TEME, Vol. XLVII, Nº 4, October – December 2023, pp. 767–786

Original research paper https://doi.org/10.22190/TEME220529048D
Received: May 29, 2022 UDC 502:621.798.15(497.11)
Revised: July 20, 2022
Accepted: March 31, 2023

THE IMPACT OF ENVIRONMENTAL TAXES ON THE REDUCTION OF PLASTIC BAG CONSUMPTION IN THE REPUBLIC OF SERBIA

Jadranka Đurović Todorović[1], Marina Đorđević[1], Miloš Stojanović[*2]

[1]University of Niš, Faculty of Economics, Niš, Serbia
[2]Metropolitan University, Belgrade, Serbia

Abstract

The problem that plastic bags cause to the environment is one of the most significant environmental problems. Not much attention is paid to this problem on the territory of the Republic of Serbia, and there is a gap where scientific research is concerned. In addition to mitigating this gap, the aim of this paper is to identify the basic factors which reduce the consumption of light (disposable) plastic bags using exploratory factor analysis. The results of the conducted analysis show that the development of environmental awareness, the availability of alternatives, social norms, and economic instruments that could be implemented in the future have a positive impact on the change in consumer behaviour on the territory of the Republic of Serbia when it comes to the use of plastic bags.

Key words: plastic bags, fee, environmental awareness, economic instruments.

УТИЦАЈ ЕКОЛОШКИХ ПОРЕЗА НА СМАЊЕЊЕ ПОТРОШЊЕ ПЛАСТИЧНИХ КЕСА У РЕПУБЛИЦИ СРБИЈИ

Апстракт

Проблем који пластичне кесе представљају по животну средину је један од значајнијих еколошких проблема. Овом проблему се на територији Републике Србије не придаје довољно пажње, а нарочито недостају научна истраживања на ову тему. Поред ублажавања наведеног проблема, циљ овог рада је идентификовање основних фактора који утичу на смањење потрошње лаких (једнократних) пластичних кеса применом експлоративне факторске анализе. Спроведеном анализом је утврђено да на промену понашања потрошача на територији Републике Србије у односу на потрошњу пластичних кеса позитиван утицај имају развој

[*] Corresponding author: Miloš Stojanović, Metropolitan University, Belgrade, Serbia, milos.s87@hotmail.com

еколошке свести, доступност алтернатива, друштвене норме, као и економски инструменти који би могли да буду имплементирани у будућности.

Кључне речи: пластичне кесе, накнада, еколошка свест, економски инструменти.

INTRODUCTION

Plastic bags are the most commonly used product for packaging, and the main reasons why this is the case are their resistance to moisture, their strength, their price, and the facts that they are lightweight and can be reused. It is estimated that around 500 billion plastic bags are used worldwide each year, which means that more than a million bags are used every minute. In the last ten years, more plastic was produced than during the entirety of the last century (Wilts et al., 2020).

Considering that the protection of the environment is one of the basic segments of the development policy of all countries in the world, the problem of the use of plastic bags is a challenge that all countries face. In higher-income countries, plastic bags, except those that are biodegradable, are completely banned, but appropriate economic instruments are generally also present. In contrast, in middle- and lower-income countries, the fight against this problem is usually solved by introducing an appropriate environmental tax, most often in the form of fees for plastic bags. Countries with lower incomes are extremely slow in solving this problem, mainly due to the accumulated problems in the field of economy and social policy.

In addition, plastic bags are extremely harmful to the environment, from the beginning to the end of their life cycle. The production of plastic bags requires a lot of energy, which usually comes from the use of fossil fuels. Among other things, in its simplest form, plastic is produced from crude oil. The excessive use of fossil fuels in the production of plastics, and thus plastic bags, leads to the creation of the greenhouse effect, i.e. the rise in the average temperature on Earth, and sea and ocean levels (Schuyler et al., 2018; Vince & Hardesty, 2017).

The negative effect of plastic bags on the environment is reflected in the fact that they decompose slowly, and very often end up in nature due to negligent disposal, or due to wind. Animals ingest these bags, which leads to them developing various diseases, or dying. Also, when plastic bags end up in the soil, they decompose gradually, which has a negative impact on plants and the quality of water. People use animal meat and plants in their diet, drink water, and catch fish, which transmits these negative external effects to humans and their health.

In the Republic of Serbia, as in most countries of the world, except in those where light plastic bags are completely banned, this problem is still present. Of the economic instruments available in the fight against this environmental problem, Serbia employs fees for plastic bags (Stojanović,

2016; Stojanović, 2017), and a ban on the use of all plastic bags aside from those that are biodegradable. However, due to insufficient control, the selective application of the ban, and its application only in certain cities, these instruments do not yield satisfactory results in practice, because non-biodegradable bags are still used in many places, such as markets.

Despite the importance of this topic, it is not sufficiently covered in the Republic of Serbia, especially from the aspect of preserving the health of the environment, and protecting biodiversity and human health. For this reason, this paper aims to point out the importance of this problem, and to identify which factors affect consumers when it comes to the use of plastic bags. The paper also aims to answer the question of what effects introducing new fees for plastic bags would have on consumer behaviour, i.e. whether the fee would cause consumers to stop using plastic bags, and start using paper bags or other bags as an alternative.

LITERATURE REVIEW

For many years, the basic instrument used to combat the negative externalities caused by economic and human activities on planet Earth has been the 'command and control' instrument (Ekins, 1999). However, over time, due to accumulated environmental problems, it has become clear that this instrument alone is not efficient enough to provide a healthy environment. So, today, economic instruments are present in all countries of the world, with the goal of effecting a change in people's behaviour towards the environment (Stojanović, 2017). In addition to numerous other instruments, environmental taxes, most often in the form of fees, are enforced in order to reduce the use of plastic bags, due to their negative impact on the environment.

The production and use of plastic bags cause negative external effects on the environment. These negative external effects are the basis for the introduction of levies on their production and import. Therefore, in the Republic of Serbia, the taxpayers who pay the fee are producers, i.e. importers. Biodegradable bags, for which no fee is paid, are an exception (*Zakon o naknadama za korišćenje javnih dobara*, Art. 129). The fee paid by the manufacturers aims to make these bags more expensive. However, it should be noted that these fees are not prescribed at a high level in our country, which does not drastically increase the price of plastic bags. In part, this source of revenue belongs to local government units, while the rest flows into the budget of the republic. Taking into account that this source of revenue is earmarked, these funds are intended to solve problems in the field of environmental protection. However, it is not possible to clearly see what these funds are used for at the municipal level or at the national level, which certainly makes solving the problem of plastic bags even more complicated (Stojanović, 2016).

In addition to the fees introduced in some cities in the Republic of Serbia, a ban on the use of non-biodegradable plastic bags is enforced, but there are cases where an exemption from this ban is made, which allows the use of light plastic bags. Some of these cities are Belgrade, Novi Sad, Vranje, and the Doljevac municipality. Although bans and fees are present in Serbia, insufficient control, numerous exemptions, and the use of bags banned in the EU but allowed in Serbia (which are not subject to these fees) make this problem extremely complex. In order to give recommendations for mitigating and solving this problem in Serbia, we will first present the views of experts dealing with this topic through a review of the available literature, which serves as the basis for the conducted research.

There is evidence in the available literature to support the notion that economic instruments, in the form of environmental taxes, give results when it comes to environmental protection (Stojanović, 2017; Dias Soares, 2011; International Institute for Labour Studies, 2009). However, the focus of this paper is specifically on those economic and other available instruments that are used, or that can be used with the aim of solving the problem. In the domestic literature, this issue is almost entirely neglected, even by economists. It is touched upon by ecologists and technologists, but extremely poorly. When it comes to foreign literature, the papers on this topic are more thorough, and we will present the main results of foreign authors, which we will use as a guide in researching this topic in Serbia.

Asarai et al. (2008) concluded that environmental taxes imposed in Taiwan are not efficient enough to reduce the consumption of plastic bags in that country. When it comes to South Africa, a study was conducted with the aim of determining whether fees for plastic bags reduce their consumption (Hasson et al., 2007). The results of the research showed that the impact of fees on the consumption of plastic bags is effective in the short term, while this effect is gradually lost in the long term.

Many researchers on this topic have come to the conclusion that economic instruments are very effective in combating the problem of plastic bags, and their negative impact on the environment (Convery et al., 2007; Dikgang & Visser., 2012; Muralidharan & Sheehan, 2016). In Ireland, in 2009, the environmental tax paid on plastic bags was increased from 0.15 euros to 0.44 euros, which led to an annual drop in the consumption of plastic bags from 328 to 21 pieces per capita (Earth Policy Institute, 2014). Also, the introduction of mandatory payment for plastic bags in stores in England, amounting to five pence per bag, led to a reduction in their use by as much as 95% (Smithers, 2020). This confirms one of the basic economic postulates, which tells us that the elasticity of demand for low-priced goods is low (Stigler, 1966). However, with the growth of the price of goods, there is a change in elasticity and, thus, with the growth of the price of plastic bags, consumers turn to alternatives.

In a study conducted in Botswana, Mogomotsi et. al. (2019) came to the conclusion that economic instruments in the field of plastic bag consumption have yielded results, but are not strong enough to solve this problem in the long run.

What is also important when it comes to the problem of the irrational use of plastic bags and ecology in general is the development of environmental awareness, and the possibility of its further development. Some authors have pointed out that the simultaneous development of environmental awareness and the use of economic tools give the best results in solving the problem of reducing the consumption of plastic bags. They pointed out that, in addition to the presence of economic instruments, social norms, the development of environmental awareness, and the availability of substitutes in retail have an impact on consumers' decisions to use plastic bags. These authors used factor analysis in their research (Hansla et al., 2008; Lee & Lim, 2020; Hoang et al., 2018; Le, 2018; Hoang, 2016; Vu et al., 2012).

Thomas et al. (2019) conducted an analysis of the fee for plastic bags introduced in England, and came to the conclusion that such a fee had a positive impact on consumer behaviour. However, they also pointed out that, in addition to compensation, environmental awareness also has an impact on the reduction of plastic waste in England.

Van et al. (2021) analysed which factors influence the use of plastic bags in Malaysia. The results of their research showed that environmental awareness and 'command and control' instruments do not have a statistically significant impact on consumers, but that economic instruments and available substitutes have a positive effect on reducing the consumption of plastic bags. Also, Luong (2013) found that environmental awareness is an extremely important factor influencing consumer behaviour when choosing between single-use plastic bags and alternative solutions.

Tong and Duong (2021) used factor analysis to investigate which factors have the greatest impact on solving the problem of plastic bags. In their analysis of a sample comprising 291 respondents, they concluded that environmental awareness, social norms, and consumer attitudes have an impact on reducing the consumption of plastic bags in Vietnam, while the availability of substitutes and present environmental taxes on this issue do not have an effect on consumer behaviour.

METHODOLOGY AND HYPOTHESES

In order to respect the existing attitudes and research, and to find out what the situation is on the territory of the Republic of Serbia, a survey was conducted in the period between February and March 2022. The aim of the survey was to get answers to the questions posed in the survey, which would enable us to conduct a factor analysis in order to determine

the most important factors in solving the problem of plastic bags in the Republic of Serbia. We wanted to determine whether the solution to this problem is influenced by the development of environmental awareness, the availability of substitutes, social norms or economic instruments, or all of them together. Taking previous research into consideration (Tong et al., 2021; Mogomosi et al., 2019; Vu et al., 2012; Le, 2018; Muralidharan et al., 2016; Hansla et al., 2008; Lee et al., 2020; Hoang et al., 2018), the following hypotheses were defined:

(1) consumer attitudes and social norms in Serbia have a positive impact on reducing the consumption of plastic bags;

(2) the availability of substitutes in retail stores in Serbia has a positive effect on the decline in the consumption of plastic bags;

(3) concerns about the quality of the environment have a positive impact on reducing the consumption of plastic bags; and

(4) economic instruments have a positive impact on the decline in the consumption of plastic bags.

The survey that was conducted was anonymous and filled in by the respondents in writing, and in electronic form. Afterwards, the results were combined and summarised in the programme. The results of 177 respondents were collected, but 170 of them were included in the analysis. Seven respondents handed in incomplete surveys, and were excluded from the analysis. Only respondents from the territories of those cities and municipalities where light plastic bags are not banned were included in the survey. The survey itself was designed in two parts. In the first part, the respondents answered questions about gender, age, level of education, and the city, i.e. the municipality in which they live. In the second part of the questionnaire, the respondents answered 25 questions, i.e. they gave their opinion on the importance of the given statements on a five-point Likert-type scale (1- absolutely disagree, ..., 5 - absolutely agree) (Scott & Gerald, 2005; Tong et al., 2021). The survey was created in accordance with research on this topic conducted by researchers around the world (Mogomotsi et al., 2019; Tong et al., 2021; Convery et al., 2007; Dikgang et al., 2012; Muralidharan et al., 2016).

Regarding statements 19, 21, 22, 23 and 24 (Table 2), the respondents received a written explanation of the possibility of a new fee being introduced. Namely, the new fee, amounting to 10 RSD per bag, would be introduced on all plastic bags, light bags, as well as biodegradable bags. The final price of the bags would depend on the retailers, so in addition to the fee of 10 RSD, the price would also include the procurement costs of those bags, which depend on the manufacturer, as well as the trade margin. In order to reduce the costs of collecting these fees, fees (environmental taxes) would be charged to the manufacturers or importers of plastic bags, and the fee itself would be passed on to final consumers. The funds that would be collected through this fee would be part of

the income of a special fund, from which the producers of biodegradable bags would be subsidised.

In order to test the defined hypotheses on the basis of the respondents' answers, the software package SPSS was used, within which exploratory factor analysis was conducted. The application of factor analysis itself was conducted on the model of the previous research on this topic, which includes an analysis of the impact of environmental awareness, social norms, and the availability of alternatives, in addition to economic instruments (Mogomotsi et al., 2019; Tong et al., 2021; Dikgang et al., 2012; Muralidharan et al., 2016; Van et al., 2021). In addition to the arithmetic mean and standard deviation, the Bartlett test and the KMO (Kaiser-Mayer-Olkin) test were used to test the collected data. After determining the key factors and applying the Varimax method, regression analysis was applied in order to give us an answer to the question of whether the independent variables have a statistically significant impact on the dependent variable. Finally, ANOVA analysis was performed to determine whether the obtained result was statistically significant.

RESEARCH RESULTS

The Demographic Description of the Sample and Descriptive Statistics

As shown in Table 1, of the total of 170 respondents, 71 respondents (47.76%) are women, while 99 respondents (58.24%) are men. When it comes to the age structure of the respondents, the largest number of the respondents is between 26 and 45 years of age (35.29%), while the smallest number of the respondents is under 18, and over 56 (5.88% and 11.77%, respectively). Regarding the educational structure of the respondents, the largest number of respondents has completed high school (80 respondents, or 47.06%), and the smallest number of them has primary school (5 respondents, or 2.94%).

Descriptive statistical analysis allowed us to calculate the arithmetic mean and the standard deviation for all statements in the questionnaire. The results of descriptive statistics are shown in Table 2. The respondents' average assessment of the stated findings in the questionnaire ranges between 3.56 and 4.40. The lowest grade was given to the tenth statement, which refers to the impact of radio broadcasts on the awakening of environmental awareness, aimed at reducing the consumption of light plastic bags.

Table 1. Description of the research sample

Demographic characteristics	Frequency	%
Gender	170	100.00
Male	99	58.24
Female	71	41.76
Age	170	100.00
Until 18	10	5.88
19-25	54	31.77
26-45	60	35.29
46-55	26	15.29
56 and more	20	11.77
Education	170	100.00
Primary school	5	2.94
Secondary education	80	47.06
Higher school	42	24.71
Faculty education	32	18.82
Master/PhD	11	6.47

Source: Authors' calculations based on the SPSS software package

Table 2. Descriptive statistics

Statement		Arithmetic mean	Standard deviation
1.	The existing system of fees for disposable plastic bags, which is charged by the manufacturer or importer, does not reduce their consumption.	4.09	0.754
2.	Parental example is important in reducing the consumption of plastic bags.	4.01	0.973
3.	The education of primary school children about the harmfulness of plastic bags to the environment is important.	4.06	0.881
4.	Defining adequate regulations at the state level, and implementing and adequately controlling them can solve this problem.	4.04	0.812
5.	The education of high school children about the harmfulness of plastic bags to the environment is important.	3.96	1.037
6.	Educating students about the harmfulness of plastic bags is important for solving this problem in the future.	3.85	1.087
7.	This topic needs to be covered more by scientists.	4.01	0.928
8.	Seminars and workshops on this topic have an impact on reducing the consumption of plastic bags.	3.83	1.012
9.	Educational television programmes can have a positive impact on environmental awareness, and can reduce the consumption of plastic bags.	3.94	0.960
10.	Radio broadcasts can have a positive impact on environmental awareness, and can reduce the consumption of plastic bags.	3.56	1.157

11. This topic should be more represented in the newspaper.	4.12	1.016
12. Institutes that examine the quality of plastic bags should regularly inform the public about it.	3.86	0.991
13. Plastic bags, in addition to their impact on the environment and health, have a negative impact on the visual experience of the environment.	3.87	1.016
14. Excessive consumption of disposable plastic bags creates a big problem when it comes to environmental quality.	4.09	0.895
15. In Serbia, environmental awareness is not sufficiently developed.	3.90	0.968
16. The retail stores in which I shop offer biodegradable bags.	4.36	0.784
17. The retail stores in which I shop offer paper bags as an alternative.	4.32	0.770
18. The retail stores in which I shop offer linen bags.	4.26	0.882
19. The introduction of a fee of 10 RSD per plastic bag would reduce their consumption[1].	4.40	0.784
20. Funds raised through the new fee should, in part, be used to subsidise manufacturers of biodegradable bags, which use chemicals that are less harmful to the environment.	3.80	1.067
21. Funds from the new fee that would be introduced per piece of plastic bag should be transferred into special-purpose funds.	3.92	0.997
22. The decision on the amount of the fee should be made at the state level, not at the city level.	3.99	0.936
23. There is no alternative to light plastic bags in the shops of smaller retailers.	4.28	0.725
24. Ordinary and moral norms are not enough to solve the problem of plastic bags.	4.40	0.784
25. Reducing the consumption of light plastic bags is necessary.	4.05	1.070

Source: Authors' calculations based on the SPSS software package

Statements 20 and 24 have the highest marks, and they refer to the introduction of a new fee that would burden consumers with the aim of reducing the consumption of light plastic bags. Where the lowest degree of disagreement among the respondents is concerned, it appears in statement 1, and amounts to 0.754. The highest degree of disagreement is seen in statement 10.

The Results of Factor and Regression Analyses

Factor analysis was used in this paper, with the aim of reducing a large number of statements to a smaller number of factors, i.e. grouping them into appropriate factors. It was done with the objective of explaining

[1] Respondents were given an explanation of what this fee is, as well as how it can be collected and used.

and determining the influence of the independent variables on the dependent variable via regression analysis. Additionally, the objective was to determine the statistical significance of this influence.

As part of the first step of factor analysis, we tested the assumptions for the justification of its application. It was determined that the application of factor analysis for this type of research is adequate because the following conditions are satisfied:

(1) statements were measured on the Likert scale; and

(2) in order to apply factor analysis, the number of observations should be five times higher than the number of statements. In our case, the number is seven times higher. The justification for the application of factor analysis was verified by applying the Kaiser-Meyer-Olkin indicator and the Bartlett test, whose values are shown in Table 3.

Table 3. The results of the Kaiser-Meyer-Olkin and Bartlett tests

Kaiser-Meyer-Olkin test	0.922
Bartlett test	2955.765
Df	276
Sig.	.000

Source: Authors' calculations based on the SPSS software package

The value of the Kaiser-Mayer-Olkin test, as can be seen in Table 3, is 0.922. This value is significantly higher than the recommended value of 0.5. Bartlett's test, which is also shown in Table 3, indicates that there is a statistically significant correlation between the variables ($\chi 2$=2955,765; p=0,000<α=0.05). The conducted tests show that it is justified to apply factor analysis in order to single out common factors.

The answers received from the respondents, based on the defined statements and their assessment on the Likert scale, were subjected to the analysis of the main components. The number of these components was determined based on Kaiser's criteria.

Kaiser's criterion implies that only those factors that have a characteristic value greater than one will be included after the rotation of factors. By analysing the main components, this research found that there are four factors that have a characteristic value greater than one. These four factors explain a total of 67.723 variances, which can be seen in Table 4.

After the factor analysis of the most important components was performed, the factors were rotated using the Varimax method. Based on the implemented Varimax methodology, only those factors that have factor weights greater than 0.5 were taken into account in further analysis.

Table 4. Analysis of the most important components of factor analysis

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumu-lative %	Total	% of Variance	Cumu-lative %	Total	% of Variance	Cumu-lative %
1.	11.770	49.010	49.010	11.770	49.010	49.010	7.368	30.723	30.723
2.	1.908	7.945	56.955	1.908	7.945	56.955	3.696	15.416	46.139
3.	1.509	6.283	63.238	1.509	6.283	63.238	2.869	11.966	58.105
4.	1.077	4.485	67.723	1.077	4.485	67.723	2.306	9.618	67.723
5.	0.944	3.931	71.654						
6.	0.776	3.231	74.885						
7.	0.728	3.031	77.916						
8.	0.627	2.611	80.527						
9.	0.580	2.415	82.942						
10.	0.471	1.961	84.903						
11.	0.430	1.791	86.694						
12.	0.412	1.716	88.410						
13.	0.381	1.586	89.996						
14.	0.338	1.407	91.403						
15.	0.315	1.312	92.715						
16.	0.269	1.120	93.835						
17.	0.251	1.045	94.880						
18.	0.225	0.937	95.817						
19.	0.218	0.908	96.725						
20.	0.207	0.862	97.587						
21.	0.175	0.729	98.316						
22.	0.148	0.618	98.934						
23.	0.136	0.566	99.500						
24.	0.120	0.500	100.000						

Source: Authors' calculations based on the SPSS software package

Table 5. The results of applying the Varimax method for factor rotation

	Components			
	1	2	3	4
Educational television programmes can have a positive impact on environmental awareness, and can reduce the consumption of plastic bags.	0.813			
Institutes that examine the quality of plastic bags should regularly inform the public about it.	0.802			
Plastic bags, in addition to their impact on the environment and health, have a negative impact on the visual experience of the environment.	0.796			
In Serbia, environmental awareness is not sufficiently developed.	0.788			

Seminars and workshops on this topic have an impact on reducing the consumption of plastic bags.	0.785				
Educating students about the harmfulness of plastic bags is important for solving this problem in the future.	0.779				
The education of high school children about the harmfulness of plastic bags to the environment is important.	0.722				
The education of primary school children about the harmfulness of plastic bags to the environment is important.	0.716				
Excessive consumption of disposable plastic bags creates a big problem when it comes to environmental quality.	0.695				
Radio broadcasts can have a positive impact on environmental awareness, and can reduce the consumption of plastic bags.	0.626				
This topic needs to be covered more by scientists.	0.604				
This topic should be more represented in the newspaper.	0.551				
The introduction of a fee of 10 RSD per plastic bag would reduce their consumption.		0.841			
Funds from the new fee that would be introduced per piece of plastic bag should be transferred into special-purpose funds.		0.809			
Funds raised through the new fee should, in part, be used to subsidise manufacturers of biodegradable bags, which use chemicals that are less harmful to the environment.		0.798			
The decision on the amount of the fee should be made at the state level, not at the city level.		0.593			
The existing system of fees for disposable plastic bags, which is charged by the manufacturer or importer, does not reduce their consumption.					
The retail stores in which I shop offer paper bags as an alternative.			0.833		
The retail stores in which I shop offer biodegradable bags.			0.828		
The retail stores in which I shop offer linen bags.			0.511		
There is no alternative to light plastic bags in the shops of smaller retailers.					
Parental example is important in reducing the consumption of plastic bags.					0.836
Defining adequate regulations at the state level, and implementing and adequately controlling them can solve this problem.					0.600
Ordinary and moral norms are not enough to solve the problem of plastic bags.					

Source: Authors' calculations based on the SPSS software package

After the rotation was performed, we obtained a matrix on the basis of which we could determine the value of the factor weight for each

factor. We added to the first factor those statements that have a factor weight greater than 0.55, which is twelve statements in total. This can be seen in Table 5.

The first factor, i.e. the statements assigned to the first factor, refers to the development of environmental awareness. Four findings are joined to another factor, which refers to economic instruments for reducing the consumption of light plastic bags. The third factor is accompanied by three statements with factor weights greater than 0.5, and relates to the existence of alternative solutions for lightweight plastic bags. Two statements were assigned to the last factor, and they refer to the impact of social norms on the use of light plastic bags. Statements with factor weights less than 0.5 were not assigned to any of the four factors listed.

After the defined statements were included in the four factors, a regression analysis was performed. The aim of conducting regression analysis is to determine whether independent variables have a statistically significant effect on the dependent variable. In our case, the dependent variable is the last statement, which reads "Reducing the consumption of light plastic bags is necessary". The four defined factors, on the other hand, represent independent variables, and our goal was to determine whether all independent variables have a statistically significant impact on the dependent variable.

Table 6. The results of regression analysis

Model	The correlation coefficient (R)	Coefficient of determination (R^2)	Adjusted coefficient of determination	Standard error value	DW statistics
1.	0.529[a]	0.280	0.270	0.902	
2.	0.648[b]	0.420	0.416	0.813	
3.	0.683[c]	0.466	0.458	0.780	
4.	0.691[d]	0.477	0.469	0.769	2.009

Source: Authors' calculations based on SPSS software package

Looking at Table 6, it can be concluded that all four independent variables remained in the defined regression model, and that they have a satisfactory statistical significance. The coefficient of determination that shows what percentage of the variability of the dependent variable explains the independent variables is 0.477 in our case. This means that the dependent variable, which implies behaviour related to the reduction of light plastic bags, is influenced by all four of the defined factors: development of environmental awareness, availability of substitutes for light plastic bags, social norms, and economic instruments.

Table 7. ANOVA analysis

		Sum of squares	Number of degrees of freedom	Mean of square	F - statistics	Significance
1.	Regression	52.134	1	52.134	65.249	.000[a]
	Residual	134.278	168	0.799		
	Amount	186.412	169			
2.	Regression	77.576	2	38.788	62.061	.000[b]
	Residual	108.836	167	0.652		
	Amount	186.412	169			
3.	Regression	85.903	3	28.634	46.333	.000[c]
	Residual	102.509	166	0.618		
	Amount	188.412	169			
4.	Regression	90.103	4	22.526	37.795	.000[d]
	Residual	98.309	165	0.596		
	Amount	188.412	169			

Source: Authors' calculations based on the SPSS software package

In order to determine the statistical significance of the obtained results, an ANOVA analysis of variance was performed. Sneder's F-statistic is 37.795 in our case, with a significance level of p (F) = 0.000 $<\alpha = 0.05$. This result shows that the coefficient of determination differs from zero, and that the regression effect of all four independent variables on the dependent one is statistically significant.

DISCUSSION AND RECOMMENDATIONS FOR FUTURE RESEARCH

Based on the analysis conducted on the territory of the Republic of Serbia, we were able to reach significant conclusions when it comes to the problem of reducing the consumption of plastic bags. All the hypotheses defined in this paper were confirmed, as shown in Table 8.

Table 8. Paper hypotheses and their proof

Hypotheses	Accepted / Rejected
Consumer attitudes and social norms in Serbia have a positive impact on reducing the consumption of plastic bags.	Accepted
The availability of substitutes in retail stores in Serbia has a positive effect on the decline in the consumption of plastic bags.	Accepted
Concerns about the quality of the environment have a positive impact on reducing the consumption of plastic bags.	Accepted
Economic instruments have a positive impact on the decline in the consumption of plastic bags.	Accepted

Source: Authors' findings

Defined social norms have a great influence on consumer behaviour, as well as the attitude that consumers have towards plastic bags. This claim has also been proven by Hansla et al. (2008), Lee et al. (2020), Hoang et al. (2018), Le (2018) Hoang (2016), Vu et al. (2012), and Tong et al. (2021). Therefore, legal regulations, the control of their application, and customary and moral norms have a great influence on the decision to use light plastic bags (disposable plastic bags), and generally on issues related to environmental protection. So, in order to reduce the consumption of plastic bags, in addition to the introduction of clear regulations and their controlled application, moral norms must be introduced through parental education and example. This is especially illustrated by the results shown in Table 2, wherein the average score of the respondents' answers in relation to parental example is 4.01.

Substitutes in the form of biodegradable bags, paper bags, and linen bags have an impact on consumer decisions about which bags to use in Serbia, although they do not represent a permanent solution to this problem. Such results have been obtained worldwide by Vu et al. (2012), Hoang et al. (2018), and Le (2018), while Tong et al. (2021), who conducted their analysis in Vietnam, did not obtain positive results in regard to this hypothesis.

The third hypothesis, which states that "Concern for the quality of the environment has a positive impact on reducing the consumption of plastic bags", refers to the level of the development of environmental awareness necessary to solve the problem of plastic bags, as well as the need for the further development of environmental awareness. Through our analysis, it was proven that the level of environmental awareness has a positive impact on reducing the consumption of light plastic bags. Education at all levels, the scientific processing of this topic, and the journalistic promotion of this topic can have a positive impact on the development of environmental awareness. Through numerous studies, authors around the world have obtained identical results about the impact of environmental awareness on the consumption of plastic bags (Hansla et al., 2008; Lee et al., 2020; Luong, 2013; Hoang, 2016; Long & Duong, 2021).

The last hypothesis of this paper refers to the impact of economic instruments which could be implemented in the Republic of Serbia in the future. Namely, the existing fees do not have a great impact on the price of bags and, thus, they do not greatly impact their consumption. Retailers charging for bags also did not affect consumers too much, considering that the amount charged is not large. Smithers (2020) and the Earth Policy Institute (2014) in Ireland and England have proven that charging bags at higher prices has an impact on consumers. On the other hand, in developing countries, the small amounts in imposed environmental taxes that do not significantly increase the price of bags generally have little impact on consumer behaviour (Long & Duong, 2021).

The current rate of light plastic bag consumption in the Republic of Serbia also confirms the fact that the existing system of fees (environmental taxes) does not have a large impact on the decline in consumption. Also, retailers charging for plastic bags has led to a slight decline in the consumption of plastic bags, but the funds collected by retailers are not used to achieve environmental goals. For that reason, we made a proposal in the survey, and explained how to introduce and use a new fee of 10.00 RSD per plastic bag. Based on the answers to question 19 (Table 2), the respondents decided they would change their behaviour if this fee were introduced, i.e. to use a certain alternative, which is environmentally friendly.

The results of the analysis also show that, among other factors, fees (environmental taxes) have an impact on consumer behaviour. We can suggest that the Government of the Republic of Serbia consider the possibility of introducing the environmental tax proposed in our research.

The proposed fee of 10.00 RSD would be paid for light plastic bags as well as biodegradable bags, but manufacturers of biodegradable bags would be subsidised. The reason we decided to include biodegradable bags in the fee is the fact that the chemicals added to biodegradable bags are still harmful to the environment, even if they degrade faster than ordinary bags (Pilić, 2020). However, bags that can be broken down by microorganisms (Pilić, 2020), which should certainly appear on our market in the future primarily with consideration to environmental issues, should certainly be excluded from the fee system because such bags are environmentally friendly and acceptable.

Almost no research on this topic has been done in Serbia, so we think that, in the future, it should become the focus of interest of economists, ecologists, and technologists. The recommendation for future researchers on this topic is to perform an analysis of the effect that the ban on consumer behaviour concerning light plastic bags has in the cities, where the ban decision was made. Also, future papers could analyse the behaviour of plastic bag manufacturers and the behaviour of retailers in the event of the introduction of a new fee (environmental tax), which is proposed in this paper.

Some limitations came to light as this research was being conducted. Namely, one of the limitations is the possibility of obtaining different results on a sample comprising different people. The insufficient cooperation of competent institutions and institutes in submitting the required data related to the quality of biodegradable bags on our market and, in general, the consumption of plastic bags are also a serious problem in analysing this issue. The domestic researchers' insufficient interest in environmental taxes and their impact on the environment should certainly not be neglected and forgotten.

CONCLUSION

The problem of protecting and improving the quality of the environment is an integral part of the development strategies of countries around the world, including the Republic of Serbia. Among the issues that should be resolved in order to protect the environment is the issue of plastic bag consumption, especially the consumption of light, i.e. disposable plastic bags. Their production and consumption in enormous quantities, and their reckless disposal and slow decomposition have led to numerous environmental and health problems. Therefore, countries with higher levels of income place great importance on this problem. In middle- and lower-income countries, this problem is not considered important enough due to the numerous problems of economic and social nature.

Fees for plastic bags are imposed in Serbia, but their impact on plastic bag consumption is extremely small. The reason this impact is inconspicuous is the low amount prescribed by the fee, along with a lack of transparency. The fee charged by some traders is part of their income, and it is not used for environmental purposes. Additionally, the application of bans in certain cities, selective application with the presence of numerous exceptions, and insufficient control do not contribute to solving this problem.

This problem is more complex in Serbia because the environmental awareness of its citizens is not sufficiently developed. In many smaller places, stores do not carry substitutes for light plastic bags. Also, children do not acquire enough knowledge about the importance of a healthy environment through the educational system; even scientists from various fields do not pay enough attention to this topic. For this reason, this paper identifies the basic factors that would help solve this problem.

The results of the conducted statistical analysis showed that the development of environmental awareness, social norms, the availability of substitutes, and the introduction of a new fee which would burden consumers could contribute to solving the problem of plastic bags in the Republic of Serbia. There must also be an increase in the level of transparency during the introduction of new solutions, and the same should apply to the process of their implementation and the control of their implementation. Any kind of environmental tax should not be seen as no more than a burden by economic entities and persons on the territory of our country. People should be aware that environmental taxes are intended to change their behaviour, i.e. to make their behaviour environmentally friendly. By changing their behaviour, they will not be burdened with environmental taxes. Simply put, if people use linen bags, they will not have to pay the fee for plastic bags.

REFERENCES

Asari, M., Sato, N., Sakai, S. (2008). Plastic shopping bag waste from the quantity quality viewpoints: Present status and vision. *Waste Management Research*, 19, 187–193.

Convery, F., McDonnell, S., Ferreira, S. (2007). The most popular tax in Europe? Lessons from the Irish plastic bag levy. *Environmental & Resource Economics*, 38, 1–11.

Dias Soares, C. A., (2011). *The design features of environmental taxes (PhD Dissertation)*. Retrived from http://etheses.lse.ac.uk/

Dikgang, J., Visser, M. (2012). Behavioral response to plastic bag legislation in Botswana. *South African Journal of Economics*, 80, 123–133.

Earth Policy Institute. *Plastic bag regulations worldwide*. 2014.

Ekins, P. (1999). European environmental taxes and charges: Recent experience, issues and trends. *Ecological Economics*, 31, 39–62.

Hansla, A., Gamble, A., Juliusson, A., Garling, T. (2008). The Relationships between Awareness of Consequences, Environmental Concern, and Value Orientations. *Journal of Environmental Psychology*. 28, 1–9. doi: http://dx.doi.org/10.1016/j.jenvp.2007.08.004

Hasson, R., Leiman, A., Visser, M. (2007). The economics of plastic bag legislation in South Africa. *South African Journal of Economics*. 75, 66–83.

Hoang, T. B. T. (2016). *Factors affecting the relationship between Vietnamese consumers' green consumption intentions and behaviors* (PhD Dissertation).

Hoang, T. H., Huynh, T. T. Q., Huynh, T. N. (2018). Factors affecting green consumption behavior of consumers in Hue city. *Hue University Journal of Science*. 127(5A), 199–212.

International Institute for Labour Studies. *World of Work Report*, 2009.

Lee, C. J., Lim, S. Y. (2020). *Impact of Environmental Concern on Image of Internal GSCM Practices and Consumer Purchasing Behavior*. Journal of Asian Finance, Economics and Business, 7(6), 241–254. https://doi.org/10.13106/jafeb.2020.vol7.no6.241.

Luong, T. B. V. (2013). *Assessment of the impact of the environmental protection tax policy on the use of plastic bags in Hanoi (Master Thesis)*.

Mogomotsi, P., Goemeone M., Nametso, P. (2018). *Plastic bag usage in a taxed environment: Investigation on the deterrent nature of plastic levy in Maun, Botswana*. Waste Management & Research, 37(1), 20–25. doi: https://doi.org/10.1177/0734242X18801495.

Muralidharan, S., Sheehan, K. (2016). *"Tax" and "Fee" message frames as inhibitors of plastic bag usage among shoppers: A social marketing application of the theory of planned behavior.* Social Marketing Quarterly, 22, 200–217.

Pilić, B. (2020, January 4). Biorazgradive kese na tržištu u Srbiji nisu biorazgradive. U Evropi su zabranjene. *Nedeljnik*. https://www.nedeljnik.rs/biorazgradive-kese-na-trzistu-u-srbiji-nisu-biorazgradive-u-evropi-su-zabranjene/

Schuyler, Q., Hardesty, B. D., Lawson, T., Opie, K., Wilcox, C. *Economic incentives reduce plasic inputs to the ocean*. Marine Policy, 96, 250-255.

Scott, M. S., Gerald, S. A. (2005). *Fundamentals of Marketing Research*. London, London: SAGE.

Smithers, R. (2020). England's Plastic Bag Usage Drops 85% since 5p Charge Introduced. Retrieved November 30, 2020 from https://www.theguardian.com/environment/2020/jul/30/use-ofplastic-bags-in-england-drops-by-59-in-a-year.

Stigler, G.J. (1966). *The theory of Price*. New York, NY:Macmillan.

Stojanović, M. (2016). *Efikasnos poreza u rešavanj ekoloških* problema *(PhD Dissertation)*. Retrieved from https://nardus.mpn.gov.rs/handle/123456789/8422

Stojanović, M. (2017). *Ekološke naknade kao deo sistema ekoloških poreza u Republici Srbiji*. Ekonomski signali, 12 (1), 41-54.

Thomas, G. O., Sautkina E., Poortinga, W., Wolstenholme, E., Whitmarsh, L. (2019). *The English Plastic Bag Charge Changed Behaviour and Increased Suupport for Other Charges to Reduce Plastic Waste*. Environmental Psychology, 10:266. doi: 10.3389/fpsyg.2019.00266.

Tong, H.L., Duong, T. H.M. (2021). *The Impact of Environmental Protection Tax on Plastic Bag Use: A Case Study of Vietnam*. Journal of Asian Finance, Economics and Business, 8(2), 213-221.

Van, L., Norhadilah A. H., Md. Fauzi, A., Ahmad, N. A. A., Rumaizah, R., Puteri, F., Muhamad T. *Factors of Single Use Plastic Reduction Behavioral Intention*. Emerging Science Journal, 5(3), 269-278.

Vince, J., Hardesty, D. (2017). *Plastic pollution challenges in marine and coastal environments: from local to global governance*. Restoration Ecology, 25(1), 123-128.

Vu, A. D., Nguyen, T. H., Nguyen, N. A. (2012). *Test the model of factors affecting green consumption behavior*. Vietnam Economic Review, 7(195), 30–52.

Wilts, H., Schinkel, J., Feder, L. (2020). *Prevention of lastic waste in production and consumption by multi-actor partnerships*. Bonn, Bonn:Prevent Waste Aliance.

Zakon o naknadama za korišćenje javnih dobara, Službeni Glasnik RS br. 95/2018, 49/2019, 86/2019, usklađeni din. izn., 156/2020 – usklađeni din. izn. i 15/2021 – dop. usklađeni din. izn.

УТИЦАЈ ЕКОЛОШКИХ ПОРЕЗА НА СМАЊЕЊЕ ПОТРОШЊЕ ПЛАСТИЧНИХ КЕСА У РЕПУБЛИЦИ СРБИЈИ

Јандранка Ђуровић Тодоровић[1], Марина Ђорђевић[1], Милош Стојановић[2]

[1]Универзитет у Нишу, Економски факултет, Ниш, Србија

[2]Универзитет Метрополитан, Београд, Србија

Резиме

Проблем заштите и унапређења квалитета животне средине је саставни део развојних стратегија како земаља широм света тако и Републике Србије. Једно од питања које са циљем заштите животне средине треба решити је питање потрошње пластичних кеса, и то пре свега лаких, односно једнократних пластичних кеса. Разлог због којег је овај проблем од изузетно битног значаја је штетност коју ове кесе имају по животну средину и здравље људи. Њихова производња и потрошња у енормним количинама, као и несавесно одлагање и спора разградња су довели до бројних еколошких и здравствених проблема. У нашој земљи су у циљу решавања овог проблема у примени накнаде за пластичне кесе, али њихов утицај на потрошњу је изузетно мали. Разлог због којег је овај утицај готово неприметан је низак износ прописане накнаде. Уз то, проблематична је и недовољна транспарентност. Накнада коју део трговаца наплаћује представља део њиховог прихода и не користи се у еколошке сврхе. Такође, примена забрана у појединим градовима, селективна примена уз присуство бројних изузетака и недовољна контрола не доприносе решавању овог проблема. У Републици Србији је проблем сложенији и због тога што еколошка свест грађана није довољно развијена. У радњама у многим мањим местима нема алтернатива за лаке

пластичне кесе. Такође, деца кроз образовни систем не стичу довољно знања о значају здраве животне средине, а ни научници из различитих области овој теми не посвећују довољно пажње. Из тог разлога, у раду су идентификовани основни фактори који би помогли да се дати проблем реши. Резултати спроведене статистичке анализе су показали да развој еколошке свести, друштвене норме, достуност алтернатива и увођење нове накнаде којом би потрошачи били оптерећени могу да допринесу решавању проблема пластичних кеса на теритрорији Републике Србије.