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ENVIRONMENTAL MANAGEMENT IN THE FIELD OF SUSTAINABLE DEVELOPMENT

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Abstract. The present linear (take-make-waste) model of economy representing as well with textile and clothing industry has slight chances of effectively adopting sustainable development principles. In recent decades, clothing production has significantly changed and has grown into a Fast fashion trend characterized by mass production of clothes, low prices, and their short life cycle. Supporting the sustainability, circularity, and resource efficiency of all materials, processes and general business operations is essential in this sector. The paper deals with the issue of the negative environmental, social, and economic impacts of the clothing industry on society. To better understand the situation on the market, paper analyses and evaluates consumer behavior in the clothing industry through the results of a questionnaire survey. Draws attention to the negatives of the linear economy model and proposes solutions to mitigate the detrimental effect of the clothing industry on the environment and society through education, stricter legislation, simplification of the certification process, support and promotion of organic production, and by highlighting the necessity to move from linear economy to the circular economy. Mitigating the negative impact of the clothing industry is essential to achieving sustainable living conditions.

Keywords: environmental management, circular economy, clothing industry, Fast fashion, sustainable development.

JEL Classification: Q53, Q56, F18.

Introduction

In recent decades, there has been a huge development of the clothing industry, which has resulted not only in a change like production but also in an increased impact on the environment. Clothing and textile production is one of the foremost contaminating industries within the world, this has raised queries and concerns from various actors and establishments from the corporate, government, civil society, media, and private spheres. The Europeans consume substantially more clothing today than they did two decades ago. Due to lower prices and a greater variety of clothing consumers are buying more items. The clothing industry has a significant environmental, social, and economic impact on society. The McKinsey Global Fashion Index (MGFI)[1] indicates that more than 100 billion pieces of clothing are produced annually. The production, transport, and use of goods (washing, drying, and ironing) cause more than 850 million tons of CO2 emissions each year (Gavranović, 2020). The intention of the present study, therefore, is to emphasize the negatives of the linear economy model and proposes solutions to mitigate the detrimental effect of the clothing industry on the environment and society. In order to validate the survey instrument, a pilot test was previously conducted on a small focus group to correct the questionnaire than we interview the experts from the field for data validation and compare our findings with studies realized in other countries.

1. Literature review

In the past, the only decision as consumers when we were choosing clothes was whether our clothes are flattering,

[1] The McKinsey Global Fashion Index (MGFI) offers a bird's-eye view of the fashion industry, tracking financial development and value creation through economic profit. Spanning regions, value segments and product categories, the MGFI is comprised of a proprietary data set of public companies whose predominant revenue streams are from fashion.

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trendy, expressive, or appropriate. With the growing knowledge of climate change, new consumers are changing their habits and customs by making choices that have less damaging effects on the environment (United Nation [UN], 2019).

McKinsey's research shows that the sector was responsible for some 2.1 billion metric tons of greenhouse gas (GHG) emissions in 2018, about 4% of the global total. The fashion industry, including the production of all clothes that people wear, contributes to around 10% of global greenhouse gas emissions; representing more than 1.7 billion tonnes per year. This is mainly due to its long supply chains and energy-intensive production. More than 70% of the emissions come from upstream activities, particularly energy-intensive raw material production, preparation, and processing. The remaining 30% are generated by downstream activities such as transport, packaging, retail operations, usage, and end-of-use. In addition to its carbon-intensive supply chain and production processes, the fashion industry also consumes a great deal of other precious resources. The fashion industry is a major consumer of water, cumulatively, it produces about 20% of global wastewater. The dyeing and finishing process of the garments as well as cotton usage consume thousands of tons of fresh water. (E.g. 10,000 litres of water are required to grow the one kilo of cotton; in comparison, one person would take 10 years to drink 10,000 litres of water; (Quantis, 2018; UN, 2019; McKinsey, 2020).

In addition, the fashion industry is responsible for industrial water pollution. The fashion industry produces 20% of wastewater. These textiles like polyester produce toxic wastewaters that contain mercury, arsenic, and, when dumped into the river by the factories, can endanger aquatic life (Perry, 2018). Synthetic fibres such as polyester, nylon, and acrylic are made from fossil fuel, which during laundry releases 1.900 individual microfibers that eventually go into the ocean and are digested by fish that humans eat. The industry accounts for 35% of ocean micro-plastic pollution (190,000 tonnes per year; SustainYourStyle, 2019; Niinimäki et al., 2020).

Talking about the negative impact of the clothing industry we have to refer as well to the major trend in the fashion industry, which Fast fashion has become in recent years (Jin et al., 2012; Arrigo, 2013). Fast-fashion products are characterized by short product life and many trendy styles, as well as being inexpensive and disposable generate a strong impact, not only on the market structure but also on the environment and the amount of textile waste produced (Cachon & Swinney, 2011; Moon et al., 2015, 2017).

The other huge problem is textile waste; the fashion industry produces a huge amount of textile waste (more than 92 million tonnes per year). Furthermore, 85% of textiles end up in landfills or are incinerated when most of these materials could be reused (Hu et al., 2018; Niinimäki et al., 2020). The latest study conducted by Sandin and Peters (2018) showed that the reuse and recycling of textiles, can reduce environmental impact compared to landfilling or incineration However, the textile recycling practices over time can cause a decrease in the quality of the product, and at the sure stage, after several recycling cycles, the products will inevitably become unusable because of the accumulated damage, reaching the top of their lifecycle and converting into waste. Therefore, at this point, textile waste can be utilized in new non-textile production (Yousef et al., 2020). Textile waste recycling technologies are categorized into chemical, mechanical, thermal, or combined treatment with different technologies providing different materials or products at the end of usage. Textile waste is usually recycled by mechanical recyclation, where it is shredded for reuse. Textile waste is converted into powder, which can be used as an alternative thermal insulation solution (El Wazna et al., 2017; Peña-Pichardo et al., 2018; Echeverria et al., 2019).

The production of acoustic and thermal insulation materials from textile waste is one of the most efficient sustainable recycling processes. Based on scientific research, it has been shown that the physical properties of textile waste are very similar to the physical properties of conventional building insulation materials. For this reason, the use of textile waste as an input raw material for the construction industry is directly recommended. Recycling textile waste into building insulation materials has potential advantages in the environmental, health, social, or economic direction. The use of high-quality thermal and sound insulation materials can reduce environmental impact, energy consumption, landfill space requirements, new materials requirements, greenhouse gas emissions, overall pollution (noise, air, soil, and water), oil, fuel, and natural resources consumption. In addition, the production of thermal insulation materials can reduce the energy needed to heat and cool our buildings and cars (Islam & Bhat, 2019).

2. Material and methodology

The methodology consisted of several research methods aimed at achieving the main objective set. In this work, the method of synthesis, analysis, and selection was mainly used. In this context, primary and secondary sources of information consist of professional literature, scientific articles, statistical data, and scientific studies. A questionnaire survey was chosen as the main source of information to achieve the stated objectives. The questionnaire is one of the most widely used methods in the social sciences due to its multiple uses. By using the questionnaire as the main method of research, we can jointly and quickly (many respondents in a short time) determine the facts, opinions, attitudes, preferences or needs, and interests of the respondents while preserving

their anonymity. Thanks to the uniformity of the wording, the data (depending on the type of question) can be evaluated well and the answers from the different groups can be easily compared. In principle, the content, number, and type of questions depend on the purpose of the survey and the target group for which the questionnaire is intended. The questionnaire survey aimed to collect information from the respondents to better understand the market situation and to analyse and evaluate their behaviour. The questionnaire consisted of two main parts:

The analysis of consumer behaviour, specifically on the approach of consumers to worn or discarded clothing, to the process and method of its disposal, and the purchase of clothing.

The knowledge and opinions about sustainable clothing and the impact of the clothing industry on the environment.

The survey was conducted in November 2021–February 2022 by emailing a link to an electronic questionnaire to avoid the need for the researcher to be present.

2.1. Profiles of respondents

The total number of respondents surveyed was 130. The largest share of the respondents was represented by women (101; 78%) followed by men (29; 22%). The gender percentage is not balanced. The higher share of women in the questionnaire survey is due to the higher interest of women in current fashion trends and shopping or sorting clothes. Nevertheless, we gained as well a male view of the issue, although in a smaller representation (Figure 1).

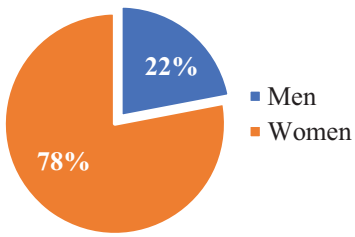

Figure 1. Gender distribution of respondents

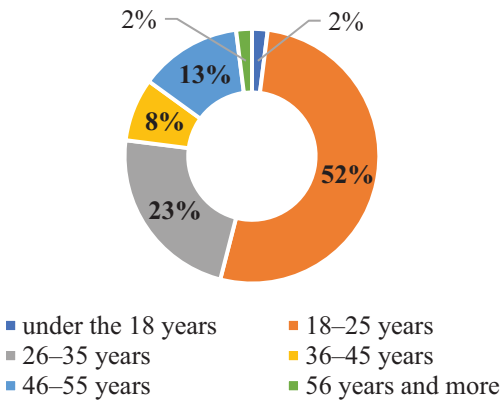

Figure 2 Distribution of respondents in terms of age structure

In terms of age structure, respondents were categorized into 6 age categories. The largest share of respondents was represented by the age category from 18 to 25 years (67; 52%). This fact was also influenced by the method of publishing the questionnaire survey through social networks, which is mostly visited by the younger generation. The data collection method was selected mainly due to the current pandemic situation with Covid-19. The second reason for the predominant representation of respondents aged 18 to 25 is that this generation is increasingly interested in the environmental issue, whether in clothing or other sectors (Figure 2).

2.2. Statistical analysis

The statistical method of the chi-square test of goodness was used to test the relationships between categorical variables. Attention was paid to selected qualitative statistical characteristics, in particular to the measurement of dependencies (associations). We perform statistical analysis with Microsoft Excel using the required formulas and the CHIQ.INV function. All data was then evaluated in Addinsoft's XL Stat statistics program (version 2019.2). We define our null and alternative hypotheses and decide on the alpha value. The risk we are willing to take to prove our independence was set to $\alpha = 0.05$. The null hypothesis is rejected and the alternative hypothesis is confirmed if the critical value (p-value) is less than a significant level (α). In case of confirmation of the dependency between the examined features, we then determined the degree of dependency using Cramer's V-coefficient and Pearson's C-coefficient.

3. Interpreting Final survey results

Fashion within the 21st century is usually fast fashion, characterized by mass production, high turnover, and product designed for a short lifespan (Hall, 2017). The fast in "fast fashion" refers to the speed with which clothing products are manufactured and put on the market for consumers (Smith, 2022). The current linear model of textile and clothing production and consumption (fast fashion) leads to enormous quantities of textile waste because clothes are discarded after being worn for a relatively short time (Koszewska, 2018).

Based on the above, we decided to concentrate on the research part of the questionnaire in four main parts – 1. Respondents' approach to sorting and disposing of used clothes, 2. The method of disposing of used clothes, 3. The frequency of using containers for collecting clothes, and 4. Their approach to buying clothes.

The result of the first research question focusing on the respondent's responsibility for sorting or removing used clothes from the wardrobe can be seen in Figure 3.

The majority of respondents share the responsibility for sorting or discarding used clothing with another person in the household (65; 50%). The second-largest group of respondents is those who perform this process independently (50; 39%). Only 5 respondents, which

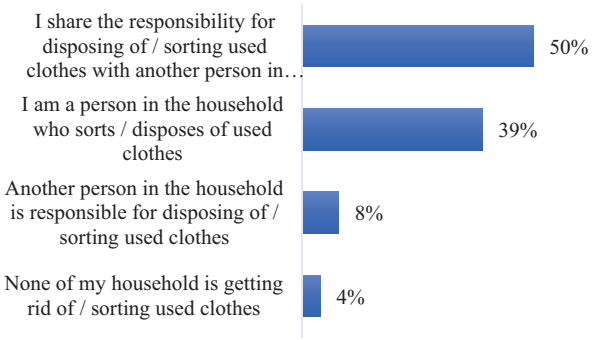

Figure 3. Distribution of the respondents in terms of their approach to the clothing decommissioning process

represents 4% do not sort or discard their used clothes in any way. After confirmation that respondents decommission clothes, we can find out the relationship of respondents to textile recycling in other questions.

With increasing, clothing waste authorities need to search for opportunities to reduce the clothing sent to landfills. The method of disposing of used clothing is regarding environmental protection very important. Clothing donation may be a popular direct reuse option and alternative for landfill disposal (Stall-Meadows & Goudeau, 2012; Degenstein et al., 2021). According to our research, we can state that even between our respondents is the most common way of disposing of used clothing donation; donation to family or friends (94 respondents, 72%), clothing donation container (86 respondents, representing 66%), or charity donation (39 respondents, 30%). There is as well a group of respondents, who try to sell their clothes through bazaars/markets (25 respondents, which represents 19%). Rarely did respondents place unwanted clothing within the trash (9; 11%); however, if respondents choose trash disposal it absolutely was because the pieces were damaged, stained, or worn out. The least popular methods included repurposing garments into another item of clothing (upcycling, 9 respondents, representing 7%; Figure 4).

Figure 4. The most commonly used methods of disposing of used clothing

Respondents were asked about their frequency of using clothing donation containers. The majority stated that they use the clothing donation containers just once a year (58; 45%). Every 4–6 months use the clothing donation containers 46 respondents, which represents 35% and only 3% of respondents use clothing donation containers each month (Figure 5). This question indicates the frequency with which consumers sort their clothes. Considering the results is the incidence of sorting the clothes most likely every 4–12 months. Studies have shown that women are inclined to be more fashion-conscious and sort of clothing more often than men (Lang et al., 2013).

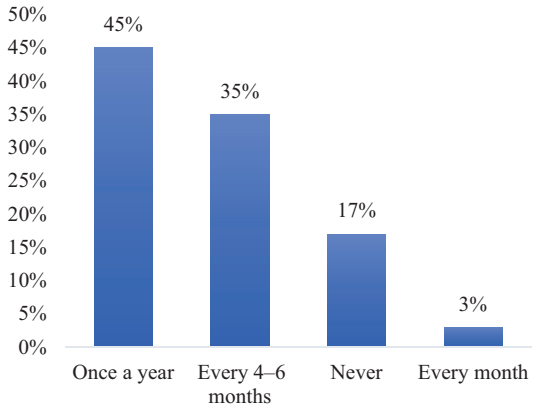

Figure 5. Frequency of using clothing donation containers

The specific part of the questionnaire was focused on the approach of purchasing clothes. The majority of respondents don´t mind buying used clothes (76; 58%). Talking about the negative impact of the textile industry on the environment a large number of respondents, who solely purchase new clothing is an enormous downside (54; 42%, Figure 6).

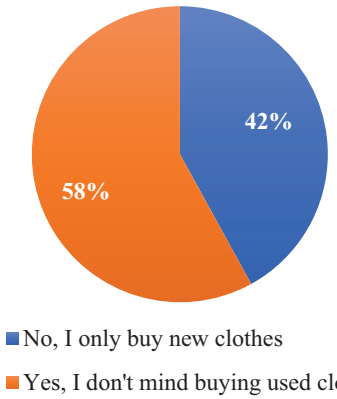

Figure 6. The approach to purchasing clothes

This negative attitude that respondents may have towards second-hand clothes may simply be subjective to each individual and may depend on their previous education and previous knowledge because by buying second-hand clothes, members of society are able to change their way of life in order to promote responsible consumption.

After defining the approach of purchasing clothes regarding second-hand or new clothes, the respondents were asked where do they usually buy clothes? Based on the results, we can state that the respondents still prefer large shopping malls to buy clothes. Up to 51 respondents indicated this option, which represents 39%. This can be proof of the constantly evolving trend of Fast fashion. Nearly one-third of consumers say that COVID has changed their shopping orientations and willingness to purchase clothing online (43 respondents, which represents 33%). On the other hand, 25 respondents, which represents 19%, shop mainly in second-hand stores. One of the most obvious and well-known benefits of buying second-hand is the cost savings. In addition, second-hand clothing has a significant positive social and environmental impact. They reduce carbon emissions, save a lot of resources, water, and energy. Buying second-hand clothing is considered an ecological practice with a responsible consumption orientation and is moving from a linear model to a circular economy (Figure 7).

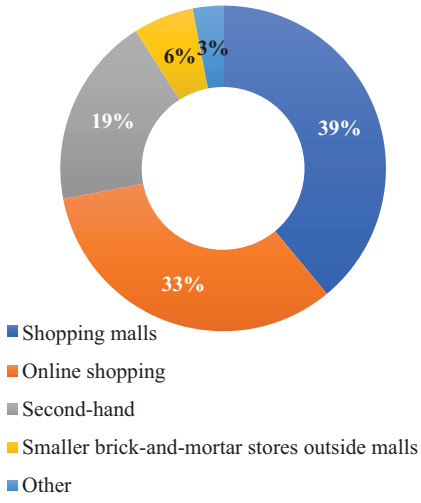

Figure 7. The place where respondents most often buy clothes

We dealt with the willingness of respondents to pay a higher price for sustainable clothing (clothing produced from organic materials, biomaterials, or recycled materials) in our research. Most respondents are willing to pay 10–20% higher prices for sustainable clothing (51 respondents; 39%). Several respondents are willing to pay 40–50% more (9 respondents; 7%). Only 5% of respondents are not willing to pay for sustainable clothes. The results show that the decisive factor in buying clothes is no longer the lowest possible price, but consumers are willing to pay a higher price for a product that would be sustainable (Figure 8).

The second part of the questionnaire survey focused on the knowledge and opinions of the respondents about sustainable clothing and the impact of the clothing industry on the environment. Respondents had to answer an agree/disagree type question (Likert item) on the scale – strongly agree, somewhat agree, neither agree nor disagree, somewhat disagree, strongly disagree.

Figure 8. Willingness to pay a higher price for sustainable clothes

Statement: *When shopping, I prefer clothes made under the conditions and principles of Fair Trade.*

Almost half of the respondents (55 respondents, 42%) were unable to express their position on the issue, which may be due to a lack of awareness of the poor conditions in which clothing is often produced, or a lack of information on Fair Trade principles. Very positive is that 48 respondents; 37%, said that they prefer clothes made under Fair Trade conditions, and therefore we can believe that respondents in Slovakia are beginning to take an interest in this issue and are starting to pay attention to the labels on the products.

Statement: *I prefer clothes made of biomaterials, recycled materials.*

Based on the achieved results, we can say that almost half of the respondents 45% targeted search for clothes produced from organic materials or recycled materials. Disagreement with the statement was expressed by 26 respondents, which represents 20%.

Statement: *When buying clothes, I deal with the origin of the clothes (the place where they were made).* Based on the achieved results, we can say that almost one-third of respondents (44 respondents; 34%) indicated that they do not deal with the origin of clothing. On the other hand, 9 respondents; 7% strongly agreed and 37 respondents; 29% agreed with the statement. Based on this fact we can state that as well one-third of respondents are interested in where the clothes were made (country of origin).

Statement: *I am concerned about the environmental impact of the clothing industry.*

The majority of respondents (100 respondents; 77%) are concerned about the impact of the clothing industry on the environment and perceive this issue (Figure 9).

Statement: *Sustainable clothing is affordable for me.*

Up to 40 respondents; 31% consider sustainable clothing to be affordable and 35 respondents; 27% of respondents, said they disagreed with this statement and considered sustainable clothing to be too expensive to be afforded by the average person. Even given that 50 respondents; 39%, neither agree nor disagree, we can state that the respondents do not know whether the clothing meets the sustainability criterion and therefore cannot even assign an adequate price to such clothing.

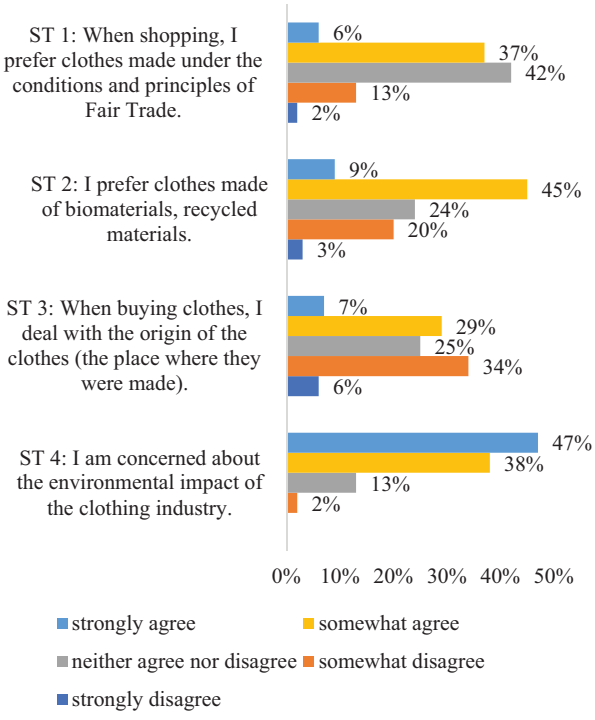

Figure 9. Respondents' opinions on selected statements: Part 1

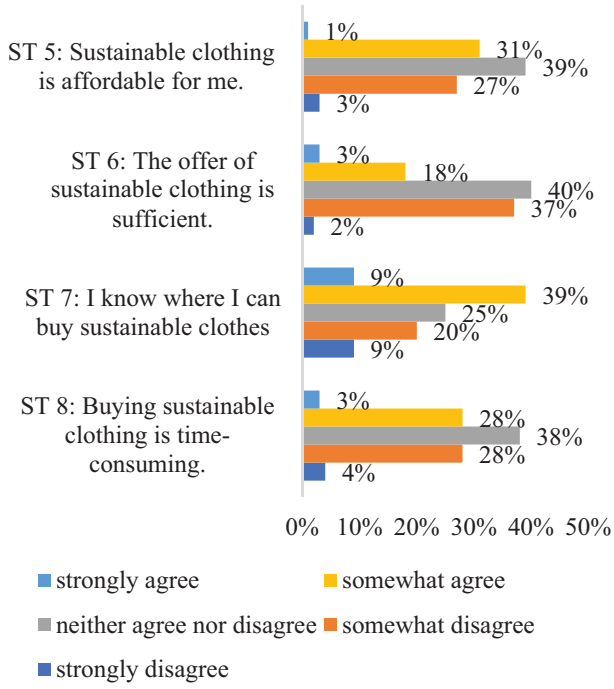

Figure 10. Respondents' opinions on selected statements: Part 2

Statement: *The offer of sustainable clothing is sufficient.*

Sustainable clothing has the potential to have very positive impacts on the environment that´s why we wanted to know the respondents' opinion regarding the sustainable clothing offered in Slovakia. Up to 48 respondents; 37% consider the offer of sustainable clothing to be insufficient and 52 respondents; 40% neither agree nor disagree. The reason may be the insufficient labeling of the products.

Statement: *I know where I can buy sustainable clothes.*

Up to 50 respondents agreed with the statement, which represents 39% of respondents and 11 respondents strongly agreed, which represents 9% of the total number of respondents. Based on the achieved results, we can consider that respondents, who are buying sustainable clothes know where to buy them.

Statement: *Buying sustainable clothing is time-consuming.*

Based on the achieved statements, we see that in terms of time 36 respondents; 28% stated that it is more time-consuming than buying normal clothes and vice versa the same amount of respondents 36; 28% disagree and consider the purchase of sustainable clothing to be as time-consuming as the purchase of normal clothing. The large group of respondents is neither agree nor disagree (49 respondents; 38%; Figure 10.

The questionnaire survey aimed to collect information from the respondents to better understand the market situation and to analyze and evaluate their behavior. Very positive is that despite the trend of fast fashion, which is dominated in the world, consumers are beginning to realize its negative impact on society and the environment.

Conclusions

The presented paper has provided analysis and evaluation of consumer behaviour in the clothing market through a questionnaire survey realized from November 2021 – to February 2022. The majority of the respondents firstly try to donate their clothes to family or friends, use the clothing donation containers, or donate clothing to charity. Based on this we can claim that most of the respondents are trying to support the circular economy and are looking for further use of clothing. The downside is that shopping malls remain a priority place to buy clothes. It is necessary to indicate that people's shopping habits slightly changed with pandemic Covid-19. As people embraced social distancing, they turned to online shopping more than ever before. Fast fashion is a world trend characterized by the ability of fashion firms to respond quickly to changing fashion trends and consumer tastes while keeping product prices low. If you've recently bought clothes in a shopping mall, probably at least one item came from a fast-fashion brand because in the past decade fast fashion became everyday normal. Despite this fact, respondents' interest in sustainable clothing is evident. Particularly among younger respondents, there is interest in purchasing sustainable clothes. The problem with sustainable clothes is the lack of awareness, insufficient labelling of these products, and the brands making false or misleading claims. There is insufficient transparency and interest in the origin of the clothes by consumers. Based on a statistical analysis of selected indicators, we found that there is a significant statistical dependence between gender and willingness to buy second-hand clothes. Significant statistical dependence was also confirmed in the

case of indicators of age and the amount of money that respondents are willing to spend on clothes in 1 month. Most respondents from 18 to 25 years of age spend on clothes up to € 50, this group is mostly students. The willingness to spend more money on clothes concerns older, employed respondents with permanent income. Lastly, we analyzed the relationship between net average monthly income and willingness to pay extra for sustainable clothing. In this case, the association was not confirmed to us, so there is no statistically significant dependence between the indicators. Summarizing the results of the survey, we can state that modern consumers are becoming increasingly interested in the environmental issue and are willing to pay a higher price for sustainable clothes. Efforts to mitigate the negative impact of the clothing industry on the environment and society are reflected in the used methods of disposing of used clothing. The clothing and fashion industry is reorganizing for the next normal after the Covid-19 crisis. We can see an accelerating demand for digital channels and shifting consumer behaviors. Constantly changing consumer habits and their needs, short product life cycles caused by fast-changing fashion trends have a huge negative impact on the environment, especially according to post-consumer textile waste. However, the industry is moving up the waste management hierarchy by reducing, reusing, recycling, up-cycling, reselling, and repairing. Despite the good intentions of some market players, there is little support for moving from a linear to a circular economy. Mass production of clothing is supported by the current "fast fashion" business model, which offers fashionable clothes at affordable prices resulting in excessive accumulation of waste. The production of textile waste is a serious economic, social and environmental problem today. To move from the current business model, managers have to rely on new business models, which are developed with regard to sustainability and environmental consciousness. Not just policymakers and companies have to change the way of thinking, but it is up to each one of us to keep in mind the negative impact of the clothing industry. The survey was administered using Google Forms and collected data by emailing a link to an electronic questionnaire. We used as well the method of snowball sampling technique, which is a standard sampling method in qualitative research. We posted a link on Facebook and Instagram to answer questions online. We applied simple random sampling to choose our respondents. The main reason for conducting the questionnaire survey was to better understand the market situation and to analyse and evaluate the responsible behavior of consumers. The obtained information will serve as a basis for further research aimed at achieving an overall improvement in the clothing market and reducing its impact on the environment and society. We plan through a case study in the field of sustainable development to evaluate social responsibility and point out the innovations that can be used in the transition from a linear model to a circular economy by textile waste recovery. We understand that each study may have its limitations. The potential weakness of the presented study we see in the methodological limitation, where the questionnaire method was used to collect data. Social desirability may affect respondents' answers. This means that respondents answer what they think looks good instead of telling the truth. There are two major limitations in this study that could be addressed in future research. First, appropriate sample size in order to draw a valid conclusion is important. We understand this research as a pilot survey aimed at evaluating the situation in the clothing market in Slovakia. There is the potential to expand our sample size. After a certain time, we plan to repeat the survey and expand the number of respondents not just in Slovakia. The second limitation that could be addressed in future research is the gender distribution of the respondents. The largest share of the respondents was represented by women (101; 78%) followed by men (29; 22%). The gender percentage is not balanced. In future research, we should focus more on men's opinions. We need to address them directly in order to have balanced gender distribution of respondents.

Disclosure statement

All authors certify that they have no affiliations with or involvement in any organization or entity with any financial interest or non-financial interest within the subject matter or materials mentioned in this manuscript.

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