Article

THE INVOLVEMENT AND ATTITUDE OF ROMANIAS IN PRO-ENVIRONMENTAL ACTIVITIES RELATED TO THE RISK OF MICROPLASTIC PARTICLES

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Abstract: Microplastic particle (MPs) pollution is and will continue to be a real threat to the entire planet. There is still no clear and complete information about these effects of MPs. In the research area, the data held so far are enough to have reasons for concern about this global phenomenon that shows an upward trend in global plastic production. The persistence in all four environmental factors and the extreme diversity of MPs leads to high levels of uncertainty in hazard and exposure estimates for this type of risk.

Why do we produce plastic? Due to its durability, rigidity, and even abrasiveness. No technical and efficient way could eliminate nano and microplastic from the environment, and thus people's attitudes can play a significant role in reducing MPs emissions. Currently, few studies have examined how individuals perceive MPs. Our research is based on how Romanians perceive risks (MPs) and how such risk perception affects people's pro-environmental behavioral intention. The entire study is based on a survey (questionnaire) of 405 people, from all over Romania. The software used is SPSS and the questionnaire was sent online through different types of platforms. GDPR rules were taken into account when preparing the questionnaire so that respondents are not asked for their personal data. One of the questions in the questionnaire measures the following statements on a scale from 1 to 7: "Dedicating time, money and effort to my activities is more convenient for me than recycling plastic products"/ "Dedicating time, money and effort is more convenient for me than replacing plastic items with ecological products. On the scale used, 1 represents - Categorically No / 7 - Categorically Yes. We made the delimitation by groups of counties/regions so that we can see a result of the attitude of Romanians from Banat, Transylvania, Maramureș, Oltenia, Moldova, and Dobrogea, in relation to MPs.

The results of our study show that in Romania, the recycling process is on an upward curve. We still do not have this culture of being friendly to the environment, as developed as in the West.

Keywords: microplastic, recycling, risk, survey, purchase decision, environment

1. INTRODUCTION

Reducing the production and input of plastic into the environment must be prioritized first of all through a global multidisciplinary approach, because improperly managed waste becomes a major source of plastic pollution in the soil, water, air, and biodiversity that can be reduced by improving the life cycle of plastics, especially in production, consumption, and disposal (Prata et al., 2019).

The global production of plastic materials reached 322 million tons in 2016, with a high percentage reached in Europe of over 39.9%, being mostly used in packaging (Plastics Europe, 2018). Estimates show that between

4.8 and 12.7 million metric tons of mismanaged plastic waste entered the world's oceans in 2010, inevitably affecting the entire food chain (Jambeck et al., 2015). These plastics, when exposed to different environmental conditions, fragment through photo and thermo-oxidative degradation thus producing particles <5 mm, known as microplastic particles (MPs) (Andrady, 2011).

These microplastic particles are an emerging and at the same time critical problem for the environment, due to their high resistance to degradation and bioaccumulation. Unfortunately, at the moment, current technologies for removing, recycling, or degrading microplastic particles are insufficient for complete elimination. Thus, the development of effective MPs removal methods as well as new plastic recycling strategies is strong points to build an MPs-free environment (Chen et al., 2022).

It is predicted that the total mass of accumulated plastic debris in the ocean could increase to 250 million metric tons by 2025(Jambeck et al., 2015). The level of concern around MPS is so high that governments worldwide are legislating against plastic production (Mitrano & Wohlleben, 2020).

To save the entire planet from this major danger, could we humans take some action?

We should not leave everything in the hands of governments. Our plastic recycling actions, replacing plastic items with more environmentally friendly ecological products, could lead to a decrease in production in the first place and not in the end to the protection of the environment. In the long term, through the actions of the population, even the improvement of human health could follow an upward, improving trend.

Are people's attitudes and perceptions important in reducing the danger of MPs?

Microplastic particles have a high capacity to absorb a large number of pollutants due to their small volume and large surface area. Therefore, MPs can bring many pollutants into different types of environments, thus endangering the stability of the entire ecosystem. Also, MPs can be easily swallowed by different marine species and thus can accumulate in their bodies reaching through the food chain to ultimately affect human health in the long term (Boucher & Friot, 2017; Carbery et al., 2018). Until now, there is no effective technical or chemical way to remove MPs once they have entered the environment. Faced with this problem, it is necessary to understand that people's attitudes and perceptions are important in reducing this danger (Che et al., 2014).

Research on MPs began at the beginning of the 21st century, but the focus has been on MPs in recent years since it became a subject of extreme interest for the press, which has grown exponentially (Klingelhöfer et al., 2020).

People's attitude plays an extremely important role in this type of risk that we encounter in this topic. It is not a foreseeable risk, because nothing similar has happened before. It is an unpredictable risk with a possible estimate of the level of loss and at the same time, it can be a partially controllable risk at the moment. In the future, if measures are taken (producers, governments, etc.), this risk can be transferred to the area of controllable risks. Mps without awareness and a manifestation of the need for environmental protection will affect our lives in the long run. Pollution with MPs is a real global danger and represents a threat to any form of life on the planet, and we, through our decisions and civic spirit, can help reduce this type of risk that affects all four environmental factors (water, air, soil, and biodiversity). Currently, it is not known exactly what is the impact of microplastic ingestion on the human body, nor what the maximum amount tolerated by it, and then returning to the question in the questionnaire, "it is important to dedicate time, money and effort to these types of activities related to the environment?

Experimental and/or Modelling

Study area

The area chosen for the study includes the entire territory of Romania, with respondents from 31 counties of the country as well as the Capital.

Fig. 1. Survey study area https://www.teoalida.ro/lista-judete/

2. Method

Questionnaire

Our survey is based on a questionnaire that was written in Romanian and carried out on an online platform and the link created for the questionnaire was distributed on Facebook, Instagram, WhatsApp, mail, Messenger, etc. The survey was subject to GDPR, the respondents being anonymous, and not asking for their data.

3. Results and discussions

The main question around which the data for the article resulted was: Is devoting time, money, and effort to my activity a more convenient activity for me than recycling plastic products? On a scale from 1-7, the respondents answered: (1- Definitely No and 7- Definitely Yes). The results related to the Romanians' actions regarding Recycling were divided among the largest regions of the country: Transylvania, Oltenia, and Moldova. Of course, a large percentage of those surveyed are not yet ready to make a major change in this MPs risk area. Fortunately, a large percentage was obtained between the two poles (1- definitely No and 7 - definitely Yes). This thing is encouraging and helped by many messages from the mass media and of course, with the help of the European legislation transposed at the national level, the percentage related to recycling could be on an upward curve in the future.

Figure number 2 analyzes the recycling process obtained in percentages following the survey, in the northwestern region of the country. A little over 9% of the respondents committed, that for the next 3 months, they will change some habits and introduce the recycling process into their daily activities, as a lifestyle. Percentage of over 20%, expressed their desire not to make a change in this area (1- definitely No), but over 10% of the respondents answered that they are still thinking, following this questionnaire. A percentage of almost 60% of the respondents from Transylvania answered that they are not sure, their daily life is attacked by many other problems, but they do not say no to the recycling process in the future, which is an encouraging thing.

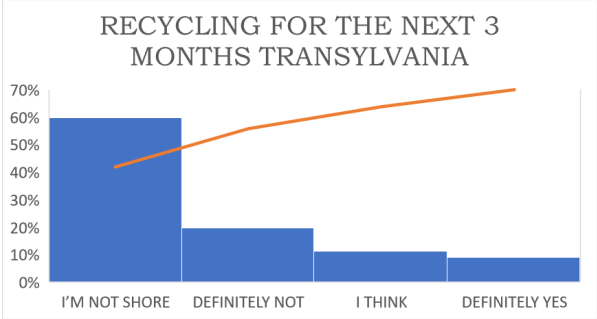

Fig. 2. Recycling for the next 3 months Transylvania

Following the survey for the south-eastern region of the country, figure 3, the percentages are identical both in accepting recycling actions (5%), and answering with an undecided (5%) to this process related to plastic. There may be some problems related to time, related to the ignorance of this type of risk, but no such questions were found in this questionnaire, only answers on a scale from 1-7 between yes and no. More than 40% of the respondents from Oltenia expressed their desire to think about and then make a decision related to the plastic recycling process. Here the percentage is much higher compared to

the respondents from Transylvania. Below 50%, they are undecided, they are not sure and they do not know this environmental problem extremely well.

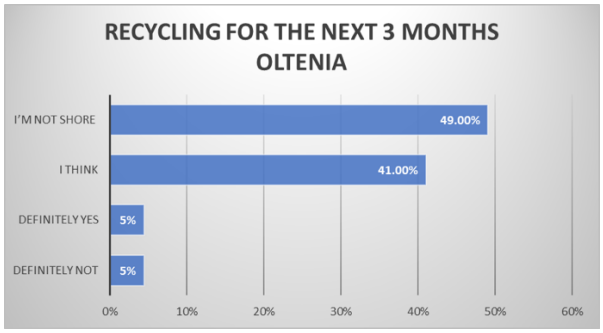

Fig. 3. Recycling for the next 3 months Oltenia

As can be seen in figure 4, 7% of those surveyed from the northeastern part of Romania proposed to introduce recycling actions in their households into their lifestyle for the next 3 months. Few under the percentage of 30% answered definitely no. This thing is not encouraging and actions of this type will be absent from their lives, even if more recently many supermarket chains encourage this recycling process, offering discounts and vouchers in exchange for plastic recycling.

Almost 20% are still thinking and over 40% are not sure.

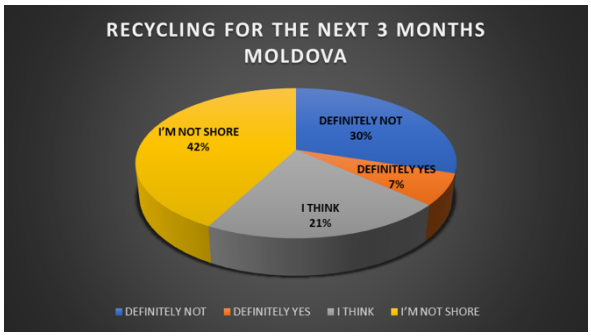

Fig. 4. Recycling for the next 3 months Moldova

4. Conclusions

In Romania, the recycling process is on an upward curve. We still do not have this culture of being friendly to the environment, as developed as in the West. Only a small percentage of over 9% of Romanians in Transylvania have committed that they will recycle in the next 3 months (Fig.2).

For the N-E part of the country, the percentage related to recycling is 6.7% (Fig.3). For the S-E part of the country, the percentages are similar, but very low at the same time, reaching a value of 5%, for those who answered 1- Definitely Yes. Those who answered 2 – categorically No, have an equally low percentage, which is encouraging, in increasing the percentage of plastic recycling (Fig 4).

There is a need for such actions either from governments, as I stated above, or from the media in the field of plastic recycling, but last but not least, a pro-environmental attitude, from each individual, could encourage the percentage of future plastic recycling.

In conclusion, people's attitudes could play an important role in reducing PM pollution, and concrete actions at the level of each individual could reduce the percentage of this type of risk, which acts along the food chain, affecting the environment and human health because the invasion of plastic waste has not been just a movie scenario for a long time, but a real threat to the entire planet. The anti-plastic directive, which aims to reduce the impact of single-use plastic products, had visible effects on Romanian society. New legislation for the entire European territory, new actions of non-governmental organizations, the mass media, and of course the attitude of the individual, all together can increase the percentage on the recycling curve and, last but not least, can lead to a decrease in plastic production.

As a result, MPs risk could be understood as an early exposure and contamination problem that could cause much greater damage and costs in the future if precautions are neglected (European Environment Agency, 2013).

Limitations

The results of our study regarding the attitude and interest of Romanians related to the risk of microplastic particles are interesting, but our study may have some limitations. The first limitation would be the one related to Covid 19. The population was subjected to

the survey following a blockade during the pandemic period. Secondly, a survey done on the Internet may have some limitations because people cannot be contacted face to face. Thirdly, a safety assessment of the risk of microplastics depends on certain factors, such as events in political and social life as well as certain personal experiences. The risk of MPs is a risk, which also results from our study, which is less known, is a snapshot of ongoing development and that is precisely why the study should be repeated.

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