 2012).

The human skin is the largest organ of elimination and absorbtion. When toxins are absorbed through the skin, they are taken-up by the lymphatic system, then into the blood stream and eventually the liver, kidney, bones, heart and brain. Because clothing comes into direct contact with skin for a long time, toxic chemicals may be absorbed, especially when the human body is warm and skin pores have opened to permit perspiration. The effect is particularly serious in children because chemicals in toxic dyes may negatively affect their growth and development, Mirghani et al. (2008).

Petrochemical fibers restrict and suffocate the skin, shutting down toxic release rather than allowing it to escape, contributing to the total body burden and may be the trigger for the onset of disease. The toxic chemicals that may be found in synthetic clothes, include formaldehyde, brominated flame retardants, perfluorinated chemicals (PTFE), insecticides. The more synthetic clothing we wear, the greater is the risk of absorbing toxic harmful chemicals (undergroundhealthreporter.com, 2018).

Let's highlight some of the worst chemicals used in clothing manufacture, some of them being on an extensive list of restricted substances, Clement and Clement (2011).

Formaldehyde is used to "finish" fabric. Exposure to low levels irritates the eyes, nose, throat, and can cause allergies affecting the skin and lungs. Higher exposure can cause throat spasms and build-up of fluid in the lungs, leading to death. A contact with this substance can also cause severe eye and skin burns with permanent damage. It is classified as a potential carcinogen, being linked to a 30% increase in lung cancer, plus skin/lung irritation and contact dermatitis. It is found in fabrics claiming to be: anti-cling, anti-static, anti-shrink, waterproof, perspiration-proof, moth-proof, mildew resistant and chlorine resistant.

Formaldehyde resin products used in the textile industry include printing inks, dyes and textile finishing products. The concentration of free formaldehyde in these products is generally less than 2%. These formaldehyde-based materials help bind dyes and pigments to fabrics, prevent colours from running, improve a fabric's resistance to wrinkles, ease clothing care and maintenance, and prevent mildew.

Formaldehyde is also used, at low levels, in a variety of cosmetic and consumer cleaning products, in some medicines and dental products, and in some bank note paper. It is found in outdoor ambient air from combustion processes related to vehicles and from industry emissions; and also in ambient indoor air from sources like pressed wood, cooking and heating appliances and tobacco smoke. Some governments restrict formaldehyde levels in clothing.

Chromium VI is used on leather and new wool and can cause or exacerbate contact dermatitis.

DMF is used to prevent mould and moisture in leather goods and may cause extensive, pronounced eczema that is difficult to treat. In the EU, the use of DMF for consumer products is banned, including in imported products.

Phthalates used in PVC for shoes and rainwear are suspected of being carcinogenic and may disturb the hormone system.

Alkphenols are used for textile and leather production, being strong disruptors of the human endocrine system and environmentally toxic.

Dispersion dyes can cause allergy and rashes.

Azo dyes are used in the colouring process for textiles and leather products. Recently it has been recognised that some azo colouring agents may form amines (breakdown products) that may have carcinogenic and mutagenic (changing genetic material) properties. These are on the EU REACH restricted list.

Chlorinated phenols (PCP, TeCP, TriCP) used in the processing of textiles can irritate the skin, eyes and mouth. Long-term exposure to low levels can cause damage to the liver, kidneys, blood and nervous system. Exposure to PCP is also associated with carcinogenic, renal and neurological effects.

Silver nanoparticles in name-brand clothing create anti-odor, anti-wrinkle and anti-stain clothes. Nano-particles in clothing can create easily absorbed toxins that, due to their miniscule size, are transported into the organs, including the brain, with unclear consequences.

Other harmful toxins found in clothes include sulfuric acid, urea resin, sulfonamides, halogens and sodium hydroxide (cancerdefeated.com, 2018).

Finally, we have to mention the **pesticide residues** found in all the textiles, even if they are not on the „black list". The toxins used to farm the fiber are almost certainly washed out in the processing of the fiber, so consumers are unlikely to get much pesticide exposure by wearing those clothes. In the case the clothes still contain pesticides they might be a health hazard. During pesticide application, clothing can pick up pesticide residue through spills and drift. The chemical can then enter the body through the skin. That is why it is necessary to wash clothing before wearing it, in order to avoid vulnerability to the harmful effects of pesticides. Consumers must be careful, because tossing contaminated garments into the washer or laundry basket with other clothes can transfer the residue to the other garments, Wessel (1994).

If people have mysterious "invisible illnesses", it is time to check the allergic reactions to the synthetic chemicals used in clothing: skin rashes and lesions that can be cancerous, nausea, unexplained fatigue, burning and itching, unexplained headaches, blurred vision, difficult breathing, reoccurring sinus infections not previously experienced, sudden inflammation and pain, Gottlieb (1956).

What can consumers do to avoid as much as possible the negative impact of toxic clothes on their health?

First of all, consumers have to check the pesticide label for information, in order to be infomed which chemicals are more toxic. Keywords on all pesticide labels identify the toxicity of the product. For example: ***poison danger*** signifies a highly toxic product; ***warning***, moderately toxic; and ***caution***, slightly toxic. Other factors which influence the ease of removal are the formulation and concentration of the pesticide. Commonly used formulations are emulsifiable concentrates ***(EC),*** granulars ***(G)*** and wettable powders ***(WP).*** Water soluble formulations are easier to remove in laundering than oil based emulsifiable concentrates. Multiple washings are necessary if pesticide used is highly toxic or concentrated (ohioline.osu, 2018).

Secondly, we recommend that all new clothes be washed twice before wearing, although washing will not remove certain types of chemicals.

An efficient way to avoid texile toxicity is to choose environmentally friendly clothes. Organic growing methods mean a lot to the environment. For example, cotton that is not grown organically is treated with pesticides,

herbicides and chemical fertilizers. Harvesting organic cotton is much safer for the workers who pick it, and those living near cotton crops will not have pesticides in their water sources. That is why consumers may choose natural fibers like: organic cotton, linen, flax, hemp (grows without any need for fungicides, herbicides, or pesticides because it is naturally insect-resistant), silk, wool, angora, cashmere, mohair and so on (totalhealthmagazine, 2018).

As of 2011 clothing labeled as organic must be certified. In particular, consumers should look for clothing certified under the Global Organic Textile Standards, meaning that the fibres are organic, and also that the garment contains no toxic finishes, dyes, chlorine or formaldehyde, among other restrictions (drfranklipman.com/organic, 2018).

In Europe, The Competition and Consumer Protection Commission is responsible for enforcing the legislation in respect of textile labelling (Textile Fibre Names and Related Labelling and Marking of the Fibre Composition of Textile Products) - Regulations 2012. The aim of the Regulations is to protect consumers by laying down rules governing the labelling or marking of products in relation to their textile fibre content and provides uniform methods for quantitative analysis of binary textile fibre mixtures. Under these Regulations, all textile products must carry a label indicating the fibre content including the fibre names, descriptions and particulars on packaging, labels and markings. Textile products can only be sold within the EU if they comply with the Regulations (beuc.eu/publications, 2016).

If the consumers look after real safety of the desired clothes, it is important to choose clothing and home textiles certified according to Standard 100 by OEKO-TEX®, which offer extensive safety regarding the harmlessness of textiles. Many features argue in favour of the reliability of this product label (oeko-tex.com, 2018):

- OEKO-TEX® testing for harmful substances ensures that the certified textiles are harmless to health;
- The OEKO-TEX® test criteria have global validity. It does not matter where the certified products are manufactured and where consumers buy them;
- The criteria for OEKO-TEX® testing for harmful substances are revised every year and are therefore always up to date with regard to legal regulations and the newest scientific findings;
- OEKO-TEX® certified items are also subject to random testing after certification in the framework of product checks;
- Consumers can independently verify the validity of a label using the test number stated at any time;
- Prerequisite for the OEKO-TEX® product certification is that all components of a product comply with the required test criteria, without exception.

Testing and certification of the textiles is carried out exclusively by the accredited research and testing institutes of the International OEKO-TEX® Association. That way, the Öko-Tex standard should be a model when regulating chemicals in textiles.

We can conclude that nowadays a growing number of consumers are interested not only in the quality or good price of the products. They are also conscious about the conditions under which a product has been manufactured. Therefore, consumer protection in textiles industry has to include both the promise for high-quality textile products without health risks, as well as the compliance that sustainability is implemented in each step of the production process.

Textile industry has a tremendous impact on the global environment and human health,

which requires governments, private sector and consumers to put in greater efforts to make it truly sustainable. That's why consumers around the world have to buy textiles that are safe. They have to make purchases that do not cause harm to Planet Earth. People who live in textile producing regions are much more aware of the sustainability issues the industry faces. Now, thanks to the internet and social media, which give environmental and social advocates a global voice, the concerns in textile producing regions are no longer isolated. As people in other parts of the world become more informed and more educated, they are able to understand these facts and are motivated to make more responsible decisions. That is why, NGOs with environmental and social agenda are becoming more numerous and vocal (theguardian.com/sustainable-business, 2016).

3. Research methodology

3.1. Past researches

Textile sustainability touches consumers in two ways. *First* of all, consumers want safe products. Most people take the safety of textile products for granted, as evidenced in the study "The key to confidence: consumers and textile sustainability - mindsets, changing behaviors and outlooks", conducted with 11,000 global consumers by Anerca for the OEKO-TEX® Association in the second half of 2017. 40% of the consumers were concerned about harmful substances in their apparel and 39% about their home textiles, concluded the study. Those numbers are not far behind the 59% of people who seem to be concerned about harmful substances in their food (undergroundhealthreporter.com, 2018).

The second aspect of textile sustainability has to do with the effect a textile purchase can have on the environment and on people who produce textile products.

Data from "The key to confidence" study indicates that consumers want their clothes to be safe from harmful substances. In fact, 60% of the respondents rated it as an 8, 9 or 10 on a 10-point importance scale. Clothes and home textiles that are made with respect for the environment and textile workers also ranked high with 53% and 54% respectively, rating it an 8, 9 or 10. The numbers indicate that consumers are not yet as well informed about the hazards in their closets and drawers, as they are about the ones in their kitchens, even if information about the textile industry's environmental and social shortcomings is rapidly disseminated (ipublishing.co.in, 2018).

A few months later, in early 2018, a group of graduate students at McMaster University developed a questionnaire as part of their research project on consumer knowledge related to synthetics and cotton in the textile industry and conducted a survey to get an understanding of the consumer perspective on the future and sustainability of this field. The survey was an attempt to explore some of the global cultural beliefs and social understandings of fast fashion and its environmental impact. Approximately 166 people (59 men and 107 women) from 15 countries (like Luxembourg, Netherlands, USA, Poland, Sweden, Norway, Austria, New Zealand, Canada, Ireland, Pakistan, Indonesia, South Korea and Australia) completed the questionnaire.

The conclusion of the research was that synthetic fibres are cheap and offer a wide range of utility that other natural fibres cannot offer. The production, distribution and consumption of synthetic fibres are increasing exponentially with the global advent of fast fashion. However, the use of synthetic fibres comes with significant environmental and health costs. Textiles, as a result, are a major

global polluter, contributing to increasing greenhouse emissions, environmental degradation, water pollution and hazardous health impacts (portals.iucn.org, 2018).

Based on the answers, it can be concluded that the majority of consumers are unaware of the potential toxicity of the materials used to produce clothes. Furthermore, 88.55% of consumers are unaware of any adverse health impacts associated with the use of synthetic fibres in the textile industry. Only the remaining 11.45% believed that they were aware of the adverse health effects.

When asked what information they felt that they should be provided with upon purchasing their clothing, the number one answer was the chemical content of the clothing (with 69.35%). The remaining results are as follows: country of production (68.62%), who made the article/working conditions (68.52%), the associated health impact on consumers (63.44%), environmental impact (59.36%), means of disposal (42.96%), and none of the above (5.11%).

At the same time, approximately 20.74% of the consumers used to always check the label, 69.55% checked the label sometimes and 9.72% never checked the label. Rather than being related to awareness about direct health impacts, the responses were mainly about the adverse impacts of clothing in general. Thus, we can assume that nearly all consumers are completely unaware about how their clothing can impact their health and well-being (portals.iucn.org, 2018).

In addition, upon questioning whether there are better alternative materials, approximately 69.75% were unsure. Those that were sure indicated materials like wool, hemp, silk, bamboo, linen and fur (but, they felt uncomfortable with the idea of animal cruelty). Some also stated that recycled synthetics are a good alternative. However, a majority indicated that cotton is the best alternative.

On average, the students concluded that the questioned consumers were neutral when it came to better understand the sustainability impact of the clothes that they bought. Similarly, they were neutral about paying more for the sustainable clothing. Consumers who said that they were interested in learning more about their clothing also indicated that they would be willing to pay more for their clothing. However, some respondents indicated that although they would like to wear more sustainable and healthier materials, they simply could not afford them.

Nevertheless, the past five decades have seen an immense shift from natural fibers to synthetic materials, even if organic cotton, for example, can play a crucial role in moving towards sustainable textiles. Nowadays cotton seems to be no longer the number one fiber in textile industry. The main reason for this shift constitutes the fact that synthetics are cheaper and easier to produce in large quantities, ideal for the rise of fast fashion, with new clothing items being quickly and cheaply produced to provide consumers with a constantly changing revolving-door of new fashions. For example, the USA imports their polyester at half the cost of cotton from China. Moreover, man-made fibers are flexible, an essential new feature of contemporary clothes. Additionally, synthetic fibres are wrinkle and moisture resistant, strong, durable, need little or no ironing, which is in the interest of athletes and travelers.

According topo Pietra Rivoli, about 1 billion garments purchased in America are made in China (Cloudio, 2007). If we buy part of our clothing locally, it will help reduce the carbon footprints of clothing travelling all the way here. Research suggests also that women buy seven times more than men and women's clothing supply and waste reflects that. Despite massive donations to the second hand market, about 85% of unwanted textiles

in North America end up in landfills (around 11 billion kilograms a year).

Having collected the surveys data, we observed a lack of awareness regarding the issue of synthetic textile pollution. That means also a lack of political will for change, even if moderate, the governments all over the world must add synthetic textile pollution to the global policy and governance agenda.

Consumers play a key role in the sustainability of fashion industry and in raising awareness about the associated health risk, even though they are often not aware of this. To create awareness means to totally change the way consumers think in terms of this issue. But not only consumers have the power to make changes, but also the producers. Radical rethinking requires changing the mentality of both consumers and the industry, giving priority to quality rather than quantity. That means, the quality of clothing available to consumers is valued and takes precedence over the quantity, the profits are not longer of the utmost importance, but rather the health of the environment and citizens worldwide. Radical rethinking includes changes that can also be made in the number of clothes people buy and the number of times these are worn before thrown away. However, these habits are strongly related to the fast fashion addiction and require changes in the entire industry.

Marketing is a key driver of fast fashion since the continuous release of new products motivates the consumers to keep up with every changing trend (hej-support.org, 2018).

The life cycle of synthetics, combined with the use of various toxic chemicals and their negative health and environmental effects, requires a true rethinking and reassessment of this issue (naturalfibres2009.or, 2018).

3.2. Present research

Taking the above mentioned researches as starting point, we developed our own research through questionnaires, which incude questions not only regarding the textiles industry environmental impact, but first of all regarding the hidden risks of purchasing clothes manufactured by using hazardous and toxic chemicals.

We want to underline the fact that the study is limited only to a sample of local Romanians (clients of a fashion shop from West Romania), capturing only a part of the general view towards textiles safety. For the future we think it would be appropriate to repeat this questionnaire at regional or national level, extending our research by choosing to run the questionnaire not only using printed files that should be filled out directly by respondents, but also via internet tools. The sample should be more balanced when talking about distribution throughout the Romanian historical regions, analyzing in that way the national culture impact on respondents' position regarding the textiles industry-environment relationship.

At the beginning, respondents were provided with a description of the purpose of the survey. The purpose of the survey was to get a general understanding of the Romanian consumers' behavior, attitude and knowledge regarding the textiles safety, the impact of fashion and not fashion textile industry, on the environment, and how environmentally-conscious the Romanians are. The interview included questions covering shopping behavior and knowledge regarding the environmental/ health concerns about textiles.

Materials and Methods

The questionnaire written in Romanian language contained 10 simple questions and was distributed directly to 200 consumers from the West Region of Romania in November 2018, as an attempt to explore the consumer's attitude, behavior and knowledge regarding the social and environmental impact of the fashion industry. We decided to question 200

clients of a fashion shop from one of the greatest Shopping Centers in West Romania, establishing a direct (face to face) contact with them. This is the reason why it wasn't necessary to use a specific sampling method.

We do not intend to find out the complete profile of the Romanian consumer concerned with environmental problems. Being a local analysis, this will be hard to achieve. That is why we do not intend to build factorial analyses, to identify all the determinants which influence the consumer's behavior, attitude and knowledge regarding the textiles safety and the impact of the fashion industry on the environment. Age and education can be considered influence factors in explaining the consumers' behavior in the textile industry - environment relationship, but they are not the only ones. Mass-media, the consumers perception of textiles safety, the level of trust/ confidence in the safety of textiles, the fear of adverse effects, the social status (social class), the influence of the social environment and entourage (family, friends, sellers etc), the own perception regarding the impact of the textiles industry on the environment, are all significant determinants which influence the consumers' behavior, knowledge and attitude regarding the impact of textiles industry on the consumers' health and on the environment. We consider gender and income level as being secondary determinants. That is why a complex research by testing hypothesis is not opportune. The data gathered from the questionnaire are not analyzed using the factor analysis, because we do not intend to proceed to a multivariate statistical analysis, just to use descriptive statistics in order to draw up some conclusions obtained from the respondents' answers, aggregated from the questionnaires.

Each question asked had a specific purpose. The first 4 questions underlined the relevancy of gender, age, occupation and income level of the consumers. This elements show potential differences in the opinions and level of knowledge between men, women and generational variation. Question 5 was intented to find out how aware consumers are of any potential negative health impacts caused by clothing. How high is the consumers' level of knowledge regarding the impact of synthetics and toxic chemicals found in clothing, on people's health?

Questions 6, 7 and 8 are dealing with the clothing labels issue, because checking the labels is an indication of the consumers' habits, knowledge and level of awareness about what they are wearing. Are consumers always checking the clothing labels? Did consumers find incorrect and misleading information on the labels? What information would peoples like to be provided through the label, when purchasing clothing?

Question 9 was interested in how concerned consumers are in terms of the sustainability of textiles industry, and how important the consumers' shopping behavior is in measuring the environmental impact of this purchase.

The last question was addressed at finding out how likely are consumers to buy clothing made of sustainable and environmentally friendly materials.

Table 1. *The respondents' behavior, attitude and knowledge regarding textiles safety*

The survey questions	Variables
1. Gender	*79 male* *121 female*
2. Age	*18-35 with 45%* *36-60 with 48%* *> 60 with 7%*
3. Education	*63% higher education* *37% secondary education*

4. Income level	*70% income > 600 euro/month* *21% income between 400-600 euro/ month* *9% income < 400 euro/month*
5. Do you think clothes may be toxic, with a potential negative impact on consumers' health?	*35% are concerned* *65% are not interested*
6. Are you always checking the clothing labels?	*19% always check the label* *53% sometimes check the label* *28% never check the label*
7. Did you ever find incorrect and misleading information on the labels?	*85% insufficiently informed* *15% totally informed*
8. What information would you like to be provided through the label?	*producers' name* *chemical content of the material/colors and the associated health impact* *environmental impact* *recycling possibilities*
9. Are you concerned about the sustainability of textiles industry?	*75% not interested* *20% neutral* *5% interested*
10. Are you interested in buying clothing made of environmentally friendly materials?	*8% interested* *92% not interested*

Results

79 males and 121 females completed the survey which means that 40% of the respondents are males and 60% females (as shown in fig. 1). 63% have higher education and 37% secondary education (fig. 2). 83% of the males and 86% of the females have higher education.

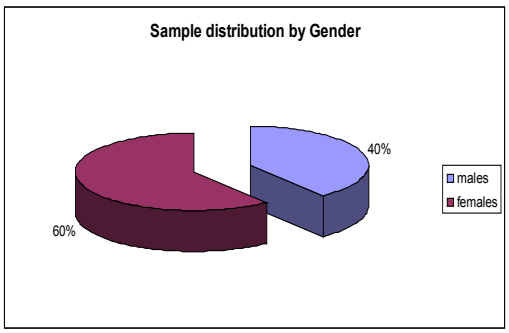

Fig. 1. *Sample distribution by Gender*

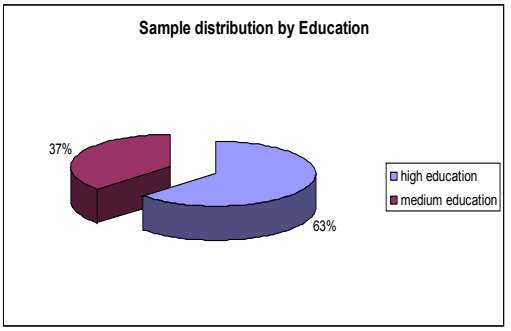

Fig. 2. *Sample distribution by Education*

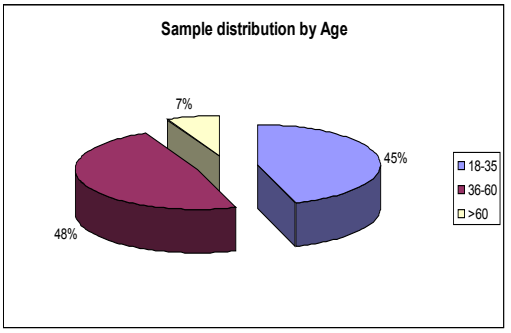

Fig. 3. *Sample distribution by Age*

70% of the respondents have incomes higher than 600 euro/month, while 9% of the consumers' income is lower than 400 euro/ month (fig. 4).

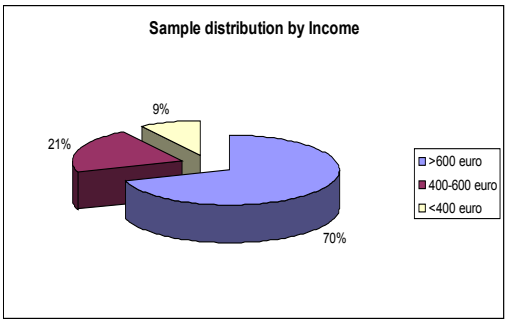

Fig. 4. *Sample distribution by Income*

Only 35% of the respondents care about the toxicity of textiles, the rest are not concerned about this issue (fig. 5). Maybe this is due to the high number of females questioned - from the 35% of respondents, around 60% are females, and only 40% are males. That means

women are more concerned about the health problems the use of textiles may cause.

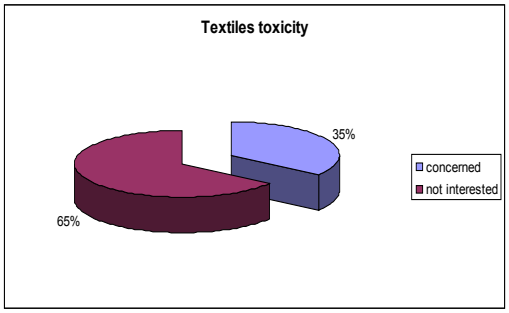

Fig. 5. *Textiles toxicity*

19% of the consumers always check the label while 53% check it sometimes. 28% never check the label (fig. 6). 76% from the females are interested to find out more information regarding the wanted clothes, that is why women read the label. If the information written on the label is insufficient, they get it directly from the sales assistants in the store,

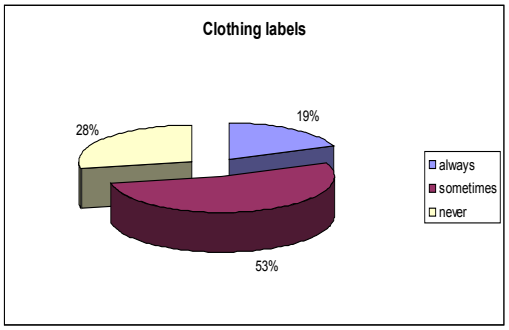

Fig. 6. *Clothing labels*

40% of the respondents were misled by the label specifications, more than 50% of them are females. 85% of the consumers felt insufficiently informed through the label, they often need more information like: producers' name, chemical content of the material/colors and the associated health impact, recycling possibilities, environmental impact (fig. 7).

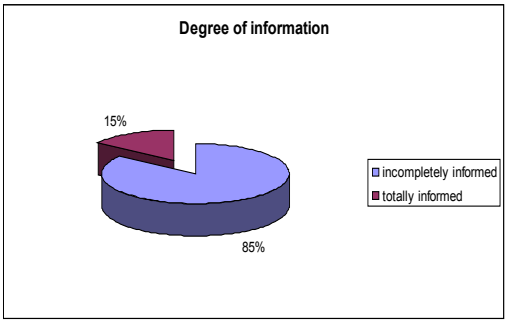

Fig. 7. *Degree of information*

When asked what information they felt that they should be provided when purchasing their clothing, the most common answer was the producers name (53%), then the chemical content of the fabric (with 49.03%). The remaining results are: the environmental impact (29.31%) and recycling possibilities (11%).

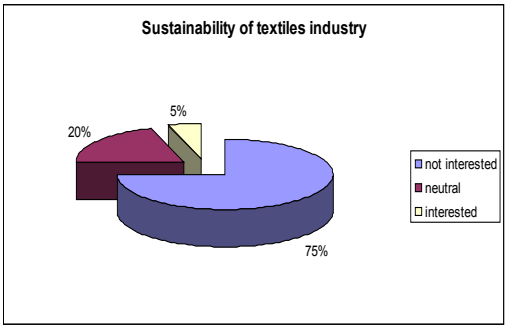

Fig. 8. *Sustainability of textiles industry*

Women are more interested in finding out more information about the chemical content of the materials and the environmental impact, while men are more interested in the producers' name.

More than 75% of the respondents are not interested or not enough informed regarding the non-sustainable character of the clothing industry, 63% of them being women. 20% are neutral when discussing the sustainability of fashion (52% females and 48% males). Because of that, finding sustainable alternatives to reduce the damaging

environmental effects of synthetic textiles is not essential for those respondents (92%).

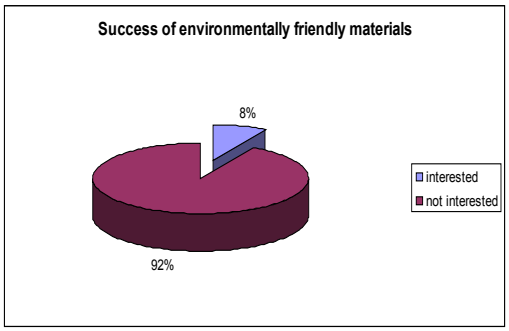

Fig. 9. *Success of environmentally friendly materials*

Romanian consumers have less knowledge about the health impact of dyes or potential toxins when simply wearing clothing. Some of the respondents did speculate about the health effects (35%), while others did not think of the health impact (65%). This result seems to be matching the results obtained by the group of graduate students at McMaster University in 2018, the majority of consumers being unaware (88.55%) of the potential toxicity of the materials used to produce clothes.

We have also obtained similar results with those shown in 2018, regarding the label issue. 19% of the consumers always check the label (compared with 20.74%), while 53% check it sometimes (compared with 69.55%, the result obtained by the group of graduate students at McMaster University). That means a low level of knowledge of Romanian consumers regarding the possibility to obtain accurate information through the textile labels.

From the survey we conclude the real need for the Romanian consumers to have more awareness around the impact of textiles on health and on the environment. Alternative sustainable materials exist in the clothing industry and have a lesser impact on health/ environment, but Romanian consumers are not interested in finding sustainable ways in consuming textiles (92%), compared with 69.75% - the result of past researches. The push for other options should be both on the production and consumption side of the life cycle, so that it impacts both consumers and the industry.

Consumers recognize that organic fibers are a better option for health, but this is associated with higher costs. Alternative materials are not readily available.

For most Romanian consumers, environmental and health impact does not change their consumer behavior.

Conclusion and Discussions

As pointed out in this paper, many familiar and unfamiliar health and environmental impacts are related to the use of synthetic fibers. As an important result of the survey we conclude that the environmental impact of the textiles industry is less recognized by Romanian consumers, which translates into a low environmental consciousness. We believe that knowing the direct health impacts of textiles on consumers would influence positively the consumer shopping behaviour. That is why consumers must be continuously informed and educated in order to increase consumer awareness and to change behavioural habits (clothing purchases, clothes washing etc). Awareness involves not only having the information, but also ensuring it is easily understood and accessible by all.

Global governance must implement policy solutions that recognize the socio-cultural role of fast fashion and promote corporate social responsibility by incentivizing companies to adopt sustainable textile production. Government policies must also incentivize consumers to purchase more sustainable clothing through educating them and providing subsidies to make sustainable clothing alternatives affordable. All these measures are meant to increase corporate and consumer responsibility.

Consumers have at their disposal multiple ways to change their habits and to choose to increase the sustainability of textiles industry: adopting an environmentally friendly laundry regime, washing full-loads, using the correct washing-cycle, switching to an energy-efficient washing machine, washing in cold water, drying clothes on a line, using biodegradable detergents. At the same time, consumers must check the labels and buy as much as possible eco clothing, because they have the possibility to choose sustainable materials, Laughlin and Gold (1990). Completely switching over to natural fibres might present the most sustainable pathway for environment and health. Natural fibers have their own advantages and disadvantages, but they are a sustainable resource as they are renewable, biodegradable and carbon-neutral. Moreover, natural materials seem to have a significantly less damaging impact on human health, for example, a reduction in allergies and rashes. However, opting for the organic production of these materials is essential, since traditional processes use significant quantities of chemicals and pesticides. The problem with many of these materials is that they use a lot of water to produce (cotton uses one thousand times as much as polyester), may harm animals (silk and leather), or are less readily available and more expensive. These natural fibres could provide a sustainable option in the future, but developments must be made in improving the characteristics of natural materials and the increase in production and availability (aboutorganiccotton.org, 2018).

Another option related to more sustainable material choices is the usage of recycled synthetics. Recycled polyester, for example, provides a green, sustainable alternative for virgin polyester. By using PET as raw material, it reduces plastic waste and decreases dependence on petrolatum, thus creating less pollution. Furthermore, no agricultural land is required, no animals get hurt and it does not require gallons of water for production. Moreover, the recycling process can continue to use old fibers as raw material. Econyl is another sustainable example of recycled nylon plastic waste. However, these recycled materials are still a form of synthetic fibres and therefore pose serious health concerns for consumers (cbc.ca/news/business, 2018).

Since consumers are constantly in close contact with textiles and clothing, the need for safety and quality is global. That is why textiles must meet quality, safety and social standards. In order to assure these requirements, producers all over the world have to test the products taking into account the international standards, make quality inspections, assure stability, durability and performance of the final product, avoid using dangerous substances, make rigourous fiber analysis, test clothes against flammability and footwear in order to obtain the CE mark on leather, leather products, footwear, and finally, to give the consumers proper care instructions through labeling.

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