PRO-ENVIRONMENTAL BEHAVIOR AND BIOECONOMY: REFLECTIONS ON SINGLE-BOTTLED WATER CONSUMPTION

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Abstract

Nowadays, many global challenges such as climate change, food security, health, industrial restructuring, and energy conservation may be solved by applying the principles of bioeconomy. Adequately implementing the principles of Bioeconomy ensures a transition from a fossil-based economy to a bio-based economy. Although in most European countries, there is clean, safe and reliable drinking water, the bottled water industry has the fastest growing rate with ***severe*** consequences for the environment. This research assesses the intentions of Romanian university students regarding single-bottled water usage by implementing a pro-environmental behavior model. As such, this study extends the existing literature on pro-environmental behavior by identifying the factors specific to the single-bottled water consumption. The model encompassed the following factors which would influence the bottled water consumption: safety and hygiene, personal benefit, locus of control, personal responsibility, health benefits, environmental concerns, knowledge of action strategies and intention to adopt a pro-environmental behavior. Using Structural Equation Modeling, we validated the pro-environmental single-bottled water consumption model on a sample of 283 university students, with the mean age of 20. The nonprobabilistic sampling method was homogenous convenience type, nonrepresentative but with the possibility to determine an ideal defined group. The findings revealed that the primary motivation of the respondents to use bottled water was safety and hygiene and they would engage in a pro-environmental behavior in using refillable bottles for drinking water. Further, the study outlined the main implications for both theory and practice.

Keywords: Bioeconomy, bottled water, pro-environmental behaviour, Bootsrapping method, Partial Least Squares.

JEL Classification. Q01, Q02, Q25, Q53, Q57.

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Introduction

The emergence of bioeconomy has raised many questions both in theory and practice. More precisely, in theory, in policy documents, bioeconomy a bioeconomic approach contributes significantly to sustainability (Chen, 2008; Hardy, 2002). The Lund Declaration highlighted the urgency to pursue solutions to current issues of the society related to climate change, food security, health, industrial restructuring and energy conservation at an European level by implementing bioeconomic principles such as transitioning from fossil-based to bio-based products, ensuring security in food, health and energy and industrial restructuring (Bugge, Hansen and Klitkou, 2016; Pulzl, Kleinschmit and Arts, 2014). However, there are several controversies around the efficiency of such transitions and whether these transitions would force a more sustainable future (Pfau et al., 2014). Thus, how and when the transition to a bioeconomy will occur in these particular key domains, remains uncertain. While bioeconomy should solve issues related to climate change, little attention has been given to the environmental protection and climate change effects in terms of exploration and exploitation of bio-resources (Bugge, Hansen and Klitkou, 2016).

Even though, in most European countries, there is clean, safe and reliable drinking water, the consumption of bottled water continues to be the fastest growing segment of the non-alcoholic beverage market (Ward et al., 2009; Mikhailovich and Fitzgerald, 2012). Actually, bottled water has become a complete substitute for tap water for a vast majority of consumers, as they believe it tastes better, it is safer and of better quality than tap water (Armas and Sutherland, 1999; Ferrier, 2001). Although bottled water is a profitable market, it is not a global sustainable solution due to the massive amount of fossil fuel required for burning, transportation and packaging of bottle containers.

The Report published by the European Commission regarding the attitudes of European citizens towards the environment revealed that three in four Europeans agree are worried about the impact of everyday plastic products on their health (74%) and at least half of the respondents mentioned that the following measures are very important when reducing plastic waste: "products should be designed in a way that facilitates the recycling of plastic (65%), industry and retailers should make efforts to reduce plastic packaging (63%) and local authorities should provide more collection facilities for plastic waste (51%) and, respectively, a lower proportion of respondents considers that consumers should pay an extra charge for single-use plastic goods (61%) (European Commission, 2017). According to the same Report, in Romania, the most important environmental issue which requires great attention is the air pollution (46%), followed by agricultural pollution (39%) and the increased growth rate of waste (38%). Moreover, when it comes to tackle environmental issues at individual level, Romanians bought local products (45%), separated most of their waste goods (14%) and they avoided single-use plastic goods (14%). Still, they believed that it is utterly important for authorities to provide more collection facilities for plastic waste (95%) and the industry and retailers should make an effort in reducing plastic packaging (89%) (European Commission, 2017). In addition, Romania collects and recycles only 1% of the plastic bottles and the vast majority of pro-environmental initiatives come from private organizations when special collectable machines are being installed in hypermarkets, and, in return, consumers are offered money, 0.5 RON for a plastic bottle and 0.3 RON for an aluminum can (European Commission, 2017).

The objectives of this research are to investigate the intentions of Romanian university students regarding single-bottled water usage, to identify the major factors that determine the single-bottled water choices of Romanian university students, and, lastly, using a pro-environmental behavior model, to integrate into an empirical model the factors which determine the usage of single-bottled water of Romanian university students.

The paper was structured as follows: we begun with a review of the literature on bioeconomy and sustainable behavior, followed by a description of what was defined by single-bottled water consumption. Following the guidelines of Hines, Hugenford and Tomera (1986), we elaborated an empirical model of pro-environmental behavior in the context of single-bottled water reduction. Finally, we discussed the implications for theory and practice as well as the limitations and future research directions.

1. Review of the scientific literature

1.1. Bioeconomy and sustainable behavior

In its conceptual and operational evolution, the Bioeconomy field has undergone many changes, being reflected in attempts of defining it, such as “biotechnological advances which contribute to solving global issues” or “biomass”and “replaceable fossil materials”. Still the most complex definition of Bioeconomy emphasizes that it represents a fossil-based economy which should evolve in a biomass resource oriented economy (Pfau et al., 2014). Moreover, according to Pfau et al. (2014), there is a powerful association between bioeconomy and sustainability. Hence, bioeconomy and sustainability were found to be connected and successfully applied in research domains, as for instance, “processing and technology”, which focuses on the processing techniques used in the conversion of biogenic resources, bioproducts and technology biostrategies; environment suggesting biosecurity; society in terms of food security, and, policy concerned with agricultural and industrial policies (Pfau et al., 2014).

Bugge, Hansen and Klitkou (2016) uncovered three sustainable visions in achieving a bio-based economy: bio-technology, bio-resource and bio-ecology. Table no. 1 illustrates the key features of the 3 bioeconomy visions in terms of overall aims and objectives, value creation, drivers and mediators of innovation as well as spatial focus.

Table no. 1: Key characteristics of the bioeconomy visions

	The bio-technology vision	**The bio-resource vision**	**The bio-ecology vision**
Aims and objectives	Economic growth and job creation	Economic growth and sustainability	Sustainability, biodiversity, conservation of ecosystems, avoiding soil degradation
Value creation	Application of biotechnology, commercialization of research and technology	Conversion and upgrading of bio-resources (process oriented)	Development of integrated production systems and high-quality products with territorial identity

	The bio-technology vision	The bio-resource vision	The bio-ecology vision
Drivers and mediators of innovation	R&D, patents, research councils and funders (science push, linear model)	Interdisciplinary, optimization of land use, include degraded land in the production of biofuels, use and availability of bio-resources, waste management, engineering, science and market (interactive and networked production mode).	Identification of favourable organic agro-ecological practices, ethics, risk, transdisciplinary sustainability, ecological interactions, re-use and recycling of waste, land use
Spatial focus	Global clusters/central regions	Rural/peripheral regions	Rural/peripheral regions

Source: Bugge, Hansen and Klitkou, 2016, p.700

In this paper, we are only interested in discussing the underlying particularities of the bio-ecology vision which has as outcome the pro-environmental behavior. So, the aims and objectives of the bio-ecology vision are primarily concerned with sustainability, and value creation takes the shape of promoting biodiversity, conservation of ecosystems, the ability to provide ecosystem services and preventing soil degradation (McCormick and Kautto, 2013). In referring to the drivers and mediators of innovation, a core element is represented by the identification of favourable bio-ecological practices, known also as pro-environmental behavior, in relation to the re-use and recycling of waste and, of course, the efficacy of the land usage (Siegmeier and Moller, 2013).

Although many specialists claimed that a transition to bioeconomy is assured by implementing sustainable practices, there is a gap in solving the bioeconomic issues in a systematic and interdisciplinary or transdisciplinary setting. One such example is the consumption of single-bottled water consumption.

1.2. Single-bottled water consumption and the pro-environmental behavior

Bottled water is one of the most dynamic markets of the world's food and beverage industry, even if it is referred to as "capitalism's greatest mysteries" because it is a resource which is already free and available but it is packaged and sold (Queiroz et al., 2012). While in many countries around the world, tap water is perfectly safe for consumption at no cost, the usage of bottled water has grown in the last decade, each year revealing a steady consumption growth rate (van der Linden, 2013).

Like any other industrial activity, bottled water is far from being completely safe to the environment. For example, manufacturing, recycling or incinerating the recipients of bottles of water imply energy needs and air pollution by fuel combustion. The most frequently used materials for the recipients of bottled water are plastic (PET), aluminum and glass. Table no. 2 shows three environmental factors and the three bottle materials for recipients. The comparison between the three materials reveals that PET is better than aluminum, as it requires less energy when recycled and it releases less emissions into the atmosphere. Yet, it releases phthalates into the water, air and other parts of the environment, requires more energy consumption in terms of production and distribution of bottles, and, plastic bottle recipents are made out of petroleum, which is not easy to recycle; nevertheless, no matter the material used, the empty bottle recipients end up in landfills and forests, lakes and oceans as litter (Ferrier, 2006).

Table no. 2: Energy and environmental impacts of water containers

Container type	**Recycling rate**		
	0%	50%	100%
	Energy required (GJ/1000 L)		
PET (64 fl oz bottles)	5.9	5.0	4.1
Aluminum (12 fl oz cans)	13.9	9.2	4.4
Glass (12 fl oz bottles)	13.7	9.8	5.8
	Atmospheric emissions (kg/1000 L)		
PET (64 fl oz bottles)	7.4	6.4	5.4
Aluminum (12 fl oz cans)	16.4	11.0	5.8
Glass (12 fl oz bottles)	26.1	17.5	8.8
	Solid waste (kg/1000 L)		
PET (64 fl oz bottles)	61.6	42.2	22.7
Aluminum (12 fl oz cans)	232.6	128.2	23.8
Glass (12 fl oz bottles)	840.0	465.7	91.5

Note: GJ= Giga Joule; L= Liter; Kg= Kilogram.

Source: Ferrier, 2001, p.22

Convincing the public to adopt and maintain a sustainable behavior by drinking tap water instead of single-bottled water may turn out to be almost an impossible strategy. Bottled water is not necessarily "better" or "worse" than tap water but it is strongly agreed that bottled water is of better quality and safer than tap water, as bottled water is submitted more frequently to rigorous controlled standards and is less exposed to contamination with bacteria during distribution (Doria, 2006). So, the only solution lies in raising the practice of using refilled and returnable bottles which are simply washed and are mostly made out of glass.

Over the last 30 years, experts in pro-environmental behavior have tried to uncover the roots of direct and indirect factors which impact the environment (Kollmuss and Agyeman, 2002). The concept of pro-environmental behavior illustrates an individual who consciously seeks to minimize the impact of his negative actions on the environment, by minimizing the energy consumption, the usage of toxic substances as well as reducing water pollution and waste production. The scientific literature based on pro-environmental themes is filled with different models but the simplest one concentrates on a linear progression of knowledge which would evolve to environmental awareness and concern, forming, in fact, pro-environmental attitudes. Further, the following models were elaborated and implemented to in-depth explain pro-environmental behavior: *The Early US Linear Model*, based on the *Theory of Reasoned Action* (Ajzen and Fishbein, 1980), *The Model of Predictors of Environmental Behavior* (Hines, Hungerford, Tomera, 1986), *The Altruism, Empathy and Pro-social Behavior Models* (Stern, Dietz and Karlof, 1993), and, lastly, *The Sociological Models for Analyzing Pro-Environmental Behavior* (Blake, 1999).

In this research, following the guidelines of Hines, Hungerford and Tomera (1986), encompassed in the *Model of Responsible Environmental Behavior*, we elaborated a Pro-environmental single-bottled water reduction model. In 1986, Hines, Hungerford and Tomera (1986) conceived their *Model of Responsible Environmental Behavior* based on Ajzen and Fishbein's (1980) *Theory of Planned Behavior*, including the following variables in the model (Hines, Hungerford, Tomera, 1986) (figure no. 1):

- The variable *Knowledge of issues*: An individual has to be familiar with the environmental issues and what causes them;
- The variable *Knowledge of action strategies*: After identifying the environmental issues, an individual has to be aware of the methods he may apply in order to lower the impact of his actions on the environment;
- The variable *Locus of control* represents an individual's perception of whether he has the internal power to change the negative impact of his behavior on the environment;
- The variable *Attitude* is the outcome of an active engagement in pro-environmental behavior;
- The variable *Verbal commitment* is the willingness of an individual to take action and engage in pro-environmental behavior;
- The variable *Individual sense of responsibility* is the sense of personal responsibility for engaging in pro-environmental behavior.

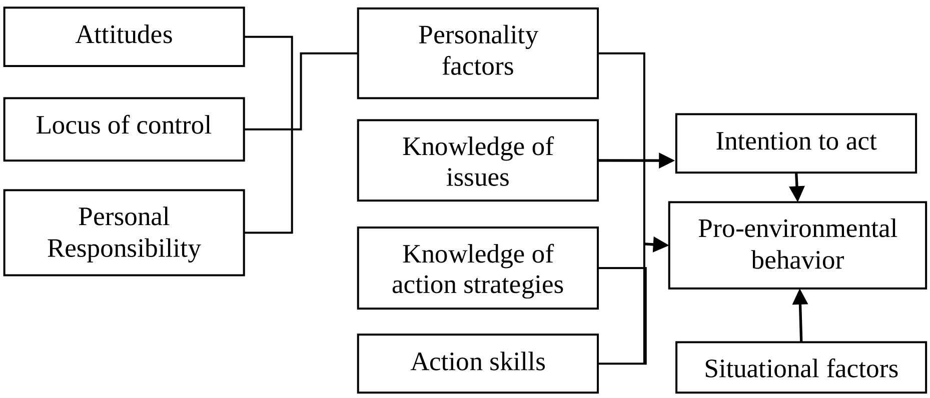

Figure no. 1: The model of responsible environmental behavior
Source: Kollmuss and Agyeman, 2002, p.244

2. Research Methodology

2.1. Participants

Participants were first-year university students of Carol Davila University of Medicine and Pharmacy, from Bucharest, Romania. We have selected this study group because, worldwide, in most universities have been developed programs and workshops on sustainability, education on sustainability and the environment and sustainability (Jones, Selby and Sterling, 2010). Moreover, university students are homogenous in nature and may be analyzed as a group community which would serve as an example in defining the general public's behavior with similar demographic profiles (Qian, 2018). As such, Carol Davila University of Medicine and Pharmacy, gathers students from all over the country, being the largest medical school at national level (Popa-Velea et al., 2017).

A sample of 300 individuals was built following a nonprobabilistic homogenous convenience sampling method, following the criteria: the participants should have an active student status, the mean age should be 20 and students should have Romanian nationality. Although convenience samples have less generalizability (representativity) than samples built on probability methods, the sampling framework for homogenous convenience sampling is intentionally restricted to design the selection of the population on socio-demographic characteristics, so as, to minimize the operational selection biases (Jager, Putnick and Bornstein, 2017). In other words, the more homogenous the socio-demographic factors are, the closer they will fall to the generalizability of probability samples, and, at the same time, the generalizability will become narrower, forming a more accurate and circumcised population. Out of 300 questionnaires, 283 were validated, based on the respondents' consents to take part in the study.

2.2. Procedure

The study was conducted in 2018, during an annual month, following the ethical guidelines published by the Committee of Ethics of the university. Each participant received a sealable envelope containing explanations about the research, a written consent and a questionnaire. The students were adviced to return the completed questionnaires and the written consents in the resealable envelopes. The collected data were processed, respecting the confidentiality of each respondent and were exclusively accessible to the researchers of this study.

2.3. Measurement instruments

The data were collected using a questionnaire which consisted of two sections: the first section referred to items which would define the demographic profile of the respondents, such as the type of consumers, the level of daily activities, gender and childhood experiences in nature, and, the second section encompassed items which made up the measurement scales of the variables included in the model.

Following Hines, Hungerford and Tomera's (1986) conceptual framework of the pro-environmental behavior, we elaborated a new model which would fit the single-bottled water reduction behavior, as illustrated in figure no. 2. The Attitude towards pro-environmental behavior consisted of items specific to Safety and hygiene as well as items which define the Personal Benefit construct. Analogous, The Knowledge of issues related to the environment is characterized by Health beliefs construct and Environmental concerns construct. Moreover, the Intention to act is made up of items which include statements referring to the usage of refillable bottles.

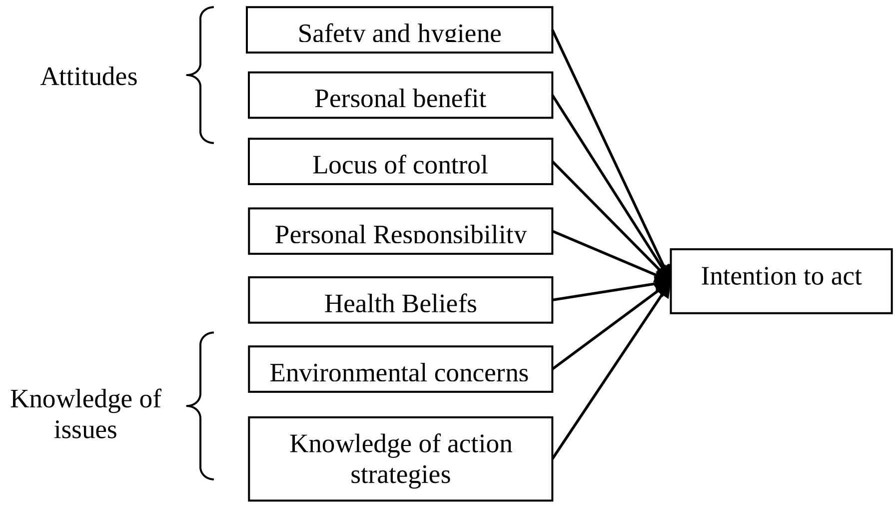

Figure no. 2: Conceptual framework

For every variable in our model we have built measurements on 5 point Likert scales, ranging from 1-*Strongly Disagree* to 5-*Strongly Agree*. The scales were adapted according to the previous scientific literature and are presented in table no. 3.

Consequently, we conceived the following hypotheses:

- H1: Between an individual's perceived safety and hygiene of bottled water and his pro-environmental intention to use refillable bottles for drinking water there is a direct correlation.
- H2: Between an individual's perceived personal benefits involved in bottled water usage and his pro-environmental intention to use refillable bottles for drinking water there is a direct association.
- H3: Between an individual's locus of control related to bottled water and his pro-environmental intention to use refillable bottles for drinking water there is a positive link.
- H4: Between an individual's personal responsibility related to bottled water and his pro-environmental intention to use refillable bottles for drinking water there is a direct association.
- H5: Between an individual's perceived health benefits of bottled water and his pro-environmental intention to use refillable bottles for drinking water there is a positive correlation.
- H6: Between an individual's environmental concerns related to his bottled water usage and his pro-environmental intention to use refillable bottles for drinking water there is a direct link.
- H7: Between an individual's knowledge of environmental action strategies and his pro-environmental intention to use refillable bottles for drinking water there is a direct association.

Table no. 3: Description of the model's scales

Scale	Components	Items	Mean ± Standard Deviation	Source
Attitude	Safety and hygiene	4	14.55 ± 3.73	Qian (2018)
	Personal Benefit	9	31.69 ± 8.93	Xu and Lin (2018)
Locus of control	-	4	13.51 ± 3.90	Ward et al. (2009), Mikhailovich and Fitzgerald (2014), Yao (2011), Doria (2006)
Personal responsibility	-	3	10.39 ± 3.26	Ward et al. (2009), Mikhailovich and Fitzgerald (2014), Yao (2011), Doria (2006)
Knowledge of issues	Health beliefs	4	10.36 ± 3.35	Qian (2018)
	Environmental concerns	7	24.18 ± 7.15	Qian (2018)
Knowledge |of action strategies	-	8	27.00 ± 7.89	Qian (2018)
Intention to act	-	3	10.85 ± 2.79	Xu and Lin (2018)

2.4. Design and analysis

The data were collected and processed using SPSS software version 20, and so, we identified the demographic profile of the respondents. The validation of the model as well as the hypotheses testing were assessed in SmartPLS version 3, using Structural Equation Modeling. Moreover, the validation of the model was performed with the help of three coefficients: the alpha Cronbach, the Convergent Validity and the Average Variance Extracted and the hypotheses were tested using the Bootstrapping method.

3. Findings

3.1. The demographic profile of the respondents

Among 283 respondents, the vast majority were frequent consumers of bottled water (89.6%), had a normal physical activity, meaning walking and active daily activities (78.5%) and had more than five yearly childhood experiences in nature (62.8%). Moreover, most of the participants drink bottled water any season (82.4%) and the taste is the motive they select a certain bottled water (56%) and the water's recipient is made out of plastic (PET) (93.5%), as it is depicted in the table no. 4.

Table no. 4: The demographic profile of the respondents

Variables	Frequency (%)
Type of consumers (depends on frequency of bottled water usage)	
Non-consumers (1-2 times per month)	0.8
Limited consumers (1-2 days per week)	9.6
Consumers (3-5 days per week)	89.6
Level of physical activity/day	
Intense (climbing stairs, going to the gym)	19.4
Normal (walking, daily activities)	78.5
None (drive all the time, sedentary lifestyle)	2.1
Gender	
Female	56.8
Male	43.2
Childhood experiences in nature	
1/year	0
2-4/year	37.2
>5/year	62.8
During which season do you use more bottled water?	
Spring	1.6
Summer	16.2
Autumn	0
Winter	0
Does not matter. I drink it anyway	82.4
What is the most important factor in determining your bottled water preference?	
Taste	56
Design of the bottle	3.3
The source of the water	8.1
Don't care	32.6
What kind of bottled water container do you usually buy?	
PET bottle (can only be used once)	93.5
Aluminum bottle	0
Glass bottle	6.5
Where did you acquire your beliefs about bottled water?	
Advertisement on TV or magazine	5.6
Advertisement on the Internet	0.3
Parents or family members	18.6
Friends	2.3
Books or articles	0
Government brochures	0
Don't care about a certain source of information. I buy bottled water depending on the context	73.2

3.2. The validation of the measurement model

The validation of the measurement model was determined by the three coefficients in SmartPls, namely Cronbach's alpha coefficient, The Convergent Validity and The Average Variance Extracted (Hair et al., 2014). After implementing several statistical instruments in which the variables *Health Beliefs* and *Environmental Concerns* have been stabilized by excluding 2 items from each scale, having in their composition 2 items (6.95±2.33) and, respectively, 5 items (17.29±5.23), all coefficients of the variables in the model had values higher than 0.50 suggesting that the conditions for achieving a robust model have been satisfied (table no. 5).

Table no. 5: The validation coefficients of the measurement model

Variables	Cronbach's alpha> 0.7	CRV>0.7	AVE> 0.5
Environmental concerns	0.894	0.918	0.692
Health Beliefs	0.800	0.853	0.749
Intention to act	0.806	0.886	0.721
Knowledge of action strategies	0.924	0.930	0.626
Locus of control	0.768	0.837	0.566
Personal Responsibility	0.848	0.904	0.759
Personal Benefit	0.938	0.940	0.634
Safety and hygiene	0.843	0.895	0.680

3.3. The validation of the hypotheses

The validation of the hypotheses' model was conducted with the help of the Bootstrapping method in SmartPls, which included the assessment of the significance of the estimated path coefficients at a p value lower than 0.05 as well as the explained variance (R^2) of the dependent variable (Hair et al., 2014).

In Figure no. 3, the estimated path coefficient indicated by an asterisk has a statistical significance value, validating the hypothesis H1. More exactly, participants in the research will continue to drink bottled water as long as they perceived it as being safer and more hygienic than tap water and, at the same time, they expressed their intentions to adopt a pro-environmental behavior in carrying around a refillable bottle of water. This result is also supported by the R^2 value (61%) which suggests that using a refillable bottle of water is greatly explained by the perceived safety and hygiene of bottled water.

4. Discussion

The concept of water as a human right was constantly debated in between being a pure free public good and a commodity, being packaged and sold for profit. Worldwide, the bottled water consumption has a constant trend of growth, endangering the environment. Despite the amount of literature on bottled water consumption and pro-environmental models, there is a gap related to the identification of the intentions which stand behind the bottled water consumption of university students, as part of the transition to bioeconomy.

A literature review on consumers' preferences and perceived risk of bottled water revealed that bottled water consumption is mostly triggered by the differences in beliefs and perceptions about the water, location and intended use, with a high contribution of marketing

(Gorelick et al., 2011). Thus, the most commonly consumer mentioned motivations to purchase bottled water are: organoleptics such as taste, odor and sight, quality, health concerns and convenience (Doria, 2006; Doria, Pidgeon, Hunter, 2009; Ferrier, 2001; Gleick and Palaniappan, 2010; van der Linden, 2013). Still, while there is a vast body of literature covering the individuals' motivations of bottled water consumption, few studies explored the intentions of reducing bottled water consumption of university students as well as the consequences linked to pro-environmental behavior, sustainability and bioeconomy.

This research assessed the intentions of university students' behavior of single-bottled water usage, examined the factors which trigger their behavioral choices and, at the same time, investigated whether their bottled water selection is influenced by pro-environmental motivations, as integrated in an empirical model. As such, the model encompassed the following independent variables (figure no. 3): safety and hygiene, personal benefit, locus of control, personal responsibility, health benefits, environmental concerns and knowledge of action strategies and a dependent variable, the intention to reduce the single-bottled water consumption by using a refillable bottle for drinking water.

The analysis revealed that university students drink bottled water because they perceived it as being safer and more hygienic than tap water. This finding is in line with previous outcomes revealed by the literature as for example Qian (2018) concluded that students in university campuses from regions in Macau, Singapore and Hong Kong drink bottled water for safety and hygiene reasons as well as for convenience and availability. Consequently, our research also revealed that university students would act in a pro-environmental direction, meaning they would use refillable bottles for water if they had an available safe and hygienic source of tap water.

Bottled water represents the resistance of "controllable human-generated hazard" and it is the reassurance that it has been protected against dangerous chemicals and microorganisms. Moreover, the bottled water industry obviously, believes that the public's fear over the safety of tap water is the main force which assures their success and profit (Olsen, 1999). Nowadays, most water advertising and labeling use images and pictures from nature, especially with mountains, woods and lakes, shaded in blue colors, suggesting "purity" and "pristine" water. The use of term "purity" brings forth a semiotic compromise, projecting an in-depth ambiguity to different audiences. More exactly, purity, on one hand, is a "prosaic and generic reassurance" for the audience who does not show any interest in the origins of bottled water, and, on the other hand, the water drinker has two positions in relation to his consumption: as the subject of technology, when the purity of water protects the drinker from dangerous technology and the object of technology when through advanced technology the purity of water is assured (Wilke, 2006). Pro-environmental behaviors are daily shaped by conflicting and competing factors such as knowledge, values, uncertainty, risk, trust, demographic variables as well as social, cultural and infrastructure factors which impact personal health up to some point (Fransson and Garling, 2003). Apart from this, some scholars have claimed that bottled water consumption is a habitual activity and it is important to suggest alternative behavioral choices such as boiling water and using filters or provide safe tap water (Ferrier, 2001; van der Linden, 2013; Doria, Pidgeon and Hunter, 2009). The main conclusion is that people generally value "good quality water" and will continue to consume what they perceive as being "purer" or "healthier" without any resentment that they endanger the environment (Doria, 2006).

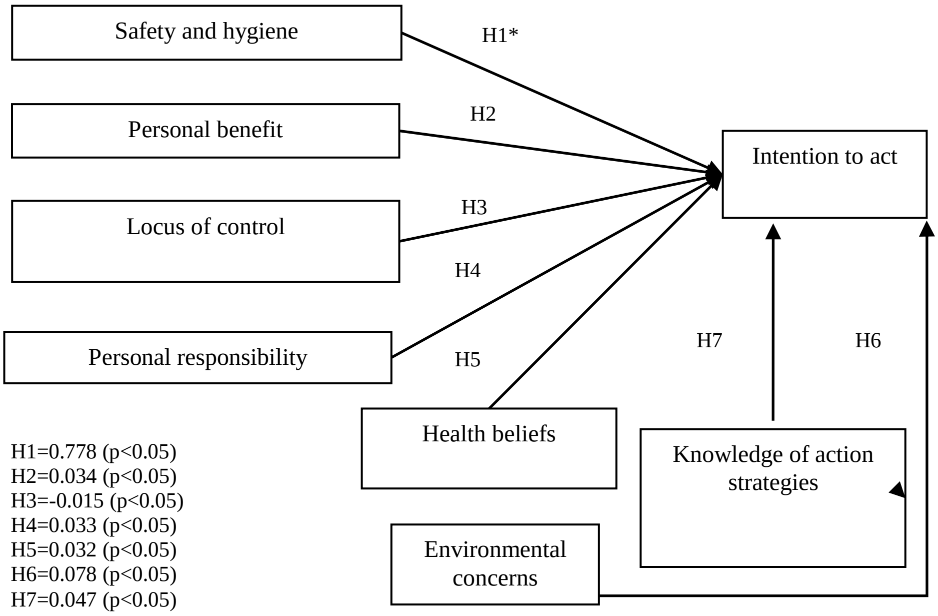

Figure no. 3: The validation of hypotheses

Conclusion

For a relatively highly educated and informed population, meaning university students, especially in a country, such as Romania, where tap water is easily accessible and still drinkable, bottled water consumption is widely encountered, emphasizing a worst scenario for the bioeconomic transition. It is necessary for governments and institutions to correct this negative impact on the environment through more public education campaigns in order to reduce the bottled water consumption and, at the same time, improve the quality of tap water.

There are a number of practical limitations, which refer to the design and the implementation of this study. Firstly, the sample made out of university students does not have generalizability, so one should be very careful when making assumptions for the general population (Peterson, 2006; van der Linden, 2013). So, university students have less formed attitudes and defined sense of self, making them more vulnerable to social changes (Sears, 1986). Secondly, since university students are considered a community, not all our findings fit other communities, but may reflect the changes which would take place on a longer period of time in a population (Hedt and Pagano, 2011). People's attitudes and beliefs about bottled water reduction may vary greatly, depending on a broad range of factors. A segmented population analysis may determine relevant attitudes and lead to the development of efficient strategies and to the elaboration and implementation of a targeted campaign which would be suitable for a certain community. Moreover, governments should provide cheap reusable water bottles, fountains and refillable stations with quality tap water.

For further research directions, we suggest that the following improvements should be conducted on the current study: to make a difference between the actual behavior and the self-reported intention of bottled water consumption reduction; to examine the results of the current research on non-student populations and to investigate the perceptions and beliefs on bottled water consumption of individuals in other contexts and cultures.

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