

Greenwashing and consumer skepticism toward eco-labels in Croatia: challenges and policy directions

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Abstract

Purpose – This study investigates the roots of consumer skepticism toward eco-labels in Croatia, a market increasingly shaped by greenwashing and regulatory frailty. Grounded in the theory of planned behavior and signaling theory, it analyzes the psychological and communicative mechanisms that underpin trust in sustainability labeling.

Design/methodology/approach – A survey of 252 Croatian consumers was conducted using regression analysis. Data were collected via the tablet-assisted intercept method in five stores. The questionnaire had 13 Likert items, demographics and one open-ended question. A pilot test preceded fieldwork. In-store context allowed for real-time consumer insight.

Findings – Four determinants – eco-label visibility, institutional support, credibility of labels and consumer knowledge – emerged as significant predictors of purchase intention. The findings imply that standardized visual placement and transparent messaging are pivotal in reducing skepticism, bolstering trust and fostering environmentally responsible purchasing behavior.

Research limitations/implications – The study covers one country with a limited sample, mostly younger consumers. It uses a survey, so it does not capture deeper attitudes. Future work should add qualitative methods, include older age groups and compare with other countries in similar transitions.

Practical implications – Policy suggestions include standardized label placement, better consumer education and digital tools for transparency. Retailers should support eco-labels through loyalty programs and in-store efforts to strengthen trust and encourage sustainable choices.

Social implications – Consumers' skepticism toward eco-labels influences daily decisions and sustainability. Trustworthy labels encourage greener habits, inspire others and make sustainable consumption a general norm. Over time, this change strengthens environmental responsibility in communities.

Originality/value – The study extends the TPB by including eco-label visibility and institutional trust, offering insights into transitional EU markets where regulation and label consistency matter more than social influence or design.

Keywords Greenwashing, Consumer skepticism, Eco-labels, Regulatory framework, Sustainability policy, Behavior

Paper type Research paper

1. Introduction

Across Europe, consumers are demonstrating heightened concern over climate change and environmental degradation, increasingly favoring products with sustainable attributes.

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Contemporary research underscores that sustainability branding is progressively influenced by technological innovation and an intensified demand for authenticity (Nascimento and Loureiro, 2024). Notably, blockchain technology has emerged as a salient mechanism for bolstering transparency within eco-labeling systems. By enabling the traceability of environmental claims, blockchain serves as a bulwark against the rise of greenwashing, a practice defined by the strategic dissemination of misleading environmental assertions to manipulate consumer perception (Balzarova, 2021; Srisathan and Naruetharadhol, 2025). As market competition intensifies, greenwashing threatens not only consumer trust but also undermines broader environmental objectives. It erects substantial barriers to informed purchasing and impedes the transition toward genuinely sustainable consumption (Ali *et al.*, 2021).

Within the European Union (EU), over half of environmental claims lack verifiability from a consumer standpoint, with 40% regarded as misleading or unverifiable (European Commission, 2024). Croatia ranks lowest among EU member states in consumer trust toward eco-labels, with merely 41% expressing confidence in their legitimacy substantially below Poland (70%) and Hungary (64%) (European Commission, 2023a, b). This pervasive skepticism in Croatia is exacerbated by a fragile regulatory framework, inconsistent labeling standards, and insufficient consumer education. Moreover, the proliferation of fragmented labeling schemes contributes to consumer confusion, ultimately impeding environmentally responsible purchasing behaviors (Prieto-Sandoval *et al.*, 2022; Huh and Kim, 2024).

This study is guided by the central research question: Which factors, including greenwashing, a lack of transparency, and social influence, drive consumer skepticism toward eco-labels, and in what ways do these variables shape purchase intentions? Grounded in an extended Theory of Planned Behavior (TPB), the research interrogates the roles of consumer attitudes, perceived social norms, and behavioral control in fostering or diminishing trust in sustainability labels. Complementing this framework, Signaling Theory is employed to elucidate how the clarity and specificity of environmental claims affect consumer credibility assessments (Atkinson and Rosenthal, 2014). Empirical validation is achieved through regression analysis based on data from a structured survey involving 252 Croatian consumers.

Although this study focuses on the national market, the findings and recommendations regarding skepticism toward standardized eco-labels and regulatory challenges can serve as a model for other transition countries facing similar regulatory and market dynamics to mitigate greenwashing.

2. Literature review

A notable body of recent studies has examined consumer skepticism toward environmental claims, emphasizing the role of transparency and signaling theory (Ulusoy and Barretta, 2016). The literature shows that clear, credible environmental claims backed by verified certifications, along with digital tools, can enhance transparency, build confidence, and improve brand experience.

The literature supports the use of TPB and signaling theory to investigate skepticism toward eco-labels. Signaling theory explains how eco-labels communicate sustainability to consumers, whereas the TPB provides a framework for understanding the variables that influence confidence and skepticism regarding environmental claims.

2.1 Signaling theory in the greenwashing dynamic

Signaling theory explains how environmentally friendly claims signal environmentally friendly attributes to consumers. When unclear, green signals promote skepticism and reduce credibility (Huh and Kim, 2024). Ali *et al.* (2021) reported that imprecise or vague claims weaken the signaling effect and thus reduce the trust and effectiveness of green advertising. Trust is the cornerstone of eco-labels because without trust, consumers lose interest and their

willingness to pay a higher price. This theory sheds light on how consumers interpret information regarding eco-products, particularly in skeptical contexts.

Labels communicate complex information using symbols, diagrams, and text, relying on consumer understanding and confidence in standardization mechanisms. However, the asymmetry of information in the marketplace, where manufacturers have important knowledge unavailable to consumers, fuels skepticism. Effective labeling bridges this gap and promotes confidence through clear communication, as noted by [Gosselt et al. \(2019\)](#), who highlight the influence of trustworthy eco-labels on consumer behavior. Claims such as “organic” and visuals such as “green leaves” inspire consumer confidence and influence emotional reactions and purchasing decisions. They act as symbolic communication and emphasize product attributes in marketing ([European Commission, 2024](#)).

2.2 TPB framework for understanding consumer intentions

The Theory of Planned Behavior (TPB) is a comprehensive framework for understanding attitudes, social norms, and perceived behavioral control in consumer skepticism. The authors argue that attitudes toward greenwashing often stem from insufficient information about the reliability of claims ([Nekmahmud et al., 2022](#)). The TPB posits intention as an important predictor of behavior that is influenced by attitudes, subjective norms, and perceived behavioral control ([Hagger, 2019](#)).

Research confirms the reliability of the TPB: attitudes significantly influence purchase intention, while subjective norms and perceived behavioral control drive consumer decision-making and confidence ([Paul et al., 2016](#); [Cho et al., 2024](#)). At the local level, social influence and transparency are key to promoting environmentally friendly intentions, as has already been parallel found in Croatia and Sweden ([Dropulić and Krupka, 2020](#)).

The adaptability of the TPB allows the inclusion of variables, such as confidence and transparency, to increase explanatory power ([Ulusoy and Barretta, 2016](#)). Croatian consumers are skeptical of eco-labels without clear explanations or reliable data, emphasizing the need for transparent certification ([Martić Kuran and Mihić, 2014](#)). Transparent certification builds trust and reduces skepticism ([Taufique et al., 2016](#)), while educating consumers allows them to distinguish credible claims from false ones ([Fernandes et al., 2020](#)). Sustainability-focused marketing strategies further improve trust and awareness of eco-labels ([Prieto-Sandoval et al., 2022](#)).

In application, TPB addresses barriers to sustainable choices by focusing on education and communication. For example, consumers are willing to pay a premium for certified products if the benefits are clear ([Paul et al., 2016](#)). Certified organic products, such as organic milk, are known for their high quality and price. Providing reliable information and educating consumers remains important to reduce skepticism and promote informed choices ([Taufique et al., 2016](#)).

2.3 Reasons for choosing eco-friendly

The motivations for choosing environmentally friendly products arise from personal values, social influence, and confidence in eco-labels ([Meis-Harris et al., 2021](#)). This is also confirmed by [Gorton et al. \(2021\)](#), who emphasize that in eco-labels positively influences their use among European consumers. [Hansman et al. \(2020\)](#) demonstrated how personal values and perceptions drive the choice of organic products, which is consistent with the trend toward sustainability. [Konuk \(2019\)](#) and [Huh and Kim \(2024\)](#) suggested that fair trade and eco-labels increase consumer awareness and willingness to buy, while [Thøgersen et al. \(2010\)](#) pointed to the importance of label clarity and reliability. While [Haws et al. \(2014\)](#) provide foundational insights into green consumption values, recent studies (e.g. [Cho et al., 2024](#)) further examine their implications in transitional markets. Similar to how Nutri-Score labeling has influenced consumer purchasing decisions in the food industry ([Calderon-Monge et al., 2024](#)), eco-labeling also plays a significant role in guiding consumer behavior. [Calderon-Monge](#)

et al. (2024) demonstrated that the perceived usefulness of a label, such as Nutri-Score, directly affects consumer attitudes and their intention to purchase, which highlights the importance of clear and easily interpretable eco-labels in the context of sustainability.

Social norms also influenced sustainable consumption. Kim and Seock (2019) linked social norms and environmental awareness to green purchasing intentions, while Nekkahmud *et al.* (2022) highlighted the role of social media in promoting sustainability. At the local level, Oplanic *et al.* (2022) argued that clear labels increase purchase intention, especially among older consumers. Perception of eco-labels differs between countries. Herbes *et al.* (2020a) found that consumers in Germany and France trusted third-party certified labels more than self-declared ones, while trust was lower in countries with weak regulation. Toyota and Tan (2024) showed that Japanese consumers do not trust labels unless they give specific and clear information. These results show that cultural and regulatory context shapes how consumers interpret and accept eco-labels.

2.4 EU policy and future regulation of eco-claims

The regulation of green claims in the EU aims to increase consumer confidence and harmonize the environmental practices of manufacturers (European Commission, 2023a, b). The proposed Green Claims Directive introduces stricter rules, including mandatory scientific assessments and a ban on self-certification, to combat greenwashing and ensure that environmental claims are clear, evidence-based, and standardized (Nygaard and Silkoset, 2023). Prieto-Sandoval *et al.* (2022) argued that transparency and credibility of green claims are important for reducing skepticism and building trust.

Driven by weak regulations and market pressures, greenwashing undermines trust in sustainable production and market integrity. Yildirim (2023) notes that greenwashing, while often seen as deceptive, can also reflect systemic failures in policy enforcement and signal the need for clearer regulatory boundaries in sustainability communication. The literature indicates that greenwashing occurs at both the company and product levels, diminishing the credibility of green claims and exposing companies to reputational and legal risk (Berrone *et al.*, 2017).

Key initiatives include the use of QR codes in packaging, giving consumers quick access to detailed information about sustainability and certification processes, increasing transparency, and reducing confidence issues (Nygaard and Silkoset, 2023). Blockchain technology has also been introduced to improve the traceability of claims and increase trust in certifications (European Commission, 2023a, b). Nygaard and Silkoset (2023) argue that blockchain can empower green consumers by offering verifiable sustainability information and combating greenwashing. In addition, the EU plans to centralize and optimize existing public environmental schemes, focusing on efficiency and clarity rather than increasing their number. Standardized visual elements, such as symbols, colors, and formats, are also being developed to enable consumers to easily identify reliable environmental claims (Nygaard and Silkoset, 2023; Keirsbilck, 2024). This technology ensures transparency in the eco-labeling process and builds trust among consumers by providing easily accessible certification data. Incorporating digital verification tools such as QR codes can further enhance consumer confidence by providing real-time access to product sustainability information. Interactive platforms supported by digital tools such as simulations and product ratings are designed to teach consumers to distinguish credible claims from greenwashing (Fernandes *et al.*, 2020).

3. Research design

A model was developed to analyze the predictors of consumers' intention to buy eco-labeled products (see Figure 1). The distinctiveness of the model consists of 11 independent variables that can influence purchase intention and are distributed across the three TPB dimensions.

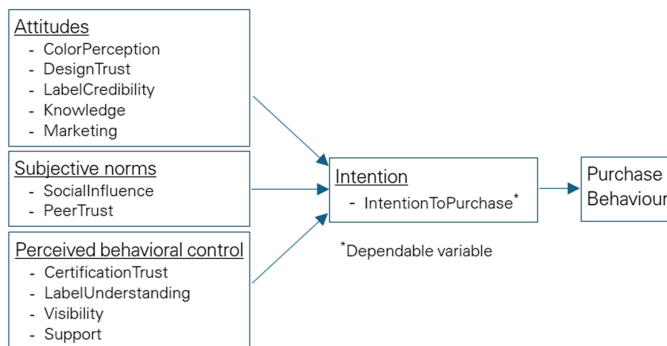


Figure 1. Research model. Source: The authors

The purpose of the model is to determine the influence of certain factors that could explain the skepticism about the intention to buy environmentally friendly products. Skepticism reflects a psychological state in which consumers doubt the veracity of claims that products are not harmful to the environment or that they are environmentally friendly and therefore beneficial. The set of selected model variables depended on their relevance for assessing skepticism towards eco-labels using the extended TPB model.

3.1 Consumer attitudes

Attitudes toward eco-labels are shaped by several interrelated variables that influence perception and purchasing behavior. [Appendix 1](#) contains the survey questions used to measure variables.

The variable *AT_ColorPerception* captures the influence of green color on consumers' perceptions of environmental friendliness. Green packaging has attracted considerable attention because it associates product attributes with nature and preserves them. Green and blue evoke emotional and cognitive responses that serve as strong sustainability signals ([Seo and Scammon, 2017](#)). [Waris and Ahmed \(2020\)](#) claimed that green packaging significantly influences consumers' perceptions of environmental friendliness by reinforcing their associations with environmental awareness. Survey question *Q1* assessed these visual cues and supported the following hypothesis.

H1. Green packaging triggers perceptions of environmental friendliness.

The *AT_DesignTrust* variable examines whether green-colored packaging conveys a genuine impression of lower environmental impact. [Herbes et al. \(2020b\)](#) found that consumers frequently associate green design with authentic sustainability, which strengthens credibility and trust in products and brands. Conversely, greenwashing undermines consumer confidence ([Berrone et al., 2017](#)). *Q2* assessed this trust, leading to the following hypothesis.

H2. Consumers believe that products with green design have real environmental benefits.

Eco-labels with clear and detailed arguments strengthen confidence in sustainability claims, especially when consumers are confident that production methods and materials align with environmental principles ([Atkinson and Rosenthal, 2014](#)). *AT_LabelCredibility* measures the extent to which eco-labels guarantee real benefits over conventional products. [Gorton et al. \(2021\)](#) emphasized that confidence in eco-labels results from the perception that they provide genuine environmental benefits compared to conventional products. *Q3* assesses this perception by asking consumers to indicate their level of agreement with a statement assessing the credibility of eco-labels, which tests the following hypothesis:

H3. Eco-labels guarantee genuine environmental benefits of products.

AT_Knowledge represents the ability of consumers to recognize standardized claims, which has a significant impact on pro-environmental behavior. [Hansmann et al. \(2020\)](#) found that better environmental knowledge reduces skepticism and promotes sustainable purchasing decisions. [Taufique et al. \(2016\)](#) emphasized that familiarity with eco-labels leads to confidence and willingness to support eco-labeled products. Therefore, to test the variable, question Q4 was posed, which measured the level of knowledge in identifying credible eco-labels. Accordingly, we propose the following hypothesis is put forward:

H4. Knowledge of credible eco-labels influences consumer confidence.

The public's perception that eco-labels are marketing gimmicks that enhance brands and justify higher prices can undermine consumer confidence. Greenwashing often serves to gain a competitive advantage and inflate prices through marketing strategies ([Fernandes et al., 2020](#)). This discrepancy between claims and actual product benefits encourages skepticism, as such labels are seen as marketing tools rather than as sustainability indicators ([Kumar et al., 2020](#); [Fella and Bausa, 2024](#)). The variable *AT_Marketing* is represented by Q5 in the survey, which measures skepticism, leading to the following hypothesis.

H5. Consumers perceive eco-labels as marketing tools rather than indicators of genuine sustainability.

3.2 Social pressure

Social pressure refers to the influence of valued individuals such as family and friends on consumers' decisions regarding eco-labels. Research reports that social norms have a significant influence on pro-environmental behavior as individuals often align their decisions with the expectations of their social networks ([Kim and Seock, 2019](#)). This influence becomes particularly important when credible sources advocate for sustainability, amplifying the impact of these norms ([Konuk, 2019](#)). However, while previous studies have examined social norms in general, little attention has been paid to their specific role in promoting trust in, and awareness of, eco-labels.

The *SN_SocialInfluence* variable provides new insights by examining how conversations with close social groups influence awareness of eco-labels. In contrast to previous research, which often focuses on general sustainability behavior, this study makes an explicit link between social conversations and eco-label adoption. [Zhan et al. \(2025\)](#) emphasized that social influence significantly affects consumer attitudes, but few studies have operationalized this concept in the context of eco-label awareness. Q6 assesses the frequency of such interactions, and thus supports the following hypothesis:

H6. Greater exposure to social discussions about eco-labels supports eco-friendly purchasing behavior.

SN_PeerTrust assesses the extent to which the opinions of trusted individuals influence the perceptions of eco-label credibility. [Gorton et al. \(2021\)](#) claimed the importance of trust in eco-label credibility, emphasizing that consumer trust often results from close relationships. This study uniquely addresses how trust in eco-labels is shaped by personal relationships such as family and friends. Q7 summarizes these findings and leads to the following hypotheses:

H7. Trust in eco-labels is shaped by the opinions of people who are close together.

3.3 Factors of perceived behavioral control

Perceived behavioral control is defined as the perception of the ease or difficulty of performing a specific behavior that is influenced by both internal and external constraints. In the context of this study, this represents the extent to which people feel confident about their intention to make environmentally friendly purchases.

Transparency in the certification process for eco-labels is crucial to reducing skepticism and combating greenwashing. The variable *PBC_CertificationTrust* measures self-reported understanding of certification processes. The [European Commission \(2024\)](#) asserted that standardized certification schemes provide clarity and help consumers understand the sustainable impacts of products. Greater transparency promotes confidence and reduces skepticism ([Herbes et al., 2020b](#)). This point of view is checked by *Q8* which establishes the hypothesis:

H8. A better understanding of the certification process increases consumer confidence in eco-labels.

If the consumer understands the meaning and easily understands the benefits offered by eco-labels, then it is precisely this specific information that he evaluates that is crucial for making informed purchasing decisions ([Herbes et al., 2020b](#)). The specific arguments associated with ecolabels reinforce the idea of credibility. This is predominantly detailed information on environmental benefits, benefits and sources of verification such as certification bodies ([Atkinson and Rosenthal, 2014](#)). Based on [Herbes et al. \(2020b\)](#), the variable *PBC_LabelUnderstanding* measures one's own understanding of eco-labels, and the corresponding *Q9* evaluates the impression. This leads to the following hypotheses:

H9. A better understanding of eco-labels increases consumer confidence.

Visibility and clarity of eco-labels are crucial for consumer confidence and sustainable choices. [Konuk \(2019\)](#) demonstrated that clear, well-labeled products are more likely to be recognized and purchased. [Oplanic et al. \(2022\)](#) and [Kumar and Basu \(2023\)](#) claimed that visible labels build trust and facilitate decision making. [Gorton et al. \(2021\)](#) argue that greater label visibility reduces skepticism by simplifying the communication of environmental values. The *PBC_Visibility* variable captures perceptions of label clarity and prominence, which are essential for differentiating products and influencing quick sustainability decisions. *Q10* measures this relationship and accordingly, the following hypothesis was tested:

H10. Greater visibility of eco-labels increases purchase intention.

PBC_Support anticipates the impressions of eco-labels that consumers receive through the actions of public institutions and retailers. The authors believe that these subjects are key to educating consumers and reducing skepticism ([Paul et al., 2016](#)). [Pacho \(2020\)](#) finds that recommendations from a reputable retailer work to build trust and thus encourage the purchase of labeled products. [Kumar and Basu \(2023\)](#) and [Zhan et al. \(2025\)](#) argue that the information provided by institutions and retailers reduces uncertainty and promotes trust in eco-labels. Based on these findings, *Q11* was set to measure the consumer's impression of how much these entities provide confident information on eco-labels, which supports the following hypothesis:

H11. Better support from the public system and retailers increases trust in eco-labels.

4. Methodology

Context-specific adaptations of the TPB improve the understanding of consumer behavior in transitional markets ([Setyawan et al., 2018](#)). A survey-based methodology within the TPB framework was employed to examine the impact of greenwashing intention. The inclusion of variables such as visibility and retailer support provides valuable insights into the Croatian market and supports strategies to increase confidence in green claims.

The survey (see [Appendix 1](#)) collected empirical data on consumers' attitudes, behaviors, and knowledge. As recommended by [Hair et al. \(2018\)](#), a sample size of 250–300 respondents ensured sufficient statistical power for regression analysis.

The survey was carried out using a simple intercept method with tablet-assisted administration. The questionnaire was made in Google Forms and was the same for everyone. Before the main part, we did a small pilot with 24 people to check if the questions made sense. Based on that, we adjusted a few things. The final version had 13 items on a Likert scale, two demographic questions, and one open-ended question. In November 2024, two groups of students helped with fieldwork — one group had three members, the other four. Each group had one tablet. Over the course of nine days, they visited five different stores. A total of 254 people agreed to participate; 252 responses were complete and included in the analysis (see [Table 1](#)). Some participants answered the survey themselves on the tablet, while others preferred that the student read the questions and enter the answers. All responses went straight into Google Forms, which helped avoid errors and kept everything consistent. This kind of setting, close to the actual place of purchase, was convenient for understanding how customers think about eco-labels in real situations.

Data analysis using IBM SPSS revealed a demographic bias toward younger and middle-aged participants (18–44 years, 85%), which is consistent with the [European Commission’s \(2024\)](#) finding that these groups show the greatest willingness to purchase environmentally friendly products. Although the limited representation of older participants (>55 years) reduced the generalizability of the results, they often prioritized price and functionality over organic labels, influenced by skepticism, financial constraints, and restricted marketing access ([Solomon, 2020](#); [Phua et al., 2020](#)).

A factor analysis was conducted to confirm the latent structure of the scale. Two variables (10 and 11) had weak loadings on the target factors (<0.4), indicating that they were unsuitable for measuring constructs. After updating the set of variables, the statistical reliability of the dataset was validated by the internal consistency of each group of variables using Cronbach’s alpha (α). In general, values of $\alpha \geq 0.7$ are considered acceptable ([Hair et al., 2018](#)), so the internal consistencies of the scales were within acceptable limits (see [Table 2](#)). All three groups of independent variables showed homogeneity between items (no significant differences between them $\rightarrow p > 0.05$).

Table 1. Sample characteristics

Completed, $n = 252$	
<i>Age (%)</i>	
18–24	29.4
25–34	31.0
35–44	24.1
45–54	10.3
55+	5.2
<i>Gender (%)</i>	
F	56.3
M	43.7
O	–
Source(s): The authors (SPSS)	

Table 2. Reliability and validity statistics

Construct	α	<i>F</i> -value	<i>p</i> -value	Mean
Attitudes	0.747	1.037	0.386	2.98
Social norms	0.709	1.369	0.243	3.03
Perceived behavioral control	0.694	1.414	0.237	3.01
Source(s): The authors (SPSS)				

The results of the factor analysis of the updated dataset (see [Appendix 2](#)) show that the variables are well-grouped according to the theoretical constructs, confirming their internal validity. Thus, regression analysis can be conducted to assess the effects of the variables on purchase intention.

The selected methodological approach sets the foundation for researching the relationship between consumer skepticism, confidence, trust in eco-labels, and purchase intention and enables a comprehensive understanding of these dynamics in the Croatian market.

5. Results: consumer insights

The arithmetic mean values in [Table 3](#) show that most aspects of the eco-labels were perceived neutrally or slightly negatively, because the arithmetic mean values were mostly below 3.0 (on a scale of 1–5, where 3 indicates a neutral attitude).

The model in [Table 4](#) explains 51.4% of the variance in purchase intention ($R^2 = 0.514$), with ANOVA confirming its statistical significance ($F = 32.072$, $p < 0.001$).

The interpretation in [Table 5](#) shows that coefficient $B = 0.361$ for the constant is not statistically significant ($p = 0.240$), indicating that the model does not predict purchase intention without the presence of predictor variables. The regression results show that four variables significantly and positively predict purchase intention for eco-labeled products, affirming the theoretical model based on TPB and signaling theory. The results of the analysis can be seen as a challenge for market and policy drivers.

Consumers remain unconvinced of the advantages that eco-labeled products offer over conventional alternatives. This skepticism aligns with the confirmation of [H3](#), as *AT_LabelCredibility* ($B = 0.219^{**}$, $\bar{x} = 2.59$, $SD < 1$) emerged as a significant predictor, demonstrating that confidence in the authenticity of eco-labels substantially increases purchase intention. These findings reinforce the belief that eco-labels guarantee genuine environmental benefits ([Gorton et al., 2021](#)). However, standardized claims were poorly recognized (*AT_Knowledge*, $B = 0.307$, $\bar{x} = 2.60$, $SD < 1$), with low mean scores and limited variability, reflecting a general lack of consumer awareness regarding credible eco-labels. Knowledge emerged as the strongest predictor, significantly reducing skepticism and mitigating greenwashing while simultaneously reinforcing trust in eco-labels, demonstrating its dual role in shaping consumer confidence (see [Figure 2](#)). This supports [H4](#), which shows that the knowledge of credible eco-labels significantly enhances consumer trust.

Moreover, by examining how skepticism and label visibility interact within the research model, this study provides novel insights into the mechanisms shaping consumer confidence in sustainability claims, thus addressing a critical gap in the literature on consumer decision making in transitional markets.

Table 3. Descriptive statistics

Variable	Min.	Max.	$\bar{x}$	SD
AT_ColorPerception	1	5	3.06	1.098
AT_DesignTrust	1	5	2.94	1.130
AT_LabelCredibility	2	5	2.59	0.962
AT_Knowledge	1	4	2.60	0.931
AT_Marketing	1	5	2.99	1.051
SN_SocialInfluence	2	5	2.94	1.090
SN_PeerTrust	1	5	2.93	1.137
PBC_CertificationTrust	1	5	3.05	1.148
PBC_LabelUnderstanding	1	5	2.93	1.062
PBC_Visibility	2	5	2.76	1.070
PBC_Support	1	4	2.95	0.928

Source(s): The authors (SPSS)

Table 4. Determination coefficient and ANOVA

					<i>R</i> square
Model	<i>R</i>				
1	0.717				0.514
ANOVA					
Model	Sum of squares	df	Mean square	<i>F</i>	<i>p</i> -value
Regression	62.468	11	5.679	32.072	0.000
Residual	42.496	240	0.177		
Total	104.964	251			
Note(s): Dependent Variable: Intention					
Source(s): The authors (SPSS)					

Table 5. Regression analysis

Hypothesis	Predictors	B	SE	t	p-value	Hypothesis confirmed
	(Constant)	0.361	0.306	1.177	0.240	
H1	AT_ColorPerception	0.058	0.019	1.746	0.082	No
H2	AT_DesignTrust	0.010	0.023	1.188	0.236	No
H3	AT_LabelCredibility	0.219***	0.136	3.331	<0.001	Yes
H4	AT_Knowledge	0.307**	0.234	2.382	0.018	Yes
H5	AT_Marketing	0.019	0.032	1.396	0.164	No
H6	SN_SocialInfluence	0.041	0.154	1.082	0.280	No
H7	SN_PeerTrust	0.106	0.208	0.746	0.456	No
H8	PBC_CertificationTrust	0.073	0.234	1.807	0.072	No
H9	PBC_LabelUnderstanding	0.033	0.433	1.003	0.317	No
H10	PBC_Visibility	0.180*	0.239	2.169	0.031	Yes
H11	PBC_Support	0.106**	0.053	3.124	0.002	Yes
Source(s): The authors (SPSS)						

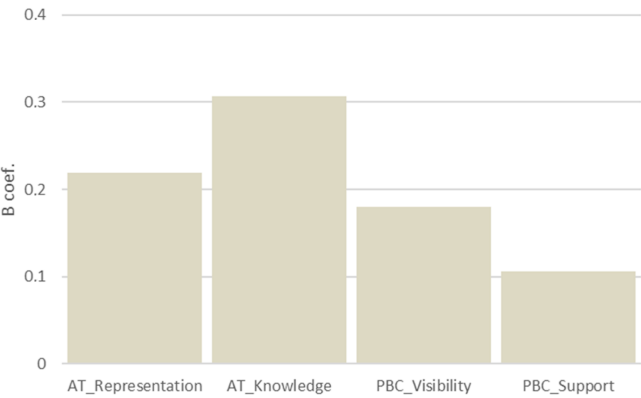


Figure 2. Comparison of the significant predictors. Source: The authors (SPSS)

PBC_Visibility ($B = 0.180, p < 0.05$) and *PBC_Support* ($B = 0.106^*, p < 0.01$) are significant predictors of purchase intention, thus confirming [H10](#) and [H11](#). Low mean scores ($\bar{x} = 2.76, SD \sim 1; \bar{x} = 2.95, SD < 1$) indicate that eco-labels currently lack sufficient visibility and informational support, which is a challenge in the marketplace. In support of [H10](#), clearly positioned and recognizable eco-labels effectively reduced skepticism, communicated eco-friendly standards, and increased confidence and purchase likelihood ([Gorton et al., 2021](#)). Easier recognition and better information guidance improve consumers' ability to make eco-friendly choices. Visible eco-labels simplify decision-making by clearly conveying sustainability values and fostering trust ([Kumar and Basu, 2023](#)). Furthermore, consistent with [Zhan et al. \(2025\)](#), the public system and retailer support reduce uncertainty, highlighting the critical roles of marketing communication and consumer education. Although *PBC_Support* has a slightly lower coefficient, it underscores the importance of actionable guidance from trusted authorities and retailers in encouraging consumers to purchase eco-labeled products.

Interpreting non-significant predictors is critical for establishing a clear course of action to avoid wasting resources on ineffective policies that do not reduce skepticism or complicate efforts to combat greenwashing.

Although green packaging is designed to trigger perceptions of environmental friendliness ([H1](#)), its influence on purchasing decisions is limited. Visual elements alone cannot create confidence or engagement without credible environmental claims ([Waris and Ahmed, 2020](#)). The variable *AT_DesignTrust* ([H2](#)) had no significant influence on purchase intention, probably because consumers no longer regard green packaging as a reliable signal for sustainability. While visual elements can provide a first impression ([Herbes et al., 2020b](#)), past experiences with greenwashing have made shoppers more cautious. They are now looking for tangible evidence rather than relying on esthetics alone ([Berrone et al., 2017](#)). As [Atkinson and Rosenthal \(2014\)](#) suggest, credibility depends more on clear, verifiable claims than on design choices. Also, *AT_Marketing* ([H5](#)), which measures whether eco-labels are perceived as marketing tools rather than true sustainability indicators, did not predict purchase behavior. This suggests that although skepticism towards green marketing is widespread, it is not necessarily a deal-breaker. Consumers may question companies' motives, but if claims about a product's sustainability are true, they are still willing to buy it ([Ali et al., 2021](#)). This is in line with [Fella and Bausa \(2024\)](#), who find that while skepticism towards green advertising is common, it does not automatically lead to a rejection of eco-labeled products. Taken together, these results reflect a change in consumer behavior: brands and marketing claims alone no longer create trust. Instead, transparent, verifiable claims are most important ([Balzarova, 2021](#)).

The *SN_SocialInfluence* variable ([H6](#)) did not significantly affect purchase intention. While social discussions raise awareness, they are not strong enough to influence decisions, as consumers need verifiable proof rather than collective sentiment ([Zhan et al., 2025](#)). Social norms have a greater impact when paired with personal convictions and knowledge ([Kim and Seock, 2019](#)). Without mechanisms like third-party certification or regulatory assurance, social discussions alone do not build enough confidence for purchase. *SN_PeerTrust* ([H7](#)) was not a significant predictor. While trusted individuals shape attitudes ([Gorton et al., 2021](#)), skepticism toward greenwashing weakens interpersonal trust in eco-labels ([Fella and Bausa, 2024](#)). Consumers prioritize independent verification over second-hand assurances, as knowledge about sustainability is often more decisive than social influence ([Hansmann et al., 2020](#)). These results suggest that consumers rely more on transparent, verifiable claims than on external endorsements, whether from broader social discussions ([H6](#)) or personal networks ([H7](#)).

[H8](#) postulated that a better understanding of certification processes increases consumer confidence, but the near-significant result indicates that transparency alone is insufficient. [Herbes et al. \(2020b\)](#) claimed that simple and understandable explanations are important for closing the gap between expectations and trust. Similarly, [H9](#) suggests that a better

understanding of eco-labels increases consumer trust. However, the nonsignificant result supports [Atkinson and Rosenthal's \(2014\)](#) finding that technical or vague claims hinder trust. Without clear and understandable information, consumers find it difficult to associate eco-labels with their purchasing decisions.

The open-ended question (Q13) showed that respondents primarily associate environmental impact with plastic waste (47.76%), followed by soil and groundwater pollution (20.90%) and resource depletion (16.42%). The strong focus on plastic waste suggests that high visibility and media attention shape consumer awareness. Many responses explicitly mention single-use plastics, ocean pollution, and microplastics, indicating that tangible, immediate environmental threats are more salient. Soil and groundwater pollution, though less visible, is still a major concern. Mentions of agricultural runoff, chemical contamination, and industrial waste suggest that respondents recognize the indirect but serious effects on food safety and water quality ([Farooq and Wicaksono, 2021](#)). Resource depletion was cited less frequently but included references to deforestation, overfishing, and excessive water use. Unlike plastic waste, which is immediately observable, resource depletion is perceived as a gradual, long-term issue, likely explaining its lower ranking. These findings indicate that eco-label communication should emphasize dominant concerns, particularly plastic-free packaging, pollution control, and responsible resource use. Addressing visible environmental threats and ensuring transparency in sustainability claims can strengthen consumer trust in eco-labels.

6. Discussion

6.1 Advancing TPB and signaling theory

Planned behavior theory remains a widely used framework for showing how attitudes, subjective norms, and perceived behavioral control influence consumers' intentions to purchase eco-labeled products. Previous research has highlighted the role of eco-label knowledge in encouraging pro-ecological behavior ([Taufique et al., 2016](#)) giving importance to clear communication strategies to improve self-confidence. Similarly, [Prieto-Sandoval et al. \(2022\)](#) consider consumer education and standardized labeling to be key mechanisms for building confidence. [Dropulić and Krupka \(2020\)](#) showed that the support of public systems and retailers can significantly increase trust and reminded of the need for more accessible and transparent information on the environment.

In addition to TPB, signaling theory helps and expands insights into how transparency and credibility affect trust in eco-labels. [Cho et al. \(2024\)](#) found that sustainability skepticism needs to be monitored and managed to increase consumer confidence. [Fernandes et al. \(2020\)](#) argue that clear and consistent communication plays a crucial role in mitigating skepticism towards green claims, and that this is the only way to address the need for standardized and verifiable environmental messages.

The insights gained can improve trust in the right environmental labels by integrating the psychological (TPB) and communicative (signaling theory) dimensions of behavior and provides the basis for management strategies around building self-confidence. It expands on previous research by empirically testing skepticism and visibility as an intermediary within the model, an approach that has not been previously explored in transition markets.

6.2 Comparison with international studies

This comparison highlights significant disparities in trust levels in eco-labels across European countries, reflecting variations in regulations, transparency, and consumer education (see [Table 6](#)). Germany, as a pioneer in the regulation and standardization of eco-labels, has a high level of consumer trust because of certificates such as Blue Angel. However, there is still a need for more transparent information about the certification process ([Thøgersen et al., 2010](#)). Sweden, with its strong institutional trust and social norms, continues to try to reduce its

Table 6. Comparison of trust in environmental claims in selected European countries

Country	Authors	Level of trust	Key challenges	Strategies and solutions
Germany	Thøgersen et al. (2010)	High	Need for greater transparency	Strict regulations, standardized labels, QR codes for certification
Sweden	Dropulić and Krupka (2020)	High	Trust in eco-labels driven by social consensus	Social campaigns, community education, strengthening institutional trust
Netherlands	Nygaard and Silkoset (2023)	High	Consumer awareness and innovation	Digital technologies (QR codes), sustainability education
Poland	Witek (2019)	Medium	Low consumer awareness	Educational campaigns, involving local communities in sustainability
Hungary	Maró et al. (2019)	Medium	Low recognition of international certifications	Promotion of internationally recognized certifications, encouraging local initiatives
Croatia	This study	Low	Greenwashing, weak education, communication, and regulation	Regulatory enforcement, improving eco-label transparency, and expanding consumer education programs

Source(s): The authors

skepticism through campaigns that encourage communities to work together on sustainability ([Dropulić and Krupka, 2020](#)). On the other hand, [Witek \(2019\)](#) reported that Poles have a medium level of trust because they are not sufficiently informed about environmental statements, and in the discussion, they emphasize the importance of education and local initiatives to increase the level of trust.

Hungary exhibits moderate confidence levels, with consumers favoring national eco-labels over international ones, highlighting the need to improve the visibility and transparency of global certifications ([Maró et al., 2019](#)). The integration of QR codes and blockchain technologies in eco-labeling, as seen in countries like the Netherlands, is effective in enhancing transparency ([Nygaard and Silkoset, 2023](#)). However, a meta-analysis of eco-label persuasion across different cultures shows that cultural values and institutional trust greatly influence how consumers react to eco-labeling ([Velasco et al., 2024](#)). These technologies are most successful when they are complemented by a high level of institutional trust and positive cultural attitudes toward sustainability. Without such support, even the most advanced technologies may struggle to overcome skepticism in countries with lower regulatory oversight, such as Croatia.

In addition to the EU-wide labels, national certification systems, such as the Polish “Znak certyfikowany rolnictwa ekologicznego BIO”, show how tailored policy measures influence the credibility of the eco-label. These findings are particularly relevant for Croatia, where trust is lowest. Stricter enforcement of regulations, improving the visibility of eco-labels, and integrating Swedish-style community engagement with Dutch-style digital transparency solutions could reduce skepticism and encourage sustainable consumer behavior in transition markets.

6.3 Policy and managerial implications

From the results obtained, it is possible to take the statement taken by many other authors that it is necessary to implement European policy more consistently in order to improve the visibility and transparency of eco-labels in the fight against consumer skepticism ([Taufique et al., 2016](#); [Ulusoy and Barrett, 2016](#); [Prieto-Sandoval et al., 2022](#); [European Commission, 2023a, b, 2024](#); [Nygaard and Silkoset, 2023](#); [Jog and Pani, 2024](#); [Srisathan and Naruetharadhol, 2025](#)). Regulatory changes should address segmented certification schemes, inconsistent labeling and poor consumer awareness. Standardizing the positioning of eco-labels on the front of

packaging and the introduction of QR codes for instant digital access to real-time certification details via blockchain technology can significantly improve the visibility of labels (Taufique *et al.*, 2016; Nygaard and Silkoset, 2023). Blockchain technology is revolutionizing eco-labeling schemes by providing immutable, transparent records that ensure sustainability claims are verifiable and increase consumer confidence in eco-labeled products (Balzarova, 2021). In neighboring Slovenia, 97% of consumers recognize QR codes on food packaging. However, actual usage remains limited, as only 32% of consumers actively scan QR codes (Žurbi and Gregor-Sveteć, 2023). The motivation for scanning QR codes is mainly linked to quick access to product information, discounts, or additional content. Velasco *et al.* (2024) emphasize that the persuasiveness and perceived credibility of digital eco-labeling tools, such as QR codes or online certification links, depend not only on accessibility but also on cultural expectations and prior exposure to trustworthy labeling schemes.

The weak regulation of the Croatian ecolabel has led to low consumer trust, mainly due to inconsistent certification, weak enforcement, and lack of transparency (Grgurić Čop *et al.*, 2024). In contrast to Germany, Sweden, and the Netherlands, which have independent control systems (Hartmann *et al.*, 2019), Croatia has no central authority overseeing the awarding of ecolabels. Multiple certification schemes cause confusion and inconsistency. Another major problem is the weak enforcement of regulations, as there are few penalties for misleading sustainability claims, so greenwashing remains prevalent (European Commission, 2024). Transparency is also lacking, as there is no public registry where consumers can check the credibility of eco-labels. Additionally, consumer awareness remains limited, as many find it difficult to distinguish between credible eco-labels and marketing tools.

To improve the legal framework, Croatia should introduce independent verification by requiring third-party certification instead of self-regulation. Stricter enforcement is needed, including fines for false claims, based on the Dutch model. Increasing transparency through a national certification database, similar to that in Germany, would allow consumers to verify the validity of eco-labels (Grgurić Čop *et al.*, 2024). Additionally, expanding consumer education initiatives, as in Sweden, would improve trust and understanding of the credibility of ecolabels.

Stronger monitoring and stricter enforcement would bring Croatia in line with EU best practices, increase transparency, and reduce consumer skepticism. Gamification (Robson *et al.*, 2016) and interactive digital platforms can increase engagement, while staff training, institutional collaboration, and consumer satisfaction ratings provide credibility. Strengthening these measures stabilizes the organic market and allows brands to justify premium prices and mitigate the risk of greenwashing (Grgurić Čop *et al.*, 2024).

Findings from the open-ended question (Q13) indicate that consumers primarily associate environmental impact with plastic waste (47.76%), soil and groundwater pollution (20.90%), and resource depletion (16.42%). This suggests that eco-label communication must align with these dominant concerns. Regulations should require clear disclosures on packaging about how labeled products contribute to waste reduction, pollution prevention, or sustainable resource management. Marketing campaigns, such as those on plastic waste and soil and groundwater pollution, must emphasize these specific environmental impacts rather than generalized sustainability claims.

7. Limitations and future research

This study has several limitations that provide opportunities for future research. First, the results are based on data from Croatia and reflect the country's specific legal, institutional and consumer context. However, Croatia shares several structural characteristics with other EU markets, such as weak enforcement of green marketing regulation and low confidence in eco-labels, which makes the findings applicable beyond the national level in similar contexts. Although the results are consistent with general trends in eco-label skepticism, they may not be directly generalized to other countries. Future research should conduct cross-country

comparisons to examine how the regulatory environment, institutional trust, and consumer education influence confidence in eco-labels in various contexts.

Second, the study relies on quantitative data, which reveals patterns and relationships but does not capture the deeper perceptions of consumers. The inclusion of qualitative methods, such as in-depth interviews or focus groups, could provide deeper insights into the psychological drivers of credibility and skepticism toward eco-labels and complement the findings of this study.

Third, older consumers were limited to the sample, although they played an important role in purchasing decisions. Future research should include a broader age range to examine the generational differences in eco-label use. Additionally, further studies could examine how digital technologies, such as QR codes and blockchain-based certifications, increase the credibility of eco-labels across different product categories and consumer demographics.

Addressing these gaps will contribute to a more comprehensive understanding of eco-labels and support the development of targeted strategies to increase global consumer confidence in sustainability.

8. Conclusion

This study examined the drivers of consumer skepticism toward eco-labels in Croatia, a transitional EU market characterized by low institutional trust and fragmented sustainability regulation. Using an extended Theory of Planned Behavior (TPB) framework, the analysis identified greenwashing perception, transparency concerns, and distrust in regulatory enforcement as significant barriers to purchase intention. In contrast, visual design cues and peer-related social influences exhibited no measurable effect, suggesting that in structurally weak environments, symbolic and normative signals fail to establish credibility on their own.

The findings make a theoretical contribution by integrating institutional trust into the TPB framework as a determinant of perceived behavioral control and attitudinal reliability. This addition reflects the reality that consumer intention in such markets is not solely shaped by internal beliefs or social norms but is deeply influenced by perceived systemic legitimacy. While existing literature has emphasized individual-level factors, this study reinforces the view that institutional voids directly alter how eco-labels are processed and evaluated (Herbes *et al.*, 2020b; Gosselt *et al.*, 2019). Thus, the study supports and extends prior findings from emerging markets (e.g. Taufique *et al.*, 2016; Dropulić and Krupka, 2020), while demonstrating that even within the EU, uniform eco-label strategies may underperform in contexts lacking regulatory robustness.

These insights are relevant for both researchers and policymakers. Persuasion strategies relying solely on visual or normative cues appear insufficient without institutional credibility. Market actors must invest in transparent, third-party certification systems and enforceable legal frameworks. For academics, the findings offer a refinement of TPB-based models in environmental behavior by embedding institutional credibility as a mediating layer in low-trust contexts.

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Appendix 1 Survey

Age group	☐ 18–24 ☐ 25–34 ☐ 35–44 ☐ 45–54 ☐ 55+	Variable:
Gender	☐ F ☐ M ☐ O	
Q1: Do green-colored packages make you think of environmentally friendly?	<i>1 (Not at all) - 5 (Very much)</i>	AT_ColorPerception
Q2: Do you trust that products with green packaging are truly produced in an environmentally sustainable way?	<i>1 (Do not trust at all) - 5 (Completely trust)</i>	AT_DesignTrust
Q3: To what extent do you agree that eco-labels guarantee real environmental benefits compared to conventional products?	<i>1 (Strongly disagree) - 5 (Strongly agree)</i>	AT_LabelCredibility
Q4: How confident are you in identifying credible eco-labels among those available (select credible ones)?		AT_Knowledge
 <i>1 (Not confident – no credible) - 5 (Fully confident – only credible)</i>		AT_Marketing
Q5: To what extent do you perceive eco-labels as primarily marketing tools rather than indicators of genuine sustainability?	<i>1 (Do not agree at all) - 5 (Strongly agree)</i>	SN_SocialInfluence
Q6: How often do people close to you emphasize the importance of choosing products with eco-labels?	<i>1 (Never) - 5 (Very often)</i>	SN_PeerTrust
Q7: To what extent do opinions of people close to you influence your confidence in eco-labels?	<i>1 (No influence at all) - 5 (Very strong influence)</i>	PBC_CertificationTrust
Q8: How confident are you in understanding the certification process behind eco-labels?	<i>1 (Not confident at all) - 5 (Very confident)</i>	PBC_LabelUnderstanding
Q9: How well do you understand the meaning and significance of eco-labels and their claims?	<i>1 (Poor understanding) - 5 (Excellent understanding)</i>	PBC_Visibility
Q10: How visible and easily recognizable are eco-labels on the products you purchase?	<i>1 (Not visible at all) - 5 (Completely visible)</i>	PBC_Support
Q11: To what extent do public institutions and retailers provide sufficient information about eco-labels?	<i>1 (No support at all) - 5 (Very strong support)</i>	
Q12: I will buy products with eco-labels in the future.	<i>1 (Strongly disagree) - 5 (Strongly agree)</i>	IntentionToPurchase
Q13: When I think of the environmental impact of a product, the first thing that comes to my mind is: _____		

Source(s): Authors’

Table A1. Rotation component matrix

	Component		
	1	2	3
AT_ColorPerception	0.698		
AT_DesignTrust	0.689		
AT_LabelCredibility	0.764		
AT_Knowledge	0.646		
AT_Marketing	0.724		
SN_SocialInfluence			0.871
SN_PeerTrust			0.880
PBC_CertificationTrust		0.685	
PBC_LabelUnderstanding		0.698	
PBC_Visibility		0.625	
PBC_Support		0.731	
Note(s): Extraction Method: Principal Component Analysis			
Rotation Method: Varimax with Kaiser Normalization			
Rotation converged in 4 iterations			
Source(s): The authors (SPSS)			

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