# PR1: INTERNATIONAL REPORT

**FUTURE bio**

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# Contents

# 1. SWOT ANALYZE OF PLASTIC RECYCLING PROBLEMS

The problems that complicate the recycling of plastic are the quality and price of the recycled product, compared to the original plastic. Because plastics are easily adaptable to the functional or aesthetic needs of each manufacturer, the diversity of the raw material complicates the recycling process, making it expensive and affecting the quality of the final product. As a result, the demand for recycled plastics, although growing rapidly, represented in 2018 only 6% of the demand for plastics in Europe, also the EU's plans are to reach a circular economy by 2050, including by reducing the amount of plastic.

## 1.1. EU SOLUTIONS TO INCREASE THE RECYCLING RATE

In May 2018, the European Commission submitted a proposal on the issue of plastic reaching the seas and oceans. This proposal includes a ban from 3 July 2021 on the 10 most common disposable plastic products found on European beaches. Under the Green Pact, 55% of plastic packaging will have to be recycled by 2030. This implies a better design that takes into account the possibility of recycling, but MEPs believe that measures are also needed to stimulate the market for recycled plastic. These measures would include:

- creating quality standards for secondary plastics
- encouraging certification to increase industry and consumer confidence
- introduction of mandatory rules on the minimum recycled content in certain products
- encouraging Member States to consider reducing VAT on recycled products.

Although recycling cannot replace the need to significantly reduce the amount of disposable packaging and is by no means a justification for increasing plastic production, it has an important role to play in the transition to a plastic-free economy. Even so, it is obvious that Romania has not kept its promises even in this sector, which makes us vulnerable to an infringement procedure ( https://www.greenpeace.org/romania/articol/4507/pentru-un-viitor-nesufocat-de-plastic/)

The problem must be solved, first of all, at the source.

1. Manufacturers and traders must gradually reduce and then abandon the production of disposable plastic packaging and invest primarily in reusable systems, thus meeting our citizens in our efforts to have a consumer experience that does not harm. our health and the environment; at the same time, it must review the policies established by the associations with which it collaborates and ensure that they operate in accordance with their social and environmental values.

2. Authorities, in turn, must prioritize public policies that focus on human health and the environment and create a favorable legal framework in which citizens' efforts can be truly implemented.

3. We continue to adopt a responsible behavior towards nature and ourselves, we avoid unnecessarily packaged products in disposable plastic and we get used to reusing as much as possible and throwing away as little as possible.

## 2. A CROSS CULTURAL MODEL REGARDING BIO PLASTIC

We have to mention that the same model will be used for the study cases for: students, academic staff and industrial workers.
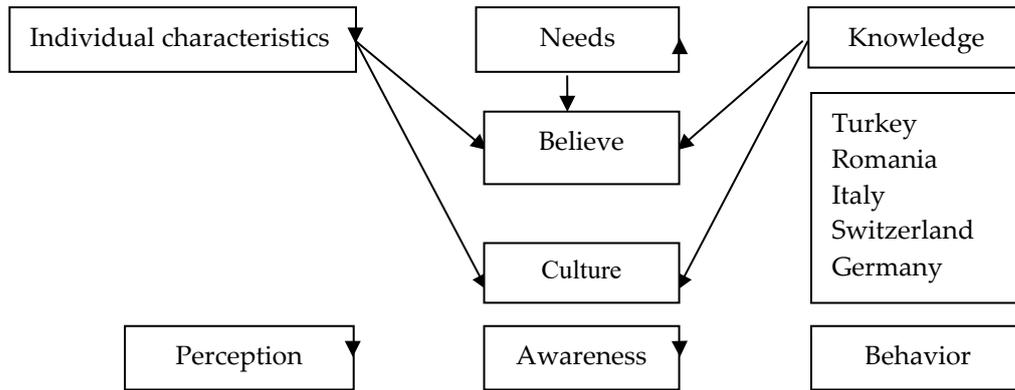
The model will be like in Figure 2.1.



Figure 2.1.  A Cross Cultural Model for  student regarding bio plastic

## 2.1. CASE STUDY 1.  A CROSS CULTURAL MODEL FOR  STUDENTS REGARDING BIO PLASTIC

A total of 589  students,  were involved in a choice experiment during which a specially designed questionnaire through face-to-face interviews and online  was applyed between June –July 2022  in Technical University of Cluj Napoca, Romania, Pamukkale University, Selcuk University and Kirkareli University from Turkey, University of Trento and Cosvitec from Italy and SUPSI from Swtzerland and OTH from Rgensburg, Germany.

In this study, data and statistical processing were performed using the SPSS software package. The purpose of the study has been to better understand students', academic staff and industrial workers behavior and attitude regarding sustainable environment and plastic knowledge and informtion  to examine whether generations play a role in responsible consumer attitudes toward the plastic products and theirr perception to that topic plastic and bio plastic.

The survey was structured in three parts:

1. the first investigated the socio-demographic characteristics of the questioned individuals (gender, age, education and grade)
2. the second was structured for the purpose of scaling methodology on students' perception about the concept of plastic sustainability  and their participation in different activities regarding plastic recycling.
3. the third part identify respondents as consumers behavior and attitude about healthy plastic education, how many  from them select the plastic, if they are using green products.

To measure the student's environmental education, a Likert-scale-type questionnaire, ranging from 1 'Totally Appropriate ' to 5 'Not at all  Appropriate', was applied on a face-to-face basis.

To determine the dimensions of students behavior and identify students implication, needs, culture about bio products and knowledges  an Explanatory Factor Analysis (EFA) were applied to the data set. By independent samples $t$ test, the hypotheses were tested using the SPSS statistical analyses software. In this study, the following factors were taken into consideration:  I—cultural characteristics (country , university, ); N- Needs ; K—knowledge and participation in environment and plastic field; B-Believes. Using the same

survey in all countries in same time it was possible to establish a Cross Cultural Model for students from different countries and identify the common and the differences between them, culture in our case will be the country.

## 2. RESULTS

Cronbach's α coefficient with the value of 0.910 shows that the data base obtains forms the 589 students from Romania, Turkey, Italy, Switzerland and Germany from different grades and fields: economics, engineering, medical, etc. Cronbach's Alpha .910 show us that's the data base can be taken in consideration. Using the data base we obtain the following information.

## A) CULTURE CHARACTERSITICS

Because we take in consideration the model for different countries, we consider the native country of students a culture simbol. From Table 1.1. regarding the students country 41.6 % percent were from Romania, 49,6 % percent were from Turkey and a percent of 3.4 % from Italy, 2,0 % from Switzerland and 3,4% from Germany.

### Table 1. 1. Country culture

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Romania | 245 | 41,6 | 41,6 | 41,6 |
| | Turkey | 292 | 49,6 | 49,6 | 91,2 |
| | Italy | 20 | 3,4 | 3,4 | 94,6 |
| | Switzerland | 12 | 2,0 | 2,0 | 96,6 |
| | Germany | 20 | 3,4 | 3,4 | 100,0 |
| | Total | 589 | 100,0 | 100,0 | |

## B) PROACTIVE ATTITUDE

Analyzing the data from Table 1.2. we can observed that 225 students(39.5%) participate and attend conferences about nature protection, waste management and only 344 students (60%) from respondents didn't participate to any conference about nature conservation, which it is a signal that it is necessary to involve students in different activities, research work and to encourage them to participate to conferences as team members or individual articles to encourage their pioneer spirit.

**Table 1.2. Country culture  * Have you attended a conference on nature conservation before?**

| | | Have you attended a conference on nature conservation before? | | Total |
| | | Yes | No | |
|---|---|---|---|---|
| Country culture | Romania | 52 | 193 | 245 |
| | Turkey | 155 | 137 | 292 |
| | Italy | 15 | 5 | 20 |
| | Switzerland | 3 | 9 | 12 |
| Total | | 225 | 344 | 569 |

Other activities organized by universities or campaigns for use of bio plastic are presented in Table 1.3., 15.14 % percent from Romanian students and  22,67 %  from Turkish students participate in environmental activities focus on  recycling and collecting plastic. 39.71 % percent from students  are active involved in different activities and in balance   29,70% are not interested about the topic, or to be involved in volunteer activities.

**Table 1.3. Country culture  *  I participate in campaigns for the use of bioplastic products**

| | | I participate in campaigns for the use of bioplastic products. | | | | | Total |
| | | Totally Appropriate | Appropriate | Somewhat Appropriate | Not Appropriate | Not At All Appropriate | |
|---|---|---|---|---|---|---|---|
| Country culture | Romania | 37 | 49 | 58 | 41 | 60 | 245 |
| | Turkey | 37 | 92 | 113 | 40 | 10 | 292 |
| | Italy | 4 | 3 | 2 | 6 | 5 | 20 |
| | Switzerland | 1 | 3 | 1 | 0 | 7 | 12 |
| Total | | 79 | 147 | 174 | 87 | 82 | 569 |

Regarding the students believes if they are environmentalist from Table 1.4, 16.52%  percent  from Romanian students they  themself  like environmentalist  and 33.39 % percent from Turkish students. Regarding that concern about  protection of nature show us that  stuents' participate  activities for and about environment, so the young generation don't like to be involve in extra curricula  activities and consider that are specialized person which are paid for that.

**Table 1.4. Country culture  * Do you think you are an environmentalist?**

| | | Do you think you are an environmentalist? | | | Total |
|---|---|---|---|---|---|
| | | Yes | No | Sometimes | |
| Country culture | Romania | 94 | 26 | 125 | 245 |
| | Turkey | 190 | 6 | 96 | 292 |
| | Italy | 7 | 6 | 7 | 20 |
| | Switzerland | 2 | 5 | 5 | 12 |
| Total | | 293 | 43 | 233 | 569 |

## C) STUDENTS   KNOWLEDGES

Students' knowledge regarding the plastic, products and technological process and how the plastic can influence the manufacturing process is presented in Table 1.5, which reflects the students from different countries.  87.75 %  percent of Romanian students heard or knew from mass media about the harm nature of plastic.

A small  percentage of 8,2% do not have any idea, maybe because they are not interested about the subject and they do not care. For Turkish students we obtain that 97.26 % percent know that plastic products used petrol

**Table 1.5.  I know that petroleum product plastics take a long time to biodegrade?**

| | | I know that petroleum product plastics take a long time to biodegrade? | | | Total |
|---|---|---|---|---|---|
| | | Yes | No | No idea | |
| Country culture | Romania | 215 | 10 | 20 | 245 |
| | Turkey | 284 | 2 | 6 | 292 |
| | Italy | 20 | 0 | 0 | 20 |
| | Switzerland | 11 | 0 | 1 | 12 |
| Total | | 530 | 12 | 27 | 569 |

37,76 % percent from Romanian students know that bioplastic is a smart solution for health protection and environment and 41,15 % percent from Turkish students also recognize  bioplastic logos on the products. In conclusion the students have enough information and knowledge about bioplastic and  are involved in environment protection and take care of nature in 93.14 % percent.

## D)  STUDENTS PREFERENCES

Table 1.6 shows that 66.43 % percent of students prefer bioplastic products and 20.56 % not decided yet, maybe because the total elimination of plastic takes a long time and patience.

Table 1.6. Country culture * I prefer bioplastic products because they degrade earlier in nature

| | | I prefer bioplastic products because they degrade earlier in nature. | | | | | Total |
|---|---|---|---|---|---|---|---|
| | | Totally Appropriate | Appropriate | Somewhat Appropriate | Not Appropriate | Not At All Appropriate | |
| Country culture | Romania | 84 | 66 | 46 | 19 | 30 | 245 |
| | Turkey | 79 | 139 | 58 | 13 | 3 | 292 |
| | Italy | 0 | 7 | 8 | 3 | 2 | 20 |
| | Switzerland | 0 | 3 | 5 | 3 | 1 | 12 |
| Total | | 163 | 215 | 117 | 38 | 36 | 569 |

58.4 % percent from students prefer and are using bioplastic bags for shopping, here we have to take in consideration that the new ISO standards obliged all the stores to eliminate the plastic bags, so they are following the rules. Because the plastic it is around our life everywhere even in kitchen (Table 1.7.) the behavior of students is similar in that 43.6 percent adapted their behavior with the new trend using bamabus, wood tools, and ceramic objects and replacing the plastic.

Maybe it is not so difficult if we take in consideration the new trend in each country returning to roots, to natural life, and in our traditional family life , we are using the ceramic and wood objects not only like a fashion but like a tradition.

Table 1.7. Country culture * I prefer to use bioplastic bags for my grocery shopping. Crosstabulation

| | | I prefer to use bioplastic bags for my grocery shopping. | | | | | Total |
|---|---|---|---|---|---|---|---|
| | | Totally Appropriate | Appropriate | Somewhat Appropriate | Not Appropriate | Not At All Appropriate | |
| Country culture | Romania | 87 | 56 | 49 | 18 | 35 | 245 |
| | Turkey | 47 | 98 | 103 | 32 | 12 | 292 |
| | Italy | 6 | 6 | 1 | 3 | 4 | 20 |
| | Switzerland | 1 | 3 | 3 | 4 | 1 | 12 |
| Total | | 141 | 163 | 156 | 57 | 52 | 569 |

## E) STUDENTS BELIEVES

If we look at the variable belief of the students, we see that a percentage of 65.56 % of the students, regardless of the country, agree that plastic will be replaced in the future (Tabel 1.8).

Table 1.8. Country culture  *  I think that bioplastics should replace conventional polymers in the future

| | | I think that bioplastics should replace conventional polymers in the future. | | | | | Total |
|---|---|---|---|---|---|---|---|
| | | Totally Appropriate | Appropriate | Somewhat Appropriate | Not Appropriate | Not At All Appropriate | |
| Country culture | Romania | 83 | 63 | 49 | 13 | 37 | 245 |
| | Turkey | 91 | 126 | 59 | 13 | 3 | 292 |
| | Italy | 1 | 6 | 5 | 6 | 2 | 20 |
| | Switzerland | 0 | 3 | 2 | 3 | 4 | 12 |
| Total | | 175 | 198 | 115 | 35 | 46 | 569 |

A percentage of 20,20% represents the students who sit on the sidelines without getting involved. In conclusion, the theme is known in every country, but membership has no influence on their behavior and knowledge. 14,23 % are not interested in that topic. The students are informed mainly from the mass media, or from the money of the universities or being active in the life of the society.

In addition to improving collection and recycling mechanisms, the European authorities have decided to limit the manufacture of plastic products, especially disposable ones. EU Directive 904 of 2019 prohibits the placing on the market of certain categories of such products for which there are affordable plastic-free alternatives.

Using the tree analysis it was possible to see the connection between the perception of students from different countries' perception of using biodegradable plastic like in Figure 2.2.

A total of 86.2%  percent of students from Turkey, Romania, Italy, Switzerland and Germany sustain the idea of using biodegradable plastic for social events from which 61.3 % percent are doing efforts to use biodegradable plastic, Turkish students in a 64,5% percent present a good behavior and attitude upon  environment. Students 76,45 % percent believe in research and studies about pollution and plastic replacement. A solution can be for universities to involve students in research activities and campaigns dedicated to environment and waste management. A percent of 69,24 % of  students believes that the use of plastics should be generalized in the field of media.
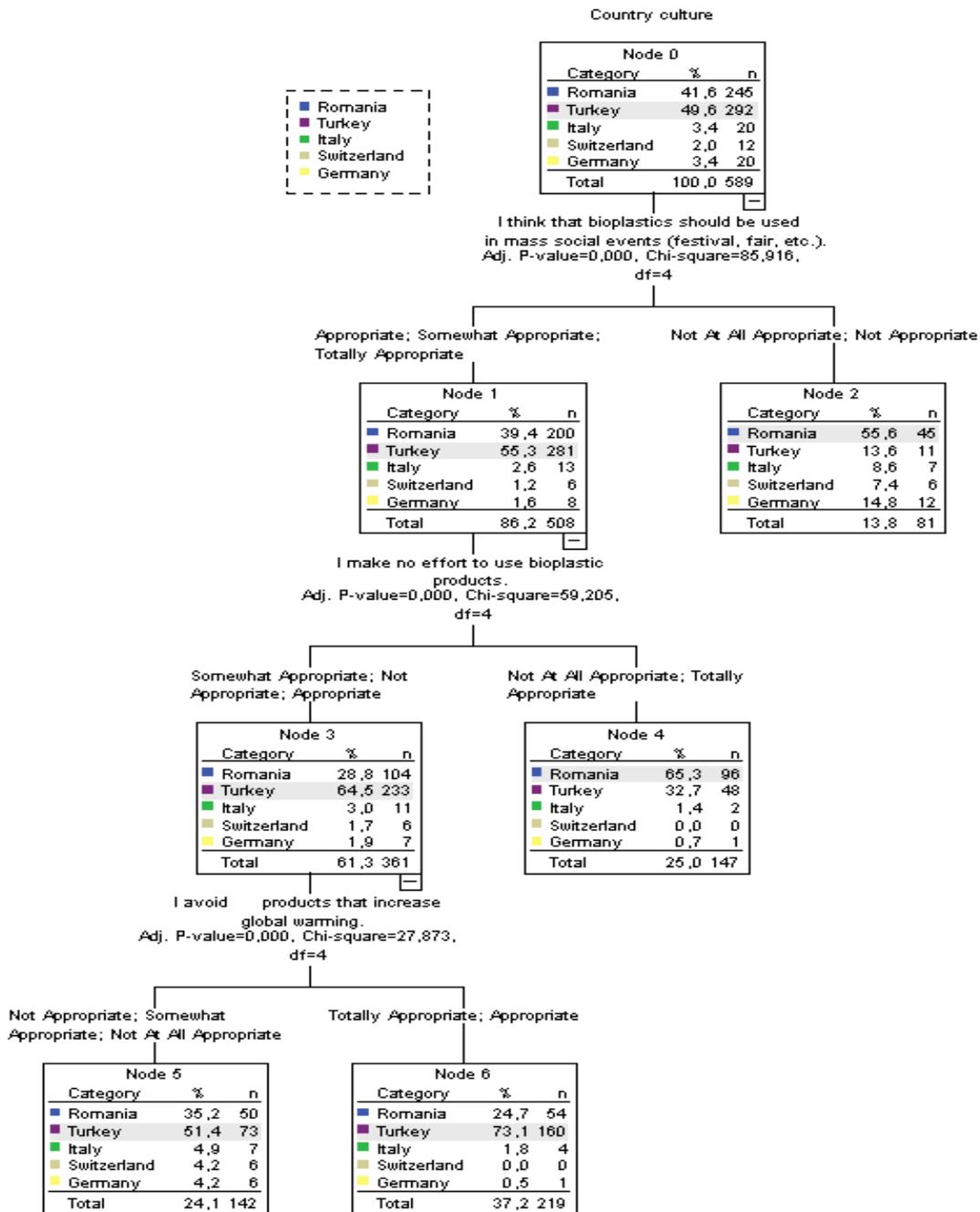
**Country culture**

Node 0

| Category | % | n |
|---|---|---|
| Romania | 41,6 | 245 |
| Turkey | 49,6 | 292 |
| Italy | 3,4 | 20 |
| Switzerland | 2,0 | 12 |
| Germany | 3,4 | 20 |
| Total | 100,0 | 589 |

I think that bioplastics should be used
in mass social events (festival, fair, etc.).
Adj. P-value=0,000, Chi-square=85,916,
df=4

**Appropriate; Somewhat Appropriate; Totally Appropriate**

Node 1

| Category | % | n |
|---|---|---|
| Romania | 39,4 | 200 |
| Turkey | 55,3 | 281 |
| Italy | 2,6 | 13 |
| Switzerland | 1,2 | 6 |
| Germany | 1,6 | 8 |
| Total | 86,2 | 508 |

**Not At All Appropriate; Not Appropriate**

Node 2

| Category | % | n |
|---|---|---|
| Romania | 55,6 | 45 |
| Turkey | 13,6 | 11 |
| Italy | 8,6 | 7 |
| Switzerland | 7,4 | 6 |
| Germany | 14,8 | 12 |
| Total | 13,8 | 81 |

I make no effort to use bioplastic
products.
Adj. P-value=0,000, Chi-square=59,205,
df=4

**Somewhat Appropriate; Not Appropriate; Appropriate**

Node 3

| Category | % | n |
|---|---|---|
| Romania | 28,8 | 104 |
| Turkey | 64,5 | 233 |
| Italy | 3,0 | 11 |
| Switzerland | 1,7 | 6 |
| Germany | 1,9 | 7 |
| Total | 61,3 | 361 |

**Not At All Appropriate; Totally Appropriate**

Node 4

| Category | % | n |
|---|---|---|
| Romania | 65,3 | 96 |
| Turkey | 32,7 | 48 |
| Italy | 1,4 | 2 |
| Switzerland | 0,0 | 0 |
| Germany | 0,7 | 1 |
| Total | 25,0 | 147 |

I avoid products that increase
global warming.
Adj. P-value=0,000, Chi-square=27,873,
df=4

**Not Appropriate; Somewhat Appropriate; Not At All Appropriate**

Node 5

| Category | % | n |
|---|---|---|
| Romania | 35,2 | 50 |
| Turkey | 51,4 | 73 |
| Italy | 4,9 | 7 |
| Switzerland | 4,2 | 6 |
| Germany | 4,2 | 6 |
| Total | 24,1 | 142 |

**Totally Appropriate; Appropriate**

Node 6

| Category | % | n |
|---|---|---|
| Romania | 24,7 | 54 |
| Turkey | 73,1 | 160 |
| Italy | 1,8 | 4 |
| Switzerland | 0,0 | 0 |
| Germany | 0,5 | 1 |
| Total | 37,2 | 219 |

**Figure 2. 2. Classification and regression tree (CRT) results for students behavior regarding used of biodegradable plastic**

Table 1.9 shows the interest of students for benefits of biodegradable plastic which can be use also in mass media events, mentalities are similar  for protection of environment  for 403  students were totally agree and agree with alternative of biodegradable plastic, the first steps were made by replacing plastic bags in the trade, the other steps are expected to remove the plastic gradually. 19,35 % remain in the same position of watching and waiting for others to resolve the problem.

**Table 1.9. Country culture * I think that bioplastics should be used in mass social events**

| | | I think that bioplastics should be used in mass social events (festival, fair, etc.) | | | | | Total |
|---|---|---|---|---|---|---|---|
| | | Totally Appropriate | Appropriate | Somewhat Appropriate | Not Appropriate | Not At All Appropriate | |
| Country culture | Romania | 89 | 64 | 47 | 18 | 27 | 245 |
| | Turkey | 115 | 111 | 55 | 6 | 5 | 292 |
| | Italy | 7 | 4 | 2 | 3 | 4 | 20 |
| | Switzerland | 2 | 2 | 2 | 3 | 3 | 12 |
| | Germany | 3 | 6 | 8 | 3 | 0 | 20 |
| Total | | 216 | 187 | 114 | 33 | 39 | 589 |

A majority of 60,4 % percent from all 589 respondents didn't participate in conferences, we can mention that it is a weak point which can be improved. Also students didn't attend any kind of environmental activities, only 29,3 % percent agree with the importance of participation.

In conclusion, we can mention that Turkish students are more responsible and more active in environmental activities in comparison with Romanian's students. So they have information, they know the importance of pollution, waste management, bioplastics, etc. but they are lazy and don't like to be involved in such kind of activities.

## 2.1.1. A CROSS MODEL FOR STUDENTS REGARDING BIOPLASTIC

To create the cross model for students regarding the bioplastic we took in consideration the database after applying surveys to 589 students from universities from Turkey, Romania, Italy, Switzerland and Germany. Following Ringe et al. (2015) we used SmartPLS and it was possible to establish the proposed models. From Figure 2.3. the cross model present a big connection between students' awareness and behavior with a maximum value of 0.890 .

| Knowledge | Awareness | 0,397 | minimum | - |
|---|---|---|---|---|
| Needs | Awareness | 0.550 | - | - |
| Behavior | Awareness | 0.890 | - | maximum |

For students we take in consideration the variable: awareness (A1-A6), knowledge (K1-K6), needs (N1-N8) and behavior(B1-B9) solutions show the connection between variables. For item N7 '' *I think that bioplastics should be used in mass social events (festival, fair, etc.)''* was obtain the maximum value of 0.918 which present that students from all countries recognize the importance of replacement of plastic with bioplastic, their attitude is positive regarding the environment.

To item N1 '' *I would like to learn new information about the use of bioplastic products''* a low value of 0.766 was obtained which presents a young generation which wants to learn and obtain new information.
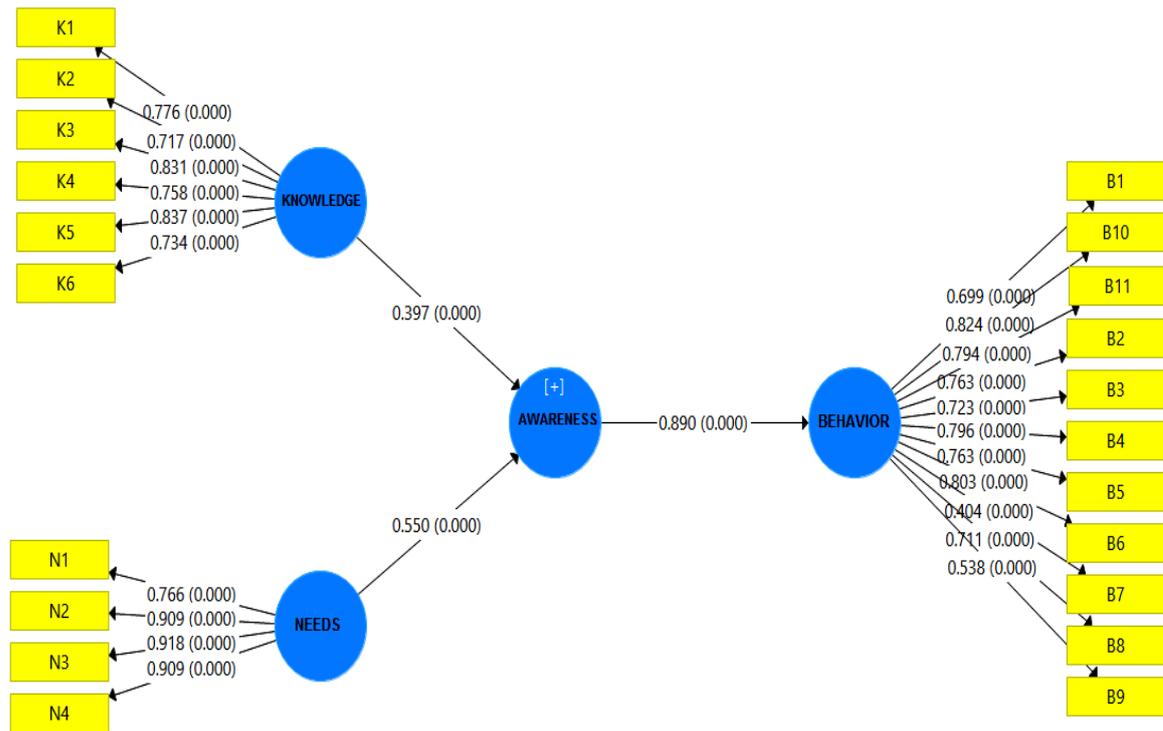
**Figure 2.3. A Cross Model for students regarding the bio plastic**

For students' knowledge we obtain a value of 0.831 for item K3 '' *I think that bioplastics should replace conventional polymers in the future*'' that means a very informed generation and very receptive to the new trends. Also another value of 0.837 was obtained for item K5 '' *I have to choose between two similar products, I prefer products that are less harmful to nature*'' so students all over countries are very protective with nature. But even if the students are inform and they have knowledges the low value of 0.404 obtained for item B9 '' *I participate in environmental activities related to bioplastics (collecting plastic caps, collecting plastics in the environment, etc.)*' present that they refuse to be involved or to participate in different activities.

## CONCLUSION

Punctually, the factors that brought us in this disastrous situation are the following:

● lack of a separate collection system at source (at people's homes) on at least 4-5 types of waste: paper / cardboard, plastic / metal, glass , bio waste (food and vegetable waste) and mixed;
● lack of proper education among the population and decision-makers at central and local level,
● lack of involvement of mayors and failure to assume their responsibilities,
● lack of sanctions and complete lack of waste collection in rural areas, where there are no sanitation contracts, which leads most often either when disposing of them in the wild or when burning uncontrolled.

Todays efforts to combat the plastic pollution crisis are rather minor, fragmented, and generally ignore the extremely harmful consequences that both we and the environment have to bear every day.

Also on the study of bio plastic, and the future vision without plastics present also that the respondents and also the organization must to be careful when it comes to alternative plastic ( cane or corn starch product, biodegradable and / or compostable) and analyze all the sustainability issues associated with this type of plastic

For the compact segment identified in the research study of 20% of respondents we can specify the following factors

✓ lack of concern for this issue first and foremost stores and then the authorities and habit;

✓ lack of information is another motive specified by respondents for lack of time to inform.

Weak values obtain for the connection preference and needs, and for believe and needs present a point in student's culture and education in environment protection with direct target plastic problems. So a necessity for students needs, in their behavior and attitude upon sustainable environment education is influence by knowledge's. Project objectives are based on that results and also on the future Book create as a result of project In conclusion universities must to involve young generation in research, in research team to stimulate them and be a part of the scientific procedure in bio plastic field.

## 2.2. CASE STUDY 2. A CROSS CULTURAL MODEL FOR ACADEMIC STAFF REGARDING BIO PLASTIC

A total of 221 academic staff from Technical University of Cluj Napoca, Maramures County from Transylvania Region, Romania, Pamukkale University, Selcuk University and Kirklareli University from Turkey, University of Trento and Cosvitec from Italy and SUPSI from Switzerland and OTH Regensburg, Germany.

The academic staff participated through face-to-face interviews and online survey between June –July 2022. In this study, data and statistical processing were performed using the SPSS software package. The purpose of the study has been to better understand educated people the staff who teach the students and their behavior regarding sustainable environment and plastic products. The survey was structured in three parts: the first investigated the individual characteristics of the questioned individuals (gender, age, education, university, department) and the second was structured for the purpose of scaling methodology on staff perception about the concept of plastic sustainability and their participation in different activities regarding plastic recycling. The third part identifies respondents' behavior and attitude about bioplastic benefits.

In this study, the following factors were taken into consideration: I—individual characteristics (A-age, G-gender, E-education grade ); N- Needs ; K—knowledge and participation in environment and plastic field; B-Believes. A Likert-scale-type questionnaire, ranging from 1 'Totally Appropriate ' to 5 'Not at all Appropriate', was applied on a face-to-face basis. We used the same model from Figure 2.1. Cronbach's α coefficient with the value of 0.968 shows that the data base obtained from the 221 academic staff from Romania, Turkey, Italy, Switzerland and Germany can be taken in consideration.

## A) INDIVIDUAL CHARACTERISTICS

The members of the academic staff participated in the questionnaire according to Table 2.1. show that 36.2 % are Romanians, 57.5 % are Turkish, 2.7 % percent are

academic staff from Switzerland and in equal percent of 1.8 % staff from Italy and Germany.

Table 2. 1. Country culture

|  |  | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Romania | 80 | 36,2 | 36,2 | 36,2 |
|  | Turkey | 127 | 57,5 | 57,5 | 93,7 |
|  | Italy | 4 | 1,8 | 1,8 | 95,5 |
|  | Switzerland | 6 | 2,7 | 2,7 | 98,2 |
|  | Germany | 4 | 1,8 | 1,8 | 100,0 |
|  | Total | 221 | 100,0 | 100,0 |  |

Majority of academic staff it is 58.1 % percent female (Table 2.2.) and in a 41.9 % percent are male from different departments and field: engineering, economic, IT.

Table 2.2. Participant gender

|  |  | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Female | 126 | 58,1 | 58,1 | 58,1 |
|  | Male | 91 | 41,9 | 41,9 | 100,0 |
|  | Total | 217 | 100,0 | 100,0 |  |

From Table 2.3. majority of respondents in 40.1% percent are between 40-49 age and in 25.8% percent are between 50-59 age, generations which are active and has been involved in different activities. That means the universities' human resources vision from participants' countries manage very well the resources as well as the young generation is involved in academic life.

Table 2.3. What age range are you in

|  |  | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | 20-29 | 25 | 11,5 | 11,5 | 11,5 |
|  | 30-39 | 39 | 18,0 | 18,0 | 29,5 |
|  | 40-49 | 87 | 40,1 | 40,1 | 69,6 |
|  | 50-59 | 56 | 25,8 | 25,8 | 95,4 |
|  | >60 | 10 | 4,6 | 4,6 | 100,0 |
|  | Total | 217 | 100,0 | 100,0 |  |

The information obtain by applying the survey is important because the staff belong from different department science, literature and engineering, so the feedback about plastic information will be relevant and see exactly the perception about the specific topic.

From Table 2.4. we can notice that the target group is very diverse, because they belong to different specializations. So that the information obtained presents us with a radiography on the level of knowledge regarding   and the impact on our lives.

### Table 2.4. Academic staff  grade and scientific  title

|       |                  | Frequency | Percent | Valid Percent | Cumulative Percent |
|-------|------------------|-----------|---------|---------------|--------------------|
| Valid | Prof.dr.         | 33        | 15,2    | 15,2          | 15,2               |
|       | Assoc.prof.dr.   | 43        | 19,8    | 19,8          | 35,0               |
|       | Assist, prof.dr  | 28        | 12,9    | 12,9          | 47,9               |
|       | Resident research| 29        | 13,4    | 13,4          | 61,3               |
|       | Instructor       | 30        | 13,8    | 13,8          | 75,1               |
|       | Prof.eng.        | 54        | 24,9    | 24,9          | 100,0              |
|       | Total            | 217       | 100,0   | 100,0         |                    |

An equal procent 29.5% of respondents are from engineering and science (chemistry, physics, education), from the economic department  13.4 %.In conclusion the results will be very relevant for model proposed taking in consideration the diversity of participants and their work field  and the possibility to identify individual perception of bio plastic for  different fields of activities (Table 2.5.)

### Table 2.5. Academic staff   working department

|       |           | Frequency | Percent | Valid Percent | Cumulative Percent |
|-------|-----------|-----------|---------|---------------|--------------------|
| Valid | Technical | 64        | 29,5    | 29,5          | 29,5               |
|       | Lettters  | 38        | 17,5    | 17,5          | 47,0               |
|       | Economic  | 29        | 13,4    | 13,4          | 60,4               |
|       | Physics   | 7         | 3,2     | 3,2           | 63,6               |
|       | Science   | 64        | 29,5    | 29,5          | 93,1               |
|       | Medicine  | 10        | 4,6     | 4,6           | 97,7               |
|       | IT        | 5         | 2,3     | 2,3           | 100,0              |
|       | Total     | 217       | 100,0   | 100,0         |                    |

## B)  ACADEMIC STAFF KNOWLEDGE

Using the Likert scale from 1 to 5 , where 1= very important to me to  5= not interested , we can see that for 96.3 % of respondents,  the waste and environment is very important, in an equal  percent with the knowledge about the plastic life cycle.

Table 2.6. present that 98.61 % percent from academic staff have knowledge about the impact of waste on the environment, not at last the academic staff from each country know also about the petrol effect upon  nature.

We can observe that Turkish academic staff  obtain a maximum values of 58,45 % percent for information and knowledge about the importance of using petrol for plastic products.

Table 2.6. What do you think about the impact of waste on the environment * Country culture

| | | Country culture | | | | Total |
|---|---|---|---|---|---|---|
| | | Romania | Turkey | Italy | Switzerland | |
| What do you think about the impact of waste on the environment | very important to me | 77 | 127 | 4 | 6 | 214 |
| | unimportant to me | 1 | 0 | 0 | 0 | 1 |
| | not interested in this issue | 2 | 0 | 0 | 0 | 2 |
| Total | | 80 | 127 | 4 | 6 | 217 |

Also   95.39 % percent from academic staff consider that they are environmentalists and it is very important especially now when the management waste is a problem for our life and nature (Table 2.7.)

Table 2.7.  Do you think you are an environmentalist * Country culture

| | | Country culture | | | | Total |
|---|---|---|---|---|---|---|
| | | Romania | Turkey | Italy | Switzerland | |
| Do you think you are an environmentalist | Yes | 51 | 99 | 1 | 3 | 154 |
| | No | 10 | 4 | 2 | 0 | 16 |
| | Sometime | 19 | 24 | 1 | 3 | 47 |
| Total | | 80 | 127 | 4 | 6 | 217 |

## C) ACADEMIC STAFF  PARTICIPATION

A weak point was discovered regarding the staff participation to conferences, Table 2.8, only 40 % percent participate  in conferences  and  58.8 %  didn't participate because of not interest or  they consider  the topic not proper for their academic  activity.

Table 2.8. Have you attended a conference on nature conservation before * Country culture

| | | Country culture | | | | Total |
|---|---|---|---|---|---|---|
| | | Romania | Turkey | Italy | Switzerland | |
| Have you attended a conference on nature conservation before | Yes | 32 | 91 | 3 | 1 | 127 |
| | No | 47 | 36 | 1 | 5 | 89 |
| | Not interested | 1 | 0 | 0 | 0 | 1 |
| Total | | 80 | 127 | 4 | 6 | 217 |

Another weak point discovered like in Table 2.9. was that only 12.6 % percent from academic staff participate in environmental events organized at university. And again a compact group of 20% percent it is not totally involved yet in that kind of activity.

Table 2.9. I participate in environmental events organized at universities * Country culture

| | | Country culture | | | | Total |
|---|---|---|---|---|---|---|
| | | Romania | Turkey | Italy | Switzerland | |
| I participate in environmental events organized at universities | Totally Appropriate | 3 | 51 | 0 | 1 | 55 |
| | Appropriate | 7 | 31 | 0 | 1 | 39 |
| | Somewhat Appropriate | 20 | 23 | 1 | 2 | 46 |
| | Not available | 19 | 17 | 2 | 1 | 39 |
| | Not at all Appropriate | 31 | 5 | 1 | 1 | 38 |
| Total | | 80 | 127 | 4 | 6 | 217 |

Academic staff from Turkey and Romania are not interested or not participating in activities regarding the environment protection or waste management, maybe because their research and activities are focus on other priorities. 41.5% percent didn't participate and 58.5 % participated in first place it is turkey with a 71.7% participation staff in comoarison with Romania which get a low values of 25,2 %.

D) ACADEMIC STAFF EDUCATION CULTURE

The academic staff consider that it is not his duty to present a specific subject in front of students because it is not in his/ her area and they consider that it is more useful to be presented by specialist in the field for 64 % from respondents. 65 % from staff believes that people are not yet familiar with the subject and that it takes time to remove the plastic that has invaded everyone's daily life but everyone is already aware of the danger that plastic now poses.

## E) ACADEMIC STAFF BEHAVIOR

The staff is aware and seriously involved in the use of bio plastic but considers that first, traders must offer consumers reusable alternatives at points of sale that are suitable and durable or that do not contain plastic.

The values obtain in Table 2.10. show that academic staff prefere bio packaging in 58,52 % percent and 31,79% consider that the problem it is not realistic yet. There are no borders between academic staff and bio plastic solution in their daily life.

**Table 2.10.  I prefer packaging that is not more harmful to nature * Country culture**

| | | Country culture | | | | Total |
|---|---|---|---|---|---|---|
| | | Romania | Turkey | Italy | Switzerland | |
| I  prefer packaging that is not more harmful to nature | Totally Appropriate | 7 | 68 | 2 | 4 | 81 |
| | Appropriate | 8 | 37 | 1 | 0 | 46 |
| | Somewhat Appropriate | 8 | 13 | 0 | 0 | 21 |
| | Not available | 8 | 8 | 1 | 0 | 17 |
| | Not at all Appropriate | 49 | 1 | 0 | 2 | 52 |
| Total | | 80 | 127 | 4 | 6 | 217 |

Academic staff  behavior and concern present a positiv attitude upon the biodegradable plastic problem in our daily life and the impact in social life, like in Table 2.11, 2.12. and 2.13.

**Table 2.11. Country culture  * Even though it is not my field, I do academic readings on the use of bioplastic products when it comes across.**

| | | Even though it is not my field, I do academic readings on the use of bioplastic products when it comes across. | | | | | Total |
|---|---|---|---|---|---|---|---|
| | | Totally Appropriate | Appropriate | Somewhat Appropriate | Not available | Not at all Appropriate | |
| Country culture | Romania | 7 | 10 | 20 | 21 | 22 | 80 |
| | Turkey | 32 | 41 | 29 | 21 | 4 | 127 |
| | Italy | 2 | 0 | 1 | 1 | 0 | 4 |
| | Switzerland | 1 | 1 | 2 | 1 | 1 | 6 |
| | Germany | 1 | 1 | 0 | 2 | 0 | 4 |
| Total | | 43 | 53 | 52 | 46 | 27 | 221 |

**Table 2.12. Country culture  * I think that universities should cooperate with different institutions on bioplastics when necessary**

| | | I think that universities should cooperate with different institutions on bioplastics when necessary | | | | | Total |
|---|---|---|---|---|---|---|---|
| | | Totally Appropriate | Appropriate | Somewhat Appropriate | Not available | Not at all Appropriate | |
| Country culture | Romania | 6 | 8 | 10 | 15 | 41 | 80 |
| | Turkey | 59 | 38 | 23 | 6 | 1 | 127 |
| | Italy | 2 | 1 | 0 | 1 | 0 | 4 |
| | Switzerland | 3 | 0 | 1 | 0 | 2 | 6 |
| | Germany | 1 | 1 | 1 | 1 | 0 | 4 |
| Total | | 71 | 48 | 35 | 23 | 44 | 221 |

## 2.2.1. A CROSS MODEL FOR ACADEMIC STAFF REGARDING BIOPLASTIC

Taking in consideration the database after applying surveys to 221 academic staff from Turkey, Romania, Italy, Germany and Switzerland from different universities, to create the cross model a special program was used. SmartPLS which is a software with graphical user interface for variance-based structural equation modeling using the partial least squares path modeling method ( https://www.smartpls.com/) Following Ringe et al. (2015), it was possible to establish the proposed models.

For academic staff we take in consideration the variable: awareness (A1-A6), knowledge )K1-K6), needs (N1-N8) and behavior(B1-B13) like in table below:

| Awareness | Behavior | 0.953 | maximum | |
|---|---|---|---|---|
| Needs | Awareness | 0.271 | | minimum |
| Knowledge | Awareness | 0.696 | | |

Solution obtained show us in Figure 2.4. for academic staff a strong connection between awareness and behavior which influence in a positive way their attitude regarding bio plastic. Also the connection between knowledge and awareness obtains the biggest value which ensures that students' knowledge from all countries influence their awareness.
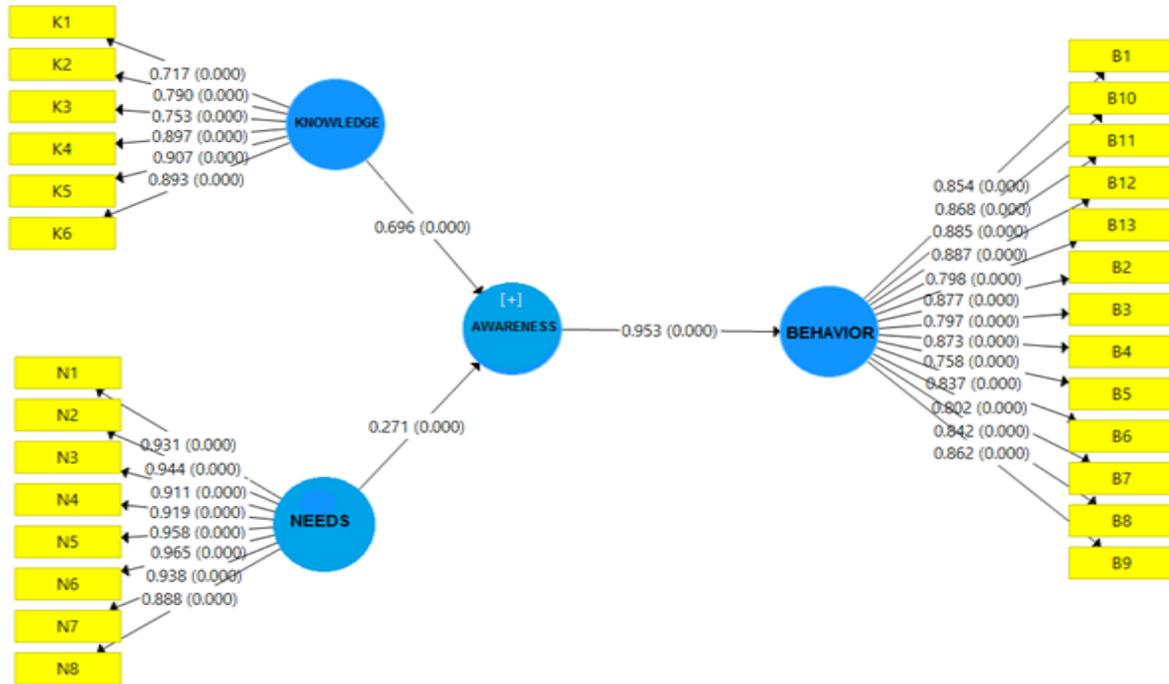
**Figure 2.4. A Cross Model for academic staff**

Because the connection between needs and awareness obtains a low value, once again that academic staff must be involved in different activities reading the environment and to participate or organize conferences, workshops on bio plastic topics. So, awareness is influenced by the staff' needs but also by their knowledge in field that definitively influences their behavior regarding plastic and the notion of environmental problems. Academic staff from all countries are very well informed about plastic and new bioplastics, because the maximum value was obtained with 0.907 for item K5 '' *Bioplastic products do not affect human health* ''. Also they are very careful how they are recycling the product in the work office for item K2 =0,717 .

Academic staff also recognise that a need to put emphasis on more academic studies should be done on bioplastics as shown by the item N7= 0.965. Model also shows a low value of 0.758 obtained by item B5 '' *I participate in environmental events organized at universities''* which is a weak point shown also in SWOT Analyze. In conclusion the FUTURE Bio project can involve academic staff from all 11 partners from 5 countries to start together and share methods and tools in that direction.

## CONCLUSION

Academic staff is not influenced by the country of origin, curiosity and adaptation to a dynamic society and what it is new is definitive and is influenced only by knowledge, beliefs and the care of adapting to new trends on the market. The results present the following direction for future:

- the involvement of universities in the welfare of society and students, thus transforming the university into a home;
- before being teachers, teachers are educators;
- the attraction of students in the research activity in the volunteer activity through various methods and means;

- exchange of good practices between universities;
- training of teaching staff;
- collaboration in organizing and participating in conferences on important topics;
- joint research groups.

## 2.3. CASE STUDY 3. A CROSS CULTURAL MODEL FOR INDUSTRIAL WORKERS REGARDING BIO PLASTIC

Target group was 271 employers from industrial activities, small and medium entreprises or individual activities from Romania, Turkey , Italy and Finland. The Cronbach's coefficient obtain has a value of 0.733 thats mean the data are available.

### A) INDIVIDUAL CHARACTERISTICS

Table 3.1. Country culture

|       |         | Frequency | Percent | Valid Percent | Cumulative Percent |
|-------|---------|-----------|---------|---------------|--------------------|
| Valid | Romania | 206       | 76,0    | 76,0          | 76,0               |
|       | Turkey  | 14        | 5,2     | 5,2           | 81,2               |
|       | Italy   | 21        | 7,7     | 7,7           | 88,9               |
|       | Finland | 30        | 11,1    | 11,1          | 100,0              |
|       | Total   | 271       | 100,0   | 100,0         |                    |

Because the target was to create a cross cultural model regarding the bioplastic importance and necessity the first part of the survey identified few individual characteristics like country and gender like in Table 3.1. 76 % percent from respondents are from Romania, 5.2% from Turkey, 7.7 % from Italy and 11.1 % from Finland.Table 3.2. show us that majority of respondents are female 60.5% and 38.7 % male, from all four countries which are more open to the subject in our case plastic and replacement with bio plastic.

Table 3.2. Gender

|       |        | Frequency | Percent | Valid Percent | Cumulative Percent |
|-------|--------|-----------|---------|---------------|--------------------|
| Valid | Female | 164       | 60,5    | 60,5          | 60,5               |
|       | Male   | 105       | 38,7    | 38,7          | 99,3               |
|       | Neutru | 2         | ,7      | ,7            | 100,0              |
|       | Total  | 271       | 100,0   | 100,0         |                    |

### B) INDUSTRIAL WORKERS KNOWLEDGES IN TECHNOLOGICAL PROCESS AND BIOPLASTIC

The second part was create to identify the knowledges of workers involved in the plastic technological process and also the relation with customers and replacement of raw materials in process. Table 3.3 presents the results obtained about the workers' knowledge about the plastic phenomen. A percent of 83.8 % of respondents know the importance of bio plastic, especially because they are working in the field and they depend on the market demand, because of petrol on global market.

**Table 3.3. Do you know that petroleum product plastics take a long time to decompose in nature?**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Yes | 227 | 83,8 | 83,8 | 83,8 |
| | No | 29 | 10,7 | 10,7 | 94,5 |
| | I am not interested | 15 | 5,5 | 5,5 | 100,0 |
| | Total | 271 | 100,0 | 100,0 | |

Regarding the knowledge of respondents about the application of bioplastic 49.1 % percent have enough information about the advantages of bioplastic, 19.2 % are not interested in the subject and they consider that they are responsible people from organizations with that topic.

**Table 3.4. Bioplastics being biodegradable offer many advantages to industrialists.**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | I totally disagree | 19 | 7,0 | 7,0 | 7,0 |
| | I disagree | 33 | 12,2 | 12,2 | 19,2 |
| | I somewhat agree | 86 | 31,7 | 31,7 | 50,9 |
| | I agree | 66 | 24,4 | 24,4 | 75,3 |
| | I agree very much | 67 | 24,7 | 24,7 | 100,0 |
| | Total | 271 | 100,0 | 100,0 | |

From Table 3.5. we obtain that 49.8 % of workers know that they are not using bio plastic. It seems to be an equal percent of using the new bio plastic.

The people are involved in the technological process and manufacture products in all countries and they know 50.2 % percent from respondents that they are using bioplastic materials in production. The replacement of plastic with the new bioplastic need time and also people training and workshops to inform people about the importance of bio plastic.

**Table 3.5. Do you use bioplastics in your productions?**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Yes | 136 | 50,2 | 50,2 | 50,2 |
| | No | 135 | 49,8 | 49,8 | 100,0 |
| | Total | 271 | 100,0 | 100,0 | |

The feeed back is presented in Table 3.6. where 17.3 % from respondents know that they are using raw materials in production, 41.7 % from respondents know that only in some part of the produciton and a 41 % percent of respondents are not using at all in the production.

**Table 3.6. What is your use of bioplastic products in the production process?**

|  |  | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | We use only bioplastic raw materials in our production. | 47 | 17,3 | 17,3 | 17,3 |
|  | We use bioplastic raw materials in some parts of the production | 113 | 41,7 | 41,7 | 59,0 |
|  | We do not use bioplastic raw materials in the production | 111 | 41,0 | 41,0 | 100,0 |
|  | Total | 271 | 100,0 | 100,0 |  |

In each organization workers are involved in their activities and they know exactly what they are doing and the importance of their work, for 74.9 % the waste and recycling subject in industry it is important because the phenomena affect their job and future activities (Table 3.7)

**Table 3.7. We are sensitive to waste recycling in our industry and in other existing units.**

|  |  | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Yes | 203 | 74,9 | 74,9 | 74,9 |
|  | No | 68 | 25,1 | 25,1 | 100,0 |
|  | Total | 271 | 100,0 | 100,0 |  |

The adaptation with the new rules from European market and the new standards for quality and harmonization with the environment standards ISO 14001 and the 3 R's it seems to be very important for 65% from staff employers. As we know from total quality management it is important to involve also the workers because only together they are a complex system which guarantee the life cycle (Table 3.8).

**Table 3.8. The products of our company are produced according to the special recycling guidelines according to the quality standards.**

|  |  | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | I totally disagree | 58 | 21,4 | 21,4 | 21,4 |
|  | I disagree | 20 | 7,4 | 7,4 | 28,8 |
|  | I somewhat agree | 59 | 21,8 | 21,8 | 50,6 |
|  | I agree | 52 | 19,2 | 19,2 | 69,7 |
|  | I agree very much | 82 | 30,3 | 30,3 | 100,0 |
|  | Total | 271 | 100,0 | 100,0 |  |

49.5 % percent of workers agree with the new rules that must be followed by all companies from all countries that guarantee quality and protection and the environment.

In conclusion, country as culture people can not influence the perception, knowledge and behavior regarding bio plastic. In change their knowledge are influenced by their attitude and behavior upon the environment. The positive impact of bioplastics is relevant for 53.4 %  percent of workers  which consider that is the future and for 32.5 % percent it is something not important because they consider that they are qualified people responsible for that (Table 3.9)

Table 3.9.  Bioplastics being biodegradable offer many advantages to industrialists.

|       |                     | Frequency | Percent | Valid Percent | Cumulative Percent |
|-------|---------------------|-----------|---------|---------------|--------------------|
| Valid | I totally disagree  | 19        | 7,0     | 7,0           | 7,0                |
|       | I disagree          | 33        | 12,2    | 12,2          | 19,2               |
|       | I somewhat agree    | 86        | 31,7    | 31,7          | 50,9               |
|       | I agree             | 66        | 24,4    | 24,4          | 75,3               |
|       | I agree very much   | 67        | 24,7    | 24,7          | 100,0              |
|       | Total               | 271       | 100,0   | 100,0         |                    |

The debate about plastics in the environment, which is sometimes very emotional in the media and the public, has a massive impact on plastics processing companies.The European Commission and national governments are trying to address consumer issues with symbolic gestures, such as restrictions on disposable plastics and carry-on bags. This strategy may reduce public debate in the short term and give the impression of high activity, but it is not effective in the interests of the environment and sustainable development.

## C) WORKERS PERCEPTION REGARDING THE BIO PLASTIC

The  workers vision and solutions for different actors from social life are analyze using the  survey. Table 3.10. present that at the national and local  region a cooperation between the local society and producers to inform and promote the bioplastic prezent for 54.6 % percent a need and for 31 % it is a partial need.

Table 3.10. We are ready to cooperate with local governments to promote the use of bioplastic products

|       |                     | Frequency | Percent | Valid Percent | Cumulative Percent |
|-------|---------------------|-----------|---------|---------------|--------------------|
| Valid | I totally disagree  | 17        | 6,3     | 6,3           | 6,3                |
|       | I disagree          | 22        | 8,1     | 8,1           | 14,4               |
|       | I somewhat agree    | 84        | 31,0    | 31,0          | 45,4               |
|       | I agree             | 58        | 21,4    | 21,4          | 66,8               |
|       | I agree very much   | 90        | 33,2    | 33,2          | 100,0              |
|       | Total               | 271       | 100,0   | 100,0         |                    |

The plastics strategy is a key element in Europe's transition to a circular and carbon-neutral economy. It will help achieve the 2030 sustainable development goals, the goals of the Paris Agreement on climate change and the EU's industrial policy goals.

Also for 55.8 % of respondents each country's national government must come with new laws and rules to protect the organization's new orientation and to encourage the investment in new technology and used of bio plastic raw materials (Table 3.11)

Table 3.11. Government policies should be developed to inform the public about bioplastic products.

|  |  | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | I totally disagree | 12 | 4,4 | 4,4 | 4,4 |
| | I disagree | 31 | 11,4 | 11,4 | 15,9 |
| | I somewhat agree | 77 | 28,4 | 28,4 | 44,3 |
| | I agree | 66 | 24,4 | 24,4 | 68,6 |
| | I agree very much | 85 | 31,4 | 31,4 | 100,0 |
| | Total | 271 | 100,0 | 100,0 | |

## D) WORKERS OPINION ABOUT IMPACT OF BIO PLASTIC COST

Same opinion with academic staff was obtain for the item regarding the cost of bio plastic, for 51.3 % percent the cost of bioplastic is high and will affect the people perception and behavior.

The obtained result was predictable because the novelty always has a strong impact on consumers and users, but with the increase in demand the price will become acceptable (Table 3.12.)

Table 3.12. The cost of bioplastic raw materials is high

|  |  | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | I totally disagree | 18 | 6,6 | 6,6 | 6,6 |
| | I disagree | 32 | 11,8 | 11,8 | 18,5 |
| | I somewhat agree | 82 | 30,3 | 30,3 | 48,7 |
| | I agree | 70 | 25,8 | 25,8 | 74,5 |
| | I agree very much | 69 | 25,5 | 25,5 | 100,0 |
| | Total | 271 | 100,0 | 100,0 | |

## E) INDUSTRIAL WORKER SUGGESTION TO PROMOTE BIO PLASTIC

School and universities are an important pillars in people education. From Table 3.13 a 52.8% percent of respondents give positive feedback to billboards as source information, schools and universities for lectures, courses , training and create a virtual world as an environment for practical exercises.

### Table 3.13.  Billboards should have awareness raising articles.

|       |         | Frequency | Percent | Valid Percent | Cumulative Percent |
|-------|---------|-----------|---------|---------------|--------------------|
| Valid | Agree   | 143       | 52,8    | 52,8          | 52,8               |
|       | No idea | 128       | 47,2    | 47,2          | 100,0              |
|       | Total   | 271       | 100,0   | 100,0         |                    |

According to the opinion of the workers from the four countries, the presentation and support of lectures on different topics was obtained in our case about bio plastic case with a maximum score of 53.9 % .

### Table 3.14. There should be lessons in schools regarding bioplastic products.

|       |         | Frequency | Percent | Valid Percent | Cumulative Percent |
|-------|---------|-----------|---------|---------------|--------------------|
| Valid | Agree   | 146       | 53,9    | 53,9          | 53,9               |
|       | No idea | 125       | 46,1    | 46,1          | 100,0              |
|       | Total   | 271       | 100,0   | 100,0         |                    |

Also, the role of universities as nurseries for future employees and trailblazers was agreed  only by 33.9 % from industrial employees (Table 3.15)

### Table 3.15. Industry-University joint projects should be carried out.

|       |         | Frequency | Percent | Valid Percent | Cumulative Percent |
|-------|---------|-----------|---------|---------------|--------------------|
| Valid | Agree   | 92        | 33,9    | 33,9          | 33,9               |
|       | No idea | 179       | 66,1    | 66,1          | 100,0              |
|       | Total   | 271       | 100,0   | 100,0         |                    |

A method used by companies is the specialization and participation in training of the staff employed in order to present the latest news in the field was approved by 28.4% percent from industrial workers  (Table 3.16)

### Table 3.16. Conferences with broad participation should be organized.

|       |         | Frequency | Percent | Valid Percent | Cumulative Percent |
|-------|---------|-----------|---------|---------------|--------------------|
| Valid | Agree   | 77        | 28,4    | 28,5          | 28,5               |
|       | No idea | 194       | 71,6    | 71,5          | 100,0              |
|       | Total   | 270       | 99,6    | 100,0         |                    |
| Total |         | 271       | 100,0   |               |                    |

Television selection as a promoter  for bio plastic was selected only by 37.3% percent of respondents ( Table  3.17)
Also  62.7 % percent of respondents don't know if television can be used as a tool for information. The other segment in 37.3 % percent consider that television advertising

and promotion of specific programs can educate people and inform them about the importance of bio plastic.

**Table 3.17. Television programs should be made.**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Agree | 101 | 37,3 | 37,3 | 37,3 |
| | No idea | 170 | 62,7 | 62,7 | 100,0 |
| | Total | 271 | 100,0 | 100,0 | |

We can observe that the country and gender can not influence the behavior and attitude of people regarding the recycling process and the importance of replacing plastic from our life.

In a percent of 41.7 % were female from 271 respondents from Romania, Italy, Turkey and Finland, they are sensitive to recycle waste, to 3R's which is important for industry and reuse of materials in production, A vital, acute problem of our society is given by the abandonment of waste in public spaces (littering), from where it ends up in the soil or in water courses. A very large percentage of abandoned waste is plastic, glass and metal beverage packaging waste. They should enter the packaging waste recycling process to increase the reuse of raw materials and conserve our limited natural resources.

## 3.    A CROSS MODEL FOR INDUSTRIAL WORKERS REGARDING BIOPLASTIC

To create the model we take in consideration the answers of the 241 respondents from industrial activities, small and medium organizations and individuals from Turkey, Romania and Italy.

The model is presented in Figure 2.6. The model for industrial workers presents a good connection between needs and awareness with a value of 0.507 which present workers open to new and which understand the needs of transfer from plastic to bioplastic.
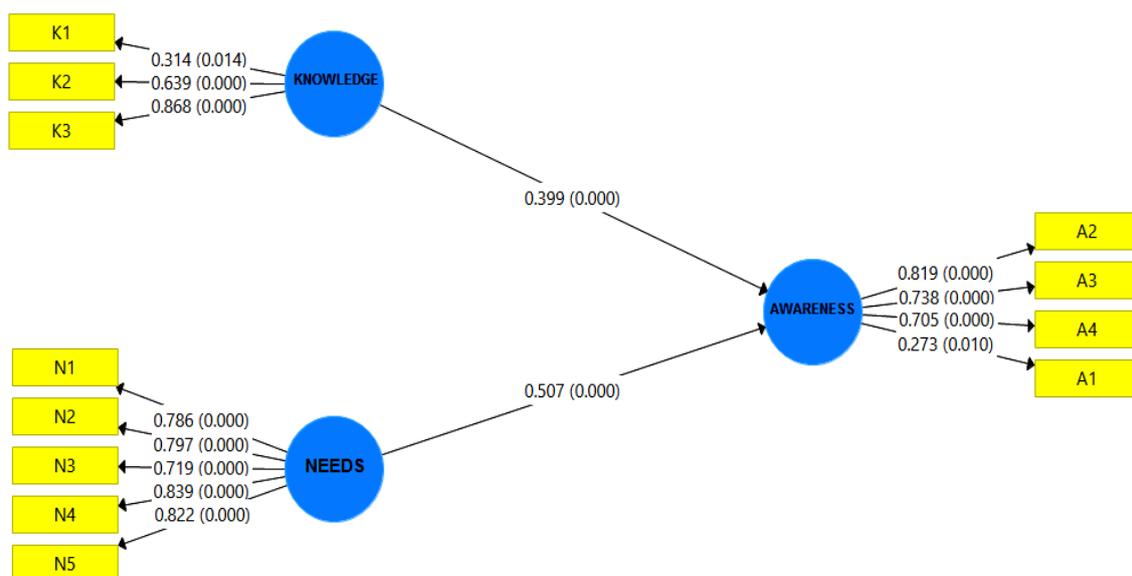


Figure 2.6. A Cross Model for industrial workers regarding bio plastic

The variables for industrial workers it is presented in table below.

| Knowledge | Awareness | 0.399 | minimum |
|-----------|-----------|-------|---------|
| Needs | Awareness | 0.507 | maximum |

The low value of 0.399 obtained for industrial workers between knowledge and awareness show a need of trainings and novelty in technological process and also in using raw materials.

Workers are open to renew the product and technological process because they now the new way to Industry 4.0 and also the new Quality 4.0 on a global market. To sustain the final conclusions we present the following results:

For variable need for item N3 '*'There is not enough research on determining the lifespan of products obtained from bioplastic raw materials''* was obtain a low value of 0.719 which give us a general view of employers need in organization, to be able to create a good work environment,

For variable awareness for item A1 ''*We make enough efforts to use bioplastic products in production'* we obtain the lowest value of 0.273 which is a signal that the process needs a continuous improvement regarding the transfer from plastic to bio pl;astic.

For variable awareness for item A2 ''*Customers' expectations about the product (impact strength, chemical stability*, high dimensional stability, etc.) make it difficult for us to use bioplastic raw materials.''* we obtain the biggest value of 0.819 as a provocation in future to maintain customers in center of the organization and their needs.

For variable knowledge for item K1 '' *Bio plastics being biodegradable provides many conveniences to industrialists.'* a low value of 0.314 measure the pulse in organization about the bioplastic benefits.

## 4. SWOT ANALYZE FOR SURVEY RESULTS

Therefore, plastic pollution is undeniably a growing global problem, and control measures must be firm and taken by all nations of the world. But in this endeavor, solutions must be presented for the companies involved, but also for the final consumers, for which disposable products have become a habit in recent years.

In addition, the aspect of the raw material from which many of the products to be replaced will be made, such as wood or maize, should not be neglected, given that they are exhausted resources and waste should be avoided.

In recent decades, bottles, bags and a wide range of plastic items have become the most toxic waste that pollutes the environment.

For these reasons, there must be well-organized public consultations in which all the unclear issues indicated by the population, non-governmental organizations and the business environment are discussed.

Based on the results obtained by applying to the three actors respectively the university, the students and the producers from the company actively involved in the economic activities, through the FUTURE Bio project we want to come and to bring an added value to the first steps in the implementation of this subject.

As a conclusion we can create the S.W.O.T. Analyze.

| STRONG | F | WEAK |
|---|---|---|
| ✓ Universities;<br>✓ Information's;<br>✓ Students;<br>✓ Cooperation ;<br>✓ Specialists in field;<br>✓ Interest. | U<br>T<br>U<br>R<br>E | ✓ No interest ;<br>✓ Social law missing ;<br>✓ Missing the rules;<br>✓ No interest ;<br>✓ Costs are high ;<br>✓ Difficulties in implementation;<br>✓ Difficulties to follow the EU rules ;<br>✓ Exhausted material . |
| **OPORTUNITIES** | | **TREATS** |
| **Project FUTURE Bio**<br>✓ Platform ;<br>✓ Courses online;<br>✓ Virtual world;<br>✓ Exchange of staff;<br>✓ Exchange of students;<br>✓ Book;<br>✓ Curricula ;<br>✓ Virtual library ;<br>✓ Workshops;<br>✓ Conferences;<br>✓ Bilateral agreements;<br>✓ Transfer of  research  ideas. | B<br>I<br>O | ✓ people and their indifference;<br>✓ resistance to charge encouraged by keeping people . |

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## PROJECT COORDINATOR



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