Consumer Awareness and Willingness to Pay for Eco-Labeled Products: Evidence from Slovakia

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ABSTRACT

Purpose: This study investigates the awareness and understanding of eco-labels among Slovak consumers, alongside their willingness to pay a premium for environmentally friendly products.

Methodology/Approach: For this study, a custom questionnaire was designed. The survey was conducted online using Google Forms from December 2020 to the end of February 2021, The collected data were analyzed using descriptive statistics and the Mann-Whitney U test to test differences among respondent groups.

Findings: Results reveal that only a minority of respondents correctly understand the meaning of the analyzed eco-labels, with higher awareness for labels associated with direct economic benefits, such as energy savings. Statistical analysis highlights significant differences in awareness and willingness to pay based on age and income. Most respondents express a preference for receiving eco-label information through in-store displays and banners.

Research Limitation/Implication: Sample is restricted to limited size and structure that was reachable during COVID-19 pandemic.

Originality/Value of paper: There are few studies that examine eco-labeling of products in relation to demographic data of respondents, but to our knowledge none from Slovakia. In addition, this study uniquely includes identifying respondents' preferences when obtaining information about eco-labels on products.

Category: Research paper

Keywords: eco-label, consumer, product, willingness to pay, Slovakia

Research Areas: Quality by Sustainability; Quality of Life

1 INTRODUCTION

Eco-labeling has long been considered an important tool for improving the sustainability of consumption (Thøgersen, Haugaard and Olesen, 2010). More than 30 years have passed since the introduction of the world's first eco-label, Der Blaue Engel, in Germany. Since then, at least 377 additional eco-labels have emerged in 211 countries and 25 industries (Modak, 2017).

According to (Thøgersen, Haugaard and Olesen, 2010), eco-labels promote sustainability without restricting consumer freedom of choice and reduce the costs associated with searching for information. Consequently, the information provided through eco-labeling is highly likely to be utilized.

Studies on eco-labels (e.g., (Loureiro, Mccluskey and Mittelhammer, 2002; Gertz, 2005; D'Souza, Taghian and Lamb, 2006; Lefébure and Muňoz, 2011; Hyandye, Mandara and Mbowe, 2012; Yau, 2012; Kikuchi-Uehara, Nakatani and Hirao, 2016; Taufique et al., 2016; Witek, 2017; Emberger-Klein and Menrad, 2018; Mufidah et al., 2018)) explore their relationship with customers' attitudes toward environmental protection and pro-environmental behavior, factors influencing the purchase of environmentally preferable products, consumers' attitudes toward eco-labeling, their level of understanding of the meaning of eco-labels, and their willingness to pay more for goods certified with an eco-label.

These studies employ various methodologies. Regarding data collection, many use surveys (e.g., (Yau, 2012; Kikuchi-Uehara, Nakatani and Hirao, 2016; Taufique et al., 2016; Mufidah et al., 2018)), interviews (e.g., (Loureiro, Mccluskey and Mittelhammer, 2002; D'Souza, Taghian and Lamb, 2006; Hyandye, Mandara and Mbowe, 2012; Emberger-Klein and Menrad, 2018)), or secondary data on purchases (e.g., (Bjørner, Hansen and Russell, 2004)). The data are analyzed using various statistical methods, including descriptive statistics (Gertz, 2005; D'Souza, Taghian and Lamb, 2006; Hyandye, Mandara and Mbowe, 2012; Yau, 2012), structural equation modeling (SEM) (Taufique et al., 2016; Mufidah et al., 2018), confirmatory factor analysis (CFA) (Taufique et al., 2016), and logistic regression models (Loureiro, Mccluskey and Mittelhammer, 2002; Yau, 2012). Statistical tests, such as Kruskal-Wallis, Mann-Whitney U test, Spearman correlation coefficient, analysis of variance, and Cronbach's alpha, are also employed (Kikuchi-Uehara, Nakatani and Hirao, 2016; Witek, 2017).

Several analyzed studies highlight the need to improve communication between businesses and customers (Taufique et al., 2016; Mufidah et al., 2018; Song et al., 2019; Mkhize and Ellis, 2020). Research further suggests that educating consumers could positively impact the purchase of environmentally friendly products and that environmentally educated consumers are motivated to buy such products (Thøgersen, Haugaard and Olesen, 2010; Taufique et al., 2016). Currently, eco-labels are primarily sought after by consumers in the food industry and mainly in developed countries (Prieto-Sandoval et al., 2016).

According to (D'Souza, Taghian and Lamb, 2006) consumer purchasing behavior is positively influenced by awareness and understanding of eco-labels. In some

countries, eco-labels have very high recognition rates (e.g., in Sweden, 97% of the population recognizes "The Nordic Swan Ecolabel") (Ecolabelling Sweden, 2019; Nordic Council of Ministers´ Office in Estonia, 2024). To our knowledge, there are no published studies in Slovakia focused on examining individuals' understanding of the meaning of eco-labels or their willingness to pay more for products certified with an eco-label. This represents one of the reasons for conducting our study. Additionally, due to the limited number of such studies in Central and Eastern Europe (see e.g. (Ziółkowski, 2020)), our research can contribute to a better understanding of differences in the perception of eco-labels across various regions in Europe. The aim of our study is to identify the level of awareness and understanding of eco-labels in Slovakia, assess willingness to pay more for environmentally preferable product alternatives, and explore differences among various respondent groups. Methodologically, we chose a survey approach with evaluation using statistical tests commonly employed in such studies, as described above.

2 LITERATURE REVIEW

2.1 Ecolabeling of products

An eco-label is a visual communication tool (logo, symbol) indicating that a product (goods or service) prioritizes environmental sustainability and meets certain standards and criteria. Eco-labeling is associated with providing certified information to consumers and serves to distinguish environmentally preferable products from conventional ones (Taufique et al., 2014). It is used to label products or services within a specific category that are demonstrably more environmentally friendly and sustainable compared to their substitutes with comparable quality (Rusko and Korauš, 2004; Global Ecolabelling Network, 2024).

Eco-labels inform consumers about superior environmentally acceptable parameters of products and services and encourage their use (Rusko, 2012). They raise consumer awareness and help them make purchase decisions favoring environmentally friendly products (Modak, 2017). According to (Jahn, Schramm and Spiller, 2005), an increasing number of customers demand certification for goods and services, putting pressure on producers. On the other hand, eco-labels provide companies with opportunities to differentiate themselves from competitors while also exerting pressure to develop products and services that are more environmentally conscious, considering the entire supply chain (Rusko and Korauš, 2004).

Eco-labels are voluntary tools through which a third (independent) party certifies the environmental impact of products, processes, and services based on an assessment of their entire life cycle (Modak, 2017). The reputation and credibility of these institutions play an important role in building consumer trust and reliability. However, the growing number of eco-labels on the market makes it

increasingly difficult for consumers to understand and trust them (Bhaskaran et al., 2006).

2.2 Classification of eco-labels

Eco-labels for products can be categorized based on their environmental impact into several categories, such as program type, approach to participation, labeling type, information content level, or type of regulation (Stø et al., 2005; Rusko, 2012; Taufique et al., 2014; OECD, 2016). (Rusko, 2012) categorizes eco-labels based on standardization into labels standardized within ISO/CT/207 (which includes Type I, Type II, and Type III labels), those standardized outside this framework, and non-standardized labels without specifications.

Type I eco-labels, according to the relevant standard, are awarded within the respective country to products meeting set requirements. For example, within the European Union, the "EU Ecolabel" is awarded, while in Slovakia, the "Environmentally Friendly Product," in the Czech Republic, the "Ecologically Friendly Product," in Germany, "Der Blaue Engel," and in the Nordic countries of Europe, "The Nordic Swan Ecolabel" (Rusko, 2012; SAŽP, 2017). Unlike Type I, Type II eco-labels are self-declared by the manufacturer, and Type III eco-labels provide written information with quantified data on the environmental impact of production per product unit (Rusko, 2012). In addition to these types, there are eco-labels aimed at specific sectors, standardized but outside the ISO 14000 series. Examples include "Energy Star" and "EU Energy Label."

2.3 The real impact of eco-labels on consumer purchasing decisions

Some customers deliberately purchase goods certified with eco-labels because they recognize and understand the label's meaning, while others are only aware of the label’s existence. To fully utilize the benefits of eco-labeling for society and stakeholders, (Thøgersen, Haugaard and Olesen, 2010) emphasize the importance of understanding the circumstances and timing under which consumers adopt eco-labels. According to him, label adoption occurs in several stages influenced by environmental factors, personal factors, and product-related factors. Environmental factors include campaigns, retail strategies, media, social norms, and the behavior of others. Personal factors involve relevant knowledge, perception of needs, personality, and demographics. Product-related factors encompass information format, certification details, and product characteristics.

The process begins with product presentation in-store or at home and continues through perception (both conscious and subconscious), understanding, forming conclusions, liking, trial adoption, and repeated adoption (Thøgersen, Haugaard and Olesen, 2010).

Environmental factors may include tools like green marketing campaigns, retail strategies, and media, as well as the behavior and attitudes of others toward environmental protection and purchasing environmentally labeled products

(Thøgersen, Haugaard and Olesen, 2010). A key concern during the adoption process is that consumers often fear being misled by sellers regarding the product's environmental claims (D'Souza, Taghian and Lamb, 2006).

Personal factors influencing product adoption include consumer personality, demographic data, perceived need to purchase a new product, and relevant environmental knowledge (Thøgersen, Haugaard and Olesen, 2010). General knowledge about the environment and specific knowledge about eco-labeling positively affect consumers' attitudes toward buying environmentally friendly products (Taufique et al., 2014; 2016). Consumers educated about environmental protection are motivated to purchase sustainable products and are among the first to adopt products with eco-labels (Thøgersen, Haugaard and Olesen, 2010).

The third category of factors affecting the adoption process involves product-related factors. These include information format (how product information is presented), certification details, or other product features (Thøgersen, Haugaard and Olesen, 2010). Improving the visibility of eco-labels is essential because they often receive little attention (Song et al., 2019). Moreover, customers frequently find the terminology used on environmentally friendly products confusing (D'Souza, Taghian and Lamb, 2006). For this reason, many studies stress the need for consumer environmental education (Hyandye, Mandara and Mbowe, 2012; Kikuchi-Uehara, Nakatani and Hirao, 2016; Taufique et al., 2016; Song et al., 2019).

In the context of consumers' decision-making about purchasing environmentally friendly products, literature also explores their willingness to pay more for such products (e.g., (Bui, 2005; Golubevaitė, 2008)). Willingness to pay more for an environmentally friendly product is influenced by human values, trust, knowledge, needs, motivation, attitudes, and demographic factors (Bui, 2005).

3 METHODOLOGY

As indicated in the introduction, our research employs standard tools and procedures used in studies investigating perceptions of eco-labels and their influence on consumer decision-making. In this field, questionnaires are a frequently used method for data collection, allowing for the exploration of public attitudes, opinions, and beliefs (e.g., (Gavora, 2007; Yau, 2012; Kikuchi-Uehara, Nakatani and Hirao, 2016; Taufique et al., 2016; Tomšik, 2017; Mufidah et al., 2018)).

For this study, a custom questionnaire was designed, with the exact wording of questions inspired primarily by Australian (D'Souza, Taghian and Lamb, 2006) and Swedish (Lefébure and Muňoz, 2011) studies. The first question (see Appendix A) was developed to identify the level of awareness and understanding of eco-labels by asking respondents whether they had encountered a particular label and whether they understood its meaning. A wide range of labels was included (a total of 14), covering national labels (Type I), labels related to energy

efficiency and sustainable forestry, and labels found on food or textiles that respondents may have encountered in Slovakia. Inspired by these studies, we proposed four possible answers to differentiate levels of label familiarity: the exact meaning of the label, an inaccurate understanding, "I have seen the label but don't know what it means," and "I have never seen this label before." The second question assessed respondents' pro-environmental behavior using a scale measuring agreement or disagreement with ten statements, which were formulated in alignment with those used in previous studies for comparability. The fourth question identified respondents' willingness to pay more for an environmentally friendly product alternative. Following the standard "willingness to pay" (WTP) concept, we used a two-step inquiry to determine the maximum additional amount respondents were willing to pay. The fifth question examined the ways in which respondents preferred to be informed about eco-labels. In addition to these questions, the questionnaire included an introductory section explaining the survey's purpose and a section collecting basic demographic characteristics of respondents.

A pilot survey was conducted during the preparation phase, resulting in a change in how answers to the third question were formulated.

The main survey, considering the constraints of the COVID-19 pandemic, was conducted online using Google Forms. The content of the online version mirrored that of the paper questionnaire (see Appendix A). Data collection took place from December 2020 to the end of February 2021, during which responses were collected from 205 respondents. The respondents were either from or living in Slovakia, with the majority residing in Košice and its surroundings (61%). The sample included 124 women (60.5%) and 81 men (39.5%). Additional demographic characteristics of the sample are presented in Table 1.

Following the approach used in comparable studies, the collected data were analyzed using descriptive statistics (e.g., (Gertz, 2005; D'Souza, Taghian and Lamb, 2006; Hyandye, Mandara and Mbowe, 2012)) and the Mann-Whitney U test (e.g., (Kikuchi-Uehara, Nakatani and Hirao, 2016; Witek, 2017)). The data were further analyzed to test differences among respondent groups based on factors such as gender, age, education, social status, and income.

Table 1 – Basic characteristics of the sample of respondents

Characteristic	**Frequency**
Age	Under 19 years: 6.8%
	20–39 years: 62.4%
	40–59 years: 26.8%
	Over 60 years: 3.9%
Highest Level of Education	Elementary: 3.4%
	High school (without diploma): 3.4%
	High school (with diploma): 32.2%

Characteristic	Frequency
	University: 61%
Social Status	Single: 62.4%
	Married: 29.3%
	Divorced: 7.3%
	Widow(er): 1%
Economic Activity	Employed: 42.9%
	Self-employed: 5.4%
	Student: 40.5%
	Unemployed: 1.5%
	Retired: 4.9%
	Parental leave: 4.9%
Average Net Monthly Income (€)	Less than 500: 45.4%
	500–1000: 28.3%
	1001–1500: 19.5%
	1501–2000: 4.9%
	Over 2000: 2%

4 RESULTS

4.1 Identification of awareness and understanding of ecolabels

This section focuses on comparing labels based on the correct understanding of their meaning versus the lack of any contact with the label.

As the results of our survey indicate (Figure 1), the highest percentage of respondents correctly understands the meaning of the EU Energy Label (75.6%), Energy Star (49.3%), and Rainforest Alliance Certified (48.3%). For other labels, fewer than 40% of respondents correctly understand their meaning.

The largest proportion of respondents (76.6%) (Figure 2) have not yet encountered the Nordic Swan Ecolabel, a national eco-label from the Nordic countries. The next most unfamiliar label is the PEFC label, which 60% of respondents have never seen. The third largest percentage of respondents (58%) have never encountered the Czech national label, Ekologicky šetrný výrobek (Ecologically Friendly Product).

Interestingly, for most labels, the percentage of people who have never seen the label is higher than the percentage who correctly understand its meaning. Exceptions include the most recognized labels identified in our study (EU Energy Label, Energy Star, Rainforest Alliance Certified) and the label related to recycling (Recycled Content). A certain consistency in results is confirmed by the fact that

the labels which the largest proportion of respondents had never seen also have the smallest proportion of respondents who correctly understand their meaning.

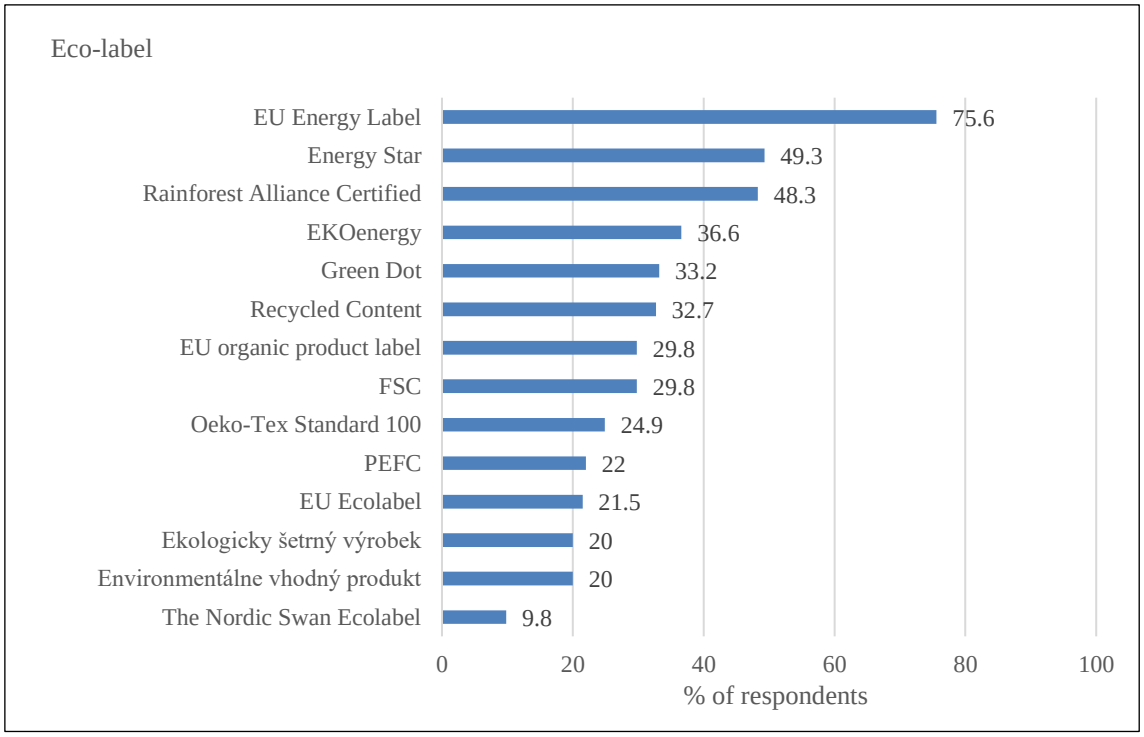

Figure 1 – Percentage of respondents who recognise and correctly understand the meaning of ecolabel

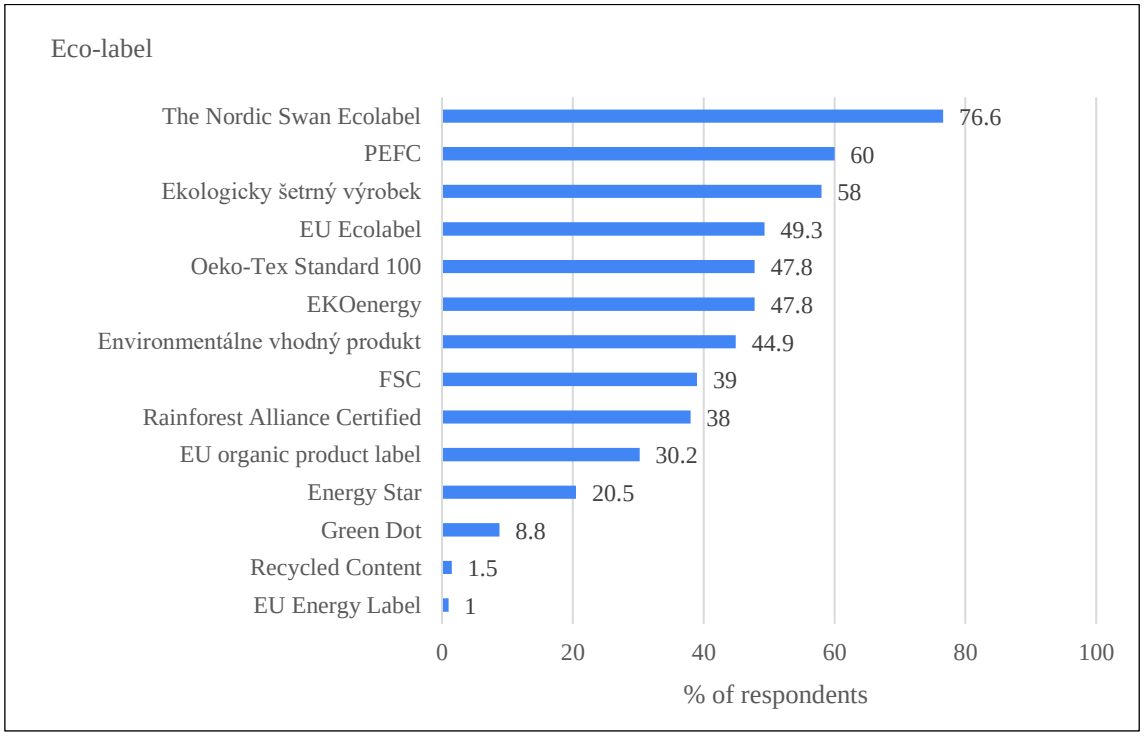

Figure 2 – Percentage of respondents who have never seen eco-label

4.2 Respondents' attitudes toward using eco-labels and pro-environmental behavior

In this analysis, the responses to the second question (see Appendix A), which concerns respondents' attitudes toward using eco-labels and pro-environmental behavior, were recorded in Table B (Appendix B). Respondents expressed their views on the provided statements (see question 2, Appendix A) on a scale ranging from "strongly disagree" (1) to "strongly agree" (5). The table presents the percentage of respondents who selected each response.

For statements in Table B (Appendix B) that directly pertain to eco-labels, we further examined whether differences in responses exist between different groups of respondents based on gender, age, education, social status, and income. These differences were tested using the Mann-Whitney U test. The resulting U and p values are presented in Table 2.

Table 2 – Differences in responses between groups of respondents (U and p-values for tested statements by observed groups)

Compared Groups	**Statement 4: I search for eco-labels on products I buy**	**Statement 7: Products certified with eco-labels are more expensive**	**Statement 9: There are too many eco-labels; it's difficult to understand them all**	**Statement 10: The meaning of eco-labels is sufficiently explained to consumers in retail stores**
Gender (male/female)	U=4685.50 p=0.401433	U=4711.00 p=0.432000	U=4479.00 p=0.172878	U=4955.50 p=0.868269
Age (under 33/over 33)	U=3938.50 **p=0.00921962**	U=4595.50 p=0.332777	U=3664.50 **p=0.000928873**	U=4630.50 p=0.382437
Education (primary+secondary/ university)	U=4723.50 p=0.489725	U=4321.50 p=0.0855114	U=4636.50 p=0.360701	U=4270.50 p=0.0663589
Social status (single/married)	U=3401.50 p=0.192093	U=3692.00 p=0.654972	U=2909.00 **p=0.00528644**	U=3654.00 p=0.577468
Income (under 1000 €/over 1000 €)	U=3862.50 p=0.553105	U=3772.50 p=0.393193	U=3083.50 **p=0.00562340**	U=3493.00 p=0.103649

Note: $\alpha = 0.05$

As shown in the table, the tendency to search for eco-labels is statistically significantly higher among respondents aged 33 years or older than among those under 33 years old. However, in both groups, the average values (on a scale of 1–5, see question 2 in Appendix A) were 3.01 and 2.67, respectively, indicating a neutral stance. Statistically significant differences were also identified for the statement "There are too many eco-labels; it's difficult to understand them all." Among respondents over 33 years old, the average value was significantly higher (4.03 versus 3.51), which corresponds to agreement. The same was true for respondents with a net monthly income above 1000 € (4.01 versus 3.58) and for married respondents compared to single respondents (4.00 versus 3.52). For the

remaining statements, no statistically significant differences were found between the groups.

4.3 Analysis of interest of respondents in explaining the meaning of eco-labels

Question 3 (Appendix A) in the questionnaire examined whether and how respondents would like the meaning of eco-labels to be explained to them. Of all respondents, 89.3% expressed interest in such explanations. As shown in the following chart (Figure 3), the largest percentage of respondents (47.3%) preferred information about eco-labels to be provided through displays, signs, or banners placed in stores. Conversely, no respondents expressed interest in receiving this information through informational workshops or meetings.

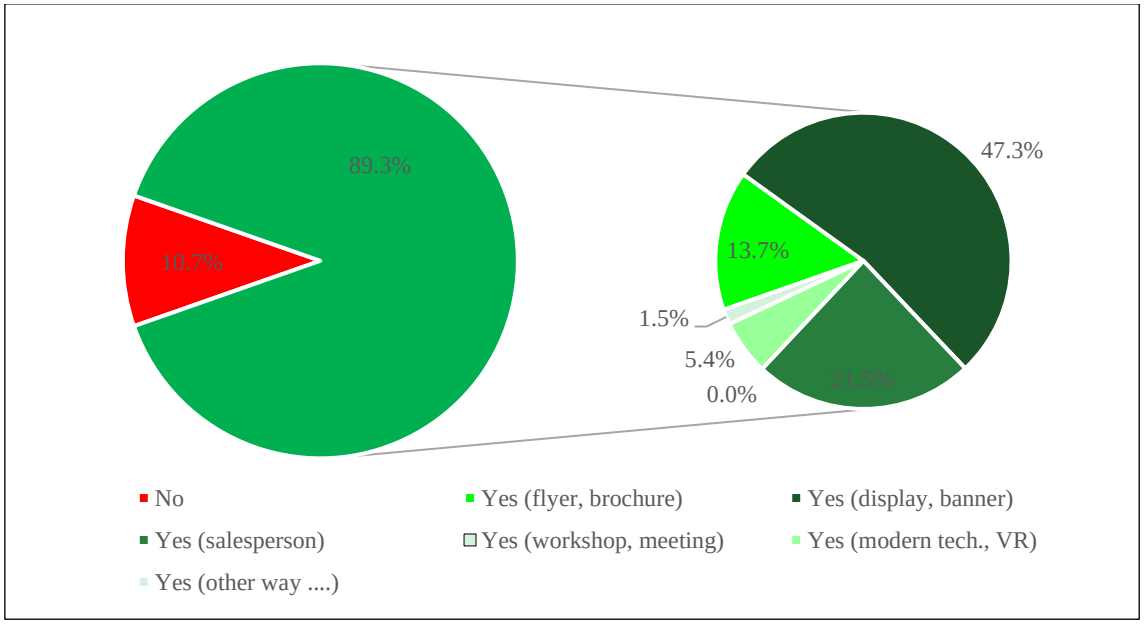

Figure 3 – Interest of respondents in explaining the meaning of eco-labels

4.4 Analysis of willingness to pay for eco-labeled product alternatives

A total of 172 respondents (out of 205) indicated a willingness to pay more for environmentally friendly product alternatives, with 158 specifying an exact amount. This willingness was assessed in question 4 (see Appendix A). Our data show that for a product priced at €10, the largest proportion of respondents (27.2%) would be willing to pay up to €2 extra, representing 20% of the product's price. On average, the entire sample was willing to pay €3.22 more for an environmentally friendly product. The histogram below (Figure 4) shows the percentage of respondents willing to pay specific additional amounts.

Using the Mann-Whitney U test, we examined whether there were statistically significant differences in willingness to pay more among different respondent groups based on gender, age, education, social status, and income. The U and p values are presented in Table 3. Statistically significant differences were found in

the cases of age and income. Respondents under 33 years old were willing to pay, on average, €3.48 more, compared to €2.85 among those over 33 years old. Paradoxically, respondents with a net monthly income under 1000 € were willing to pay, on average, €3.43 more, compared to €2.72 among those earning over 1000 €. For other groups, no statistically significant differences were found.

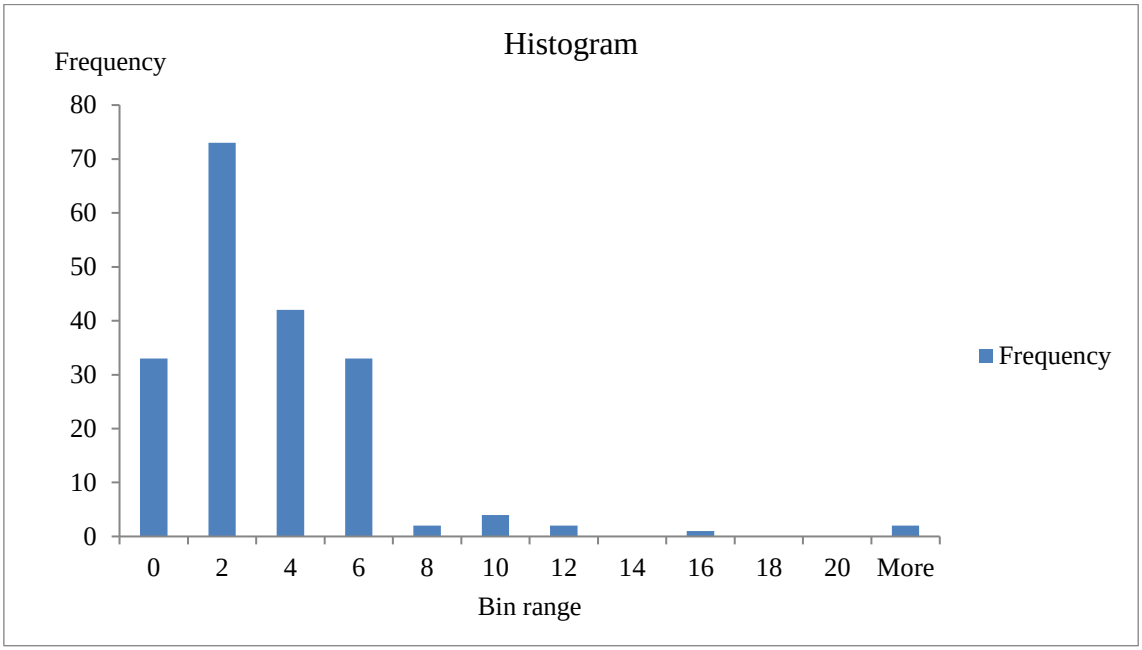

Figure 4 – Willingness to pay for eco-labeled product (Note. The "Bin range" of 0 includes all respondents who stated that they were not willing to pay more. Those who stated that they were willing but did not indicate an amount are not included in this histogram. The total number of respondents included is n = 192)

Table 3 – Differences in willingness to pay between groups of respondents (U and p-values by observed groups)

Compared Groups	**U and p-values**
Gender (male/female)	U=2469.00; p=0.0748185
Social status (single/married)	U=2080.00; p=0.126765
Income (under 1000 €/over 1000 €)	U=1900.00; **p=0.00601311**
Age (under 33/over 33)	U=2218.50; **p=0.00329973**
Education (primary+secondary/university)	U=2681.50; p=0.381812

Note: α = 0.05

5 DISCUSSION AND CONCLUSION

5.1 Understanding the meaning of eco-labels

Based on the evaluation of questions examining the understanding of eco-labels, it can be concluded that most respondents recognize the meaning of the EU Energy Label, which is used to indicate the energy efficiency of appliances, and the Energy Star label. This may suggest that consumers are aware not only of the environmental benefits but also of the direct economic impact on their household budgets through lower electricity costs. In the case of the Rainforest Alliance Certified label, which was also among the most recognized in our research, its familiarity could be attributed to its relatively prominent placement on products such as bananas, where the label featuring the well-known green frog symbol is often visible.

Although the percentages of respondents regarding awareness and understanding of individual eco-labels varied, it can be said that the percentage of people who had not seen eco-labels was generally higher than the percentage of those who understood their actual meaning. A high percentage of people had never noticed the Nordic Swan Ecolabel, the PEFC label, or the Czech national label - Ekologicky šetrný výrobek (Ecologically Friendly Product). Although two of these labels are national, the goods marked with them are available in Slovak stores. Interestingly, 44.9% of respondents had never seen Slovakia's national eco-label, which is 20% more than those who understand its meaning. Similarly, 50% of respondents had never seen the EU eco-label.

5.2 Respondents' attitudes toward using eco-labels and pro-environmental behavior

In analyzing responses to the second question (see Appendix A) concerning respondents' attitudes toward using eco-labels and pro-environmental behavior, we compared the percentage of respondents who selected "4" or "5" (i.e., an agreement on a scale from "strongly disagree" (1) to "strongly agree" (5), except for one statement (see Table 4 note)). These were compared with other comparable foreign studies. As can be seen, surprisingly, a significantly larger percentage of people in Slovakia (+22%) than in Sweden believe that their current decisions can save nature for future generations. However, for a negatively formulated statement with a similar focus ("An ordinary citizen cannot do anything to prevent environmental pollution"), the percentage of those who disagree in Slovakia and Sweden differs only slightly. Similarly, there is little difference between Slovakia and Sweden regarding the statements "Consumers should care about the environmental consequences of the products they buy", "Products certified with an eco-label are more expensive", "There are too many eco-labels; it's difficult to understand them all", and "The meaning of eco-labels is sufficiently explained to consumers in retail stores". In contrast, a significantly lower percentage of respondents in Slovakia

than in Australia agreed with statements such as "I search for eco-labels on products I buy" and "Environmentally friendly products are of low quality".

Table 4 – Comparison of respondents' attitudes in our study and comparable foreign studies

Statement	Slovakia (our study)	Sweden (Lefébure and Muňoz, 2011)	Australia (D'Souza et al., 2006)
My decisions today can save nature for future generations.	76.6%	54.6%	-
An ordinary citizen cannot do anything to prevent environmental pollution.	81.0%*	82.9%*	-
Consumers should care about the environmental consequences of the products they buy.	82.0%	83.6%	-
I search for eco-labels on products I buy.	25.9%	-	67.7%
Environmentally friendly products are of low quality.	9.8%	-	25.7%
Products certified with an eco-label are more expensive.	62.4%	58.6%	58.7%
There are too many eco-labels; it's difficult to understand them all.	56.6%	50%	-
The meaning of eco-labels is sufficiently explained to consumers in retail stores.	10.2%	-	15%

Note: Percentages represent the proportion of respondents who selected "4" or "5" on a scale ranging from "strongly disagree" (1) to "strongly agree" (5). *For this specific statement, the percentages represent respondents who selected "1" or "2" (indicating disagreement).

5.3 Interest in explaining the meaning of eco-labels

Based on our finding that most respondents would welcome explanations of eco-labels via banners, displays, or signs placed in stores, we recommend that retailers present eco-labels directly in stores using these methods. This approach could "highlight" environmentally friendly products and make it easier for customers to identify such goods over time. Conversely, if the environmental qualities of products are not adequately explained and presented to the public, it is likely that these characteristics will not influence their purchase decisions. For this reason, it is important to emphasize education through educational programs across all countries and industries. Research by (Song et al., 2019) and (Mkhize and Ellis, 2020) suggests incorporating modern technologies into the education process. For example, awareness of eco-labeling and its functioning can be creatively enhanced through mobile applications.

5.4 Willingness to pay more for environmentally friendly alternatives

The results of our study suggest that consumers in Slovakia are willing to pay more for environmentally friendly product alternatives, although the amounts vary

significantly depending on individual characteristics. A surprising finding is that younger people (under 33 years old) and those with lower monthly net incomes (under 1,000 €) are, on average, willing to pay more than older people or those with higher incomes. These results may reflect differing values or priorities, with younger and lower-income individuals potentially viewing environmentally friendly products as part of their commitment to sustainable consumption rather than purely as an economic consideration.

5.5 Conclusions

Our research provides a unique insight into Slovak consumers' awareness, attitudes, and willingness to pay more for environmentally friendly products. The findings reveal that while awareness of certain eco-labels is relatively high, there is still significant room for improvement. Addressing barriers such as the perceived complexity of the eco-labels (i.e. too many labels to understand) can further support the adoption of sustainable consumption practices.

Future research could explore longitudinal trends in consumer behavior and expand the sample to include additional demographic groups or regions within Central and Eastern Europe. Understanding how these factors evolve over time could provide valuable insights for developing more effective strategies to promote environmentally labeled products.

Theoretical Implications:

This study contributes to the growing body of literature on eco-labeling by providing insights into consumer awareness and perceptions within a Central European context, an underrepresented region in existing research. The findings corroborate previous studies on the role of demographic factors in shaping pro-environmental behavior and extend this understanding to the Slovak market.

Practical Implications:

The study provides actionable insights for policymakers, marketers, and retailers seeking to promote the adoption of eco-labels and sustainable consumption. Given the low awareness of eco-labels in Slovakia, targeted educational campaigns in retail environments are crucial. Retailers should prioritise in-store displays and banners to communicate the environmental benefits of labeled products effectively. Policymakers could support initiatives to standardise eco-labels and ensure their credibility, addressing consumer concerns about complexity (i.e., the number of different eco-labels). Finally, marketers could better adapt their green marketing strategies, knowing that the highly recognised ecolabels are explicitly emphasising the economic advantages of eco-friendly products, such as energy savings, that may point to the still paramount importance of financial reasons for consumer decisions.

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REFERENCES

Bhaskaran, S., Polonsky, M., Cary, J. and Fernandez, S., 2006. Environmentally sustainable food production and marketing. *British Food Journal*, 108(8), pp.677–690. https://doi.org/10.1108/00070700610682355.

Bjørner, T.B., Hansen, L.G. and Russell, C.S., 2004. Environmental labeling and consumers’ choice—an empirical analysis of the effect of the Nordic Swan. *Journal of Environmental Economics and Management*, 47(3), pp.411–434. https://doi.org/10.1016/j.jeem.2003.06.002.

Bui, M.H., 2005. Environmental marketing: a model of consumer behavior. In: *Proceedings of the Annual Meeting of the Association of Collegiate Marketing Educators*. [online] Available at: <https://api.semanticscholar.org/CorpusID:167546912>.

D’Souza, C., Taghian, M. and Lamb, P., 2006. An empirical study on the influence of environmental labels on consumers. *Corporate Communications: An International Journal*, 11(2), pp.162–173. https://doi.org/10.1108/13563280610661697.

Ecolabelling Sweden, 2019. *Strategies for sustainable business development*. [The report] Stockholm: Ecolabelig Sweden. p.72. Available at: <https://www.svanen.se/49e820/siteassets/rapporter--undersokningar/the-report/rapport_a4_svanen_190628.pdf>.

Emberger-Klein, A. and Menrad, K., 2018. The effect of information provision on supermarket consumers’ use of and preferences for carbon labels in Germany. *Journal of Cleaner Production*, 172, pp.253–263. https://doi.org/10.1016/j.jclepro.2017.10.105.

Gavora, P., 2007. *Sprievodca metodológiou kvalitatívneho výskumu*. Bratislava: Vydavateľstvo UK.

Gertz, R., 2005. Eco-labelling—a case for deregulation? *Law, Probability and Risk*, 4(3), pp.127–141. https://doi.org/10.1093/lpr/mgi010.

Global Ecolabelling Network, 2024. *What is Ecolabelling?* [online] Global Ecolabelling Network. Available at: <https://globalecolabelling.net/about/what-is-ecolabelling/> [Accessed 14 December 2024].

Golubevaitė, L., 2008. Eco-labelling as a marketing tool for green consumerism. *Global Academic Society Journal*, 1(3), pp.25–36.

Hyandye, C., Mandara, C.G. and Mbowe, F., 2012. Environmental Impacts of Product Labelling on Consumers Shopping and Wastes Disposal Behaviour in Dodoma Urban, Tanzania. (2).

Jahn, G., Schramm, M. and Spiller, A., 2005. The Reliability of Certification: Quality Labels as a Consumer Policy Tool. *Journal of Consumer Policy*, 28(1), pp.53–73. https://doi.org/10.1007/s10603-004-7298-6.

Kikuchi-Uehara, E., Nakatani, J. and Hirao, M., 2016. Analysis of factors influencing consumers' proenvironmental behavior based on life cycle thinking. Part II: trust model of environmental information. *Journal of Cleaner Production*, 125, pp.216–226. https://doi.org/10.1016/j.jclepro.2016.03.011.

Lefébure, A. and Muňoz, R.R., 2011. *Communicating to consumers in Sweden with eco-labels -Is the message getting through?* Master thesis. Umeå School of Business.

Loureiro, M.L., Mccluskey, J.J. and Mittelhammer, R.C., 2002. Will Consumers Pay a Premium for Eco-labeled Apples? *Journal of Consumer Affairs*, 36(2), pp.203–219. https://doi.org/10.1111/j.1745-6606.2002.tb00430.x.

Mkhize, S. and Ellis, D., 2020. Creativity in marketing communication to overcome barriers to organic produce purchases: The case of a developing nation. *Journal of Cleaner Production*, 242, p.118415. https://doi.org/10.1016/j.jclepro.2019.118415.

Modak, P., 2017. *Environmental Management towards Sustainability*. [online] Boca Raton: CRC Press. Available at: <https://doi.org/10.1201/9781315156118>.

Mufidah, I., Jiang, B.C., Lin, S.-C., Chin, J., Rachmaniati, Y.P. and Persada, S.F., 2018. Understanding the Consumers' Behavior Intention in Using Green Ecolabel Product through Pro-Environmental Planned Behavior Model in Developing and Developed Regions: Lessons Learned from Taiwan and Indonesia. *Sustainability*, 10(5), p.1423. https://doi.org/10.3390/su10051423.

Nordic Council of Ministers´ Office in Estonia, 2024. *Nordic Ecolabel*. [online] norden.ee. Available at: <https://www.norden.ee/en/green-growth/eco-label> [Accessed 14 November 2024].

OECD, 2016. *Environmental Labelling and Information Schemes*. [online] Available at: <https://web-archive.oecd.org/2017-02-14/413679-labelling-and-information-schemes.htm> [Accessed 14 December 2024].

Prieto-Sandoval, V., Alfaro, J.A., Mejía-Villa, A. and Ormazabal, M., 2016. ECO-labels as a multidimensional research topic: Trends and opportunities. *Journal of Cleaner Production*, 135, pp.806–818. https://doi.org/10.1016/j.jclepro.2016.06.167.

Rusko, M., 2012. Environmentálne orientované značky a environmentálne označovanie typu I, II, a III. In: *Zborník z konferencie so zahraničnou účasťou: Sustainability - Environment - Safety ´2012*. [online] pp.246–255. Available at:

<https://www.sszp.eu/wp-content/uploads/2012_conference_SES_p-246_Rusko.pdf>.

Rusko, M. and Korauš, A., 2004. Ecolabelling, LCA, Ecodesign and Green Marketing. *Životné prostredie*, 38(4), pp.178–181.

SAŽP, 2017. *Environmentálne označovanie produktov*. [online] SAŽP. Available at: <https://www.sazp.sk/zivotne-prostredie/environmentalne-manazerstvo/environmentalne-oznacovanie-produktov> [Accessed 14 December 2024].

Song, L., Lim, Y., Chang, P., Guo, Y., Zhang, M., Wang, X., Yu, X., Lehto, M.R. and Cai, H., 2019. Ecolabel's role in informing sustainable consumption: A naturalistic decision making study using eye tracking glasses. *Journal of Cleaner Production*, 218, pp.685–695. https://doi.org/10.1016/j.jclepro.2019.01.283.

Stø, E., Strandbakken, P., Scheer, D. and Rubik, F., 2005. Background: theoretical contributions, eco-labels and environmental policy. In: *The Future of Eco-labelling*. Routledge.

Taufique, K.M.R., Siwar, C., Chamhuri, N. and Sarah, F.H., 2016. Integrating General Environmental Knowledge and Eco-Label Knowledge in Understanding Ecologically Conscious Consumer Behavior. *Procedia Economics and Finance*, 37, pp.39–45. https://doi.org/10.1016/S2212-5671(16)30090-9.

Taufique, K.M.R., Siwar, C., Talib, B., Sarah, F.H. and Chamhuri, N., 2014. Synthesis of Constructs for Modeling Consumers' Understanding and Perception of Eco-Labels. *Sustainability*, 6(4), pp.2176–2200. https://doi.org/10.3390/su6042176.

Thøgersen, J., Haugaard, P. and Olesen, A., 2010. Consumer responses to ecolabels. *European Journal of Marketing*, 44(11/12), pp.1787–1810. https://doi.org/10.1108/03090561011079882.

Tomšik, R., 2017. *Kvantitatívny výskum v pedagogických vedách : Úvod do metodológie a štatistického spracovania.* Nitra: PEDAGOGICKÁ FAKULTA, UNIVERZITA KONŠTANTÍNA FILOZOFA V NITRE.

Witek, L., 2017. Sustainable Consumption: Eco-labelling and its impact on consumer behavior - evidence from a study on Polish consumer. [online] (142/2017). Available at: <https://ideas.repec.org/p/pes/wpaper/2017no142.html>.

Yau, Y., 2012. Eco-labels and willingness-to-pay: a Hong Kong study. *Smart and Sustainable Built Environment*, 1(3), pp.277–290. https://doi.org/10.1108/20466091211287146.

Ziółkowski, B., 2020. Environmental labels and declarations in public policies of Poland. *Polityka i Społeczeństwo*, 18(03), pp.5–15.

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CONFLICTS OF INTEREST

The authors declare no conflict of interest. The funders had no role in the design of the study, in the collection, analyses, or interpretation of data, in the writing of the manuscript, or in the decision to publish the results.