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## A Comparative Study of Attitudes Toward Sustainability in the Ecuador-Colombia Border Integration Zone

Luis Homero Viveros Almeida<sup>1</sup>, Claudia Magali Solarte Solarte<sup>2</sup>

### Abstract

*This study analyzes differences in attitudes toward sustainability among business owners in the Ecuador-Colombia Border Integration Zone (ZIF), specifically in the provinces of Carchi (Ecuador) and Nariño (Colombia). The study employed a quantitative, descriptive, and correlational cross-sectional approach. The research examines whether there are significant differences in attitudes toward sustainability, considering variables such as gender, educational background, economic sector, and country of operation. The results reveal statistically significant differences by gender and country, while academic background and economic sector did not show conclusive differences. These findings contribute to the understanding of the factors involved in the adoption of sustainability practices in cross-border contexts and provide important information for the formulation of government policies aimed at promoting corporate sustainability in the region.*

**Keywords:** corporate sustainability, sustainable attitudes, border regions, Ecuador, Colombia.

### Introduction

From the current business and entrepreneurial perspective, it is evident that growing awareness of the urgency of sustainability has placed a sustainable mindset at the center of strategies and innovation (Baber, 2024; Gautam & Bhalla, 2024; Jansen et al., 2024; Mehta et al., 2023). In this context, a sustainable mindset refers to a predisposition and a set of values that integrate economic, social, and ecological considerations into decision-making and the pursuit of opportunities (Gautam & Bhalla, 2024; Baber, 2024; Choi & Kessler, 2022). This perspective goes beyond mere compliance with environmental regulations, encompassing an intrinsic commitment to minimizing negative impacts and actively contributing to the well-being of the planet and society (Baber, 2024). The importance of fostering a sustainable mindset in business and entrepreneurship lies in its potential to drive innovation, enhance corporate reputation, respond to the demands of increasingly conscious consumers, and ultimately contribute to the long-term viability of both organizations and the planet (Munro et al., 2023). From incorporating responsible production practices and offering sustainable products and services to identifying new market opportunities that address social and ecological challenges, a sustainable approach can be a key driver of value creation and competitive differentiation (Baber, 2024).

Corporate sustainability has become a key factor in organizational competitiveness within a global environment characterized by growing environmental and social concerns (Schaltegger and Wagner, 2017). In this context, understanding entrepreneurs' attitudes toward sustainability is essential for predicting behavior and designing effective strategies to promote sustainable

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<sup>1</sup> Universidad Politécnica Estatal del Carchi, Ecuador; Email: [luis.viveros@upec.edu.ec](mailto:luis.viveros@upec.edu.ec); <https://orcid.org/0000-0003-3612-1798>

<sup>2</sup> Universidad CESMAG, Colombia; Email: [cmsolarte@unicesmag.edu.co](mailto:cmsolarte@unicesmag.edu.co); <https://orcid.org/0000-0001-8844-2070>



practices (Muñoz-Pascual et al., 2019). Ajzen's (1991) Theory of Planned Behavior (TPB) provides a robust conceptual framework for understanding how sustainable attitudes translate into concrete behaviors, positing that behavioral intention is determined by attitude toward the behavior, subjective norms, and perceived behavioral control (Wu et al., 2022). As Cheah and Ho (2023) note, TPB has proven particularly useful for understanding the gap between expressed sustainable attitudes and the actual behaviors of entrepreneurs, revealing that factors such as perceived social pressure and self-efficacy play significant moderating roles in this relationship. Border zones are of particular interest for the study of sustainability, as they are areas where different cultures, regulatory frameworks, and socioeconomic realities converge (Newman, 2006). The Ecuador-Colombia Border Integration Zone (ZIF), established as a mechanism for binational integration, offers unique characteristics for analyzing how contextual factors can influence entrepreneurs' sustainable attitudes (Ramírez, 2008). Applying TPB, Moghavvemi and Akman (2022) have demonstrated that regional and cultural differences significantly modify the relationship between sustainable attitudes and entrepreneurial intentions, underscoring the importance of contextualized studies in cross-border zones.

This research aims to determine whether there are significant differences in attitudes toward sustainability among entrepreneurs in the Ecuador-Colombia Free Trade Zone, taking into account variables such as gender, educational background, economic sector, and the country in which their businesses operate. The study seeks to address the need to generate specific knowledge on corporate sustainability in Latin American cross-border contexts, thereby contributing to the existing literature, which frequently focuses on developed economies (Moya-Clemente et al., 2021). As Srivastava and Gope (2023) argue, the TPB makes it possible to identify how context-specific economic, social, and cultural factors influence the translation of attitudes into sustainable intentions and behaviors. This is particularly relevant given that the influence of these factors on the formation and impact of sustainable attitudes on entrepreneurial intentions and behavior is not yet fully understood in developing economic contexts (Baber, 2024; Munro et al., 2023; Mehta et al., 2023).

## **Theoretical Framework**

### **Attitudes Toward Sustainability**

Attitudes toward sustainability refer to the psychological evaluations or predispositions that individuals hold regarding the adoption of economically, socially, and environmentally responsible practices (Gautam & Bhalla, 2024; Gautam & Bhalla, 2023). These attitudes are important predictors of sustainable behavior and are influenced by various individual and contextual factors (Liobikiene & Juknys, 2016). In the business context, the attitudes of managers and owners toward sustainability largely determine the sustainable orientation of their organizations (Roxas & Coetzer, 2012). Various studies have identified factors that influence these attitudes, such as personal characteristics, values, knowledge, and environmental pressures (Mohamad et al., 2022; Jansson et al., 2017).

### **Determining Factors of Sustainable Attitudes**

#### **Gender and Attitudes toward Sustainability**

The literature suggests that there are gender differences in attitudes toward sustainability, with studies indicating that women tend to show greater concern for environmental and social issues than men (Zelezny et al., 2000). In this regard, women tend to exhibit stronger and more positive attitudes toward sustainability in general and toward environmental sustainability in particular

(Santos et al., 2023; Chen et al., 2022). In the business context, previous research has found that companies led by women are more likely to adopt sustainable practices (Braun, 2010; Hechavarría et al., 2019). This suggests that women may prioritize the environmental aspects of sustainability more, while men may focus more on the social aspects.

Other studies did not find a specific difference based on the interaction between sustainability education and gender in combined attitudes. However, upon analyzing the means, it was observed that students with sustainability education placed greater importance on the social aspect in general, regardless of gender (Stewart, 2024; dos Santos et al., 2022). Nevertheless, sensitivity analysis also revealed that gender is the strongest predictor of attitudes toward sustainable events (Erul et al., 2024). From the above, it can be understood that the relationship between gender and sustainable attitudes is an active area of research and may vary depending on the population studied and the specific context, as studies are needed on the relationship between sociodemographic variables and attitudes toward sustainability, with a particular focus on the influence of gender and across several geographic locations (Szulc-Obłóza & Żurek, 2024; dos Santos et al., 2022). Based on this background, the first hypothesis is proposed:

H1: There are significant differences in attitudes toward sustainability due to the gender of entrepreneurs in the Ecuador-Colombia Free Trade Zone.

### **Academic Background and a Commitment to Sustainability**

Educational attainment has been identified as a key factor in shaping sustainable attitudes. It implies that there is a significant relationship between educational attainment or the level of vocational training and attitudes toward sustainability because, in general, higher levels of education tend to be associated with more positive attitudes toward sustainability (Leal et al., 2024; Hamdan et al., 2024), a finding supported by the fact that individuals with higher academic qualifications tend to demonstrate greater environmental awareness and a willingness to adopt sustainable practices (Vicente-Molina et al., 2013). On the other hand, it has been observed that the field of vocational training also influences attitudes toward sustainability (Elvira-Zorzo et al., 2025; Leal et al., 2024), and if the professional's remuneration is higher, the attitude toward sustainability tends to be more favorable (Szulc-Obłóza & Żurek, 2024). In the business world, formal education provides knowledge and tools that facilitate the understanding and implementation of sustainable strategies (Agyemang et al., 2019); for example, accounting students score higher on environmental issues (Stewart, 2024). Given this background, it is suggested that a more in-depth analysis of the relationship between knowledge, attitudes, and sustainability behaviors can be conducted (Leal et al., 2024), and it is recommended that studies be replicated across multiple geographic regions to draw broad conclusions (Szulc-Obłóza & Żurek, 2024). Therefore, the second hypothesis is proposed:

H2: There are revealing differences in attitudes toward sustainability due to the educational background of entrepreneurs in the Ecuador-Colombia Free Trade Zone.

### **Economic Sector and Sustainable Approach**

The reviewed findings show that the relationship between the economic sector (business activity) and sustainable attitudes can be approached from several angles. On the one hand, the potential for achieving sustainable economic growth varies across economic sectors (Suhányiová et al., 2023; Dariah et al., 2022). On the other hand, this relationship can be explored through the concept of sustainable entrepreneurship. Sustainable entrepreneurship is defined as that which integrates social, environmental, and economic values (Sharma et al., 2023). Sustainable attitudes are fundamentally linked to the economic sector when it comes to sustainable entrepreneurship because the motivation to start or manage a business in sectors focused on sustainability stems

from attitudes and values that prioritize environmental protection and social well-being, in addition to economic benefits (Sharma et al., 2023; Prialé et al., 2024). In any case, according to studies, a focus on sustainability is influenced by attitudes and beliefs regarding environmental preservation and social responsibility, and is associated with the intention to establish a new sustainable business in sectors with a greater environmental impact—such as manufacturing or agriculture—which may be subject to stricter regulatory requirements, while service sectors may face different types of pressures related to social responsibility (Gaki et al., 2025; Halkos and Skouloudis, 2018). Thus, different sectors may face specific challenges regarding sustainability, and responses will vary accordingly (Cerdá-Suárez et al., 2023). Against this backdrop, the third hypothesis is proposed:

**H3:** There are revealing differences in attitudes toward sustainability depending on the sector in which entrepreneurs in the Ecuador-Colombia Free Trade Zone operate.

### **National Context and Corporate Sustainability**

According to the literature review, there is a significant correlation between the geographical context—country, region, urban/rural location—and sustainable attitudes, as reflected in business practices, economic resilience, and a focus on the circular economy. This is evident because there are environmental, business, behavioral, and human relations factors that have a positive and significant impact on the business sustainability of SMEs and on the economic structures of countries (Abdelwahed et al., 2022; Dariah et al., 2022). From these perspectives, it is understood that sustainability priorities and strategies must be adapted to each country's specific economic and geographic context (Cerdá-Suárez et al., 2023), and although, in some cases, sustainable attitudes are not directly analyzed, it is recognized that the national context, with its regulations, can have an indirect influence (Suhányiová et al., 2023). From there, the sector in which a company operates can shape its approach to sustainability, as different industries face varying regulatory pressures, market demands, and environmental challenges (Mutambik & Almuqrin, 2024; Bansal & Roth, 2000). Finally, differences in institutional, cultural, and socioeconomic frameworks across countries can significantly influence sustainable attitudes and behaviors (Protection, 2005). Comparative studies have shown that factors such as the level of economic development, cultural values, and regulatory frameworks determine variations in perceptions and sustainability practices across different national contexts (Rosário et al., 2024; Matten and Moon, 2008). Therefore, the fourth hypothesis is formulated:

**H4:** There are revealing differences in attitudes toward sustainability depending on the country in which the entrepreneur of the Ecuador-Colombia Free Trade Zone operates.

## **Method**

### **Sample and Data Collection**

The study took place in the Ecuador-Colombia Border Integration Zone, specifically in the province of Carchi (Ecuador) and the department of Nariño (Colombia). The sample consisted of 818 business owners, with 439 in Carchi and 379 in Nariño. The selection of business owners was carried out using simple random sampling, primarily considering the main economic activities shared on both sides of the border—agriculture, commerce, construction, manufacturing, general services, and transportation. To this end, an online survey was applied by using Microsoft Forms, based on a Likert scale (1 to 5) and it was considered the variable of sustainable attitude as shown in the following table:

**Table 1:** Questionnaire Structure

Variable	No. Items	Source
Section A: Background Information	4	Authors
Section B: Sustainable mindset	15	Braun (2010); Koe et al. (2014)

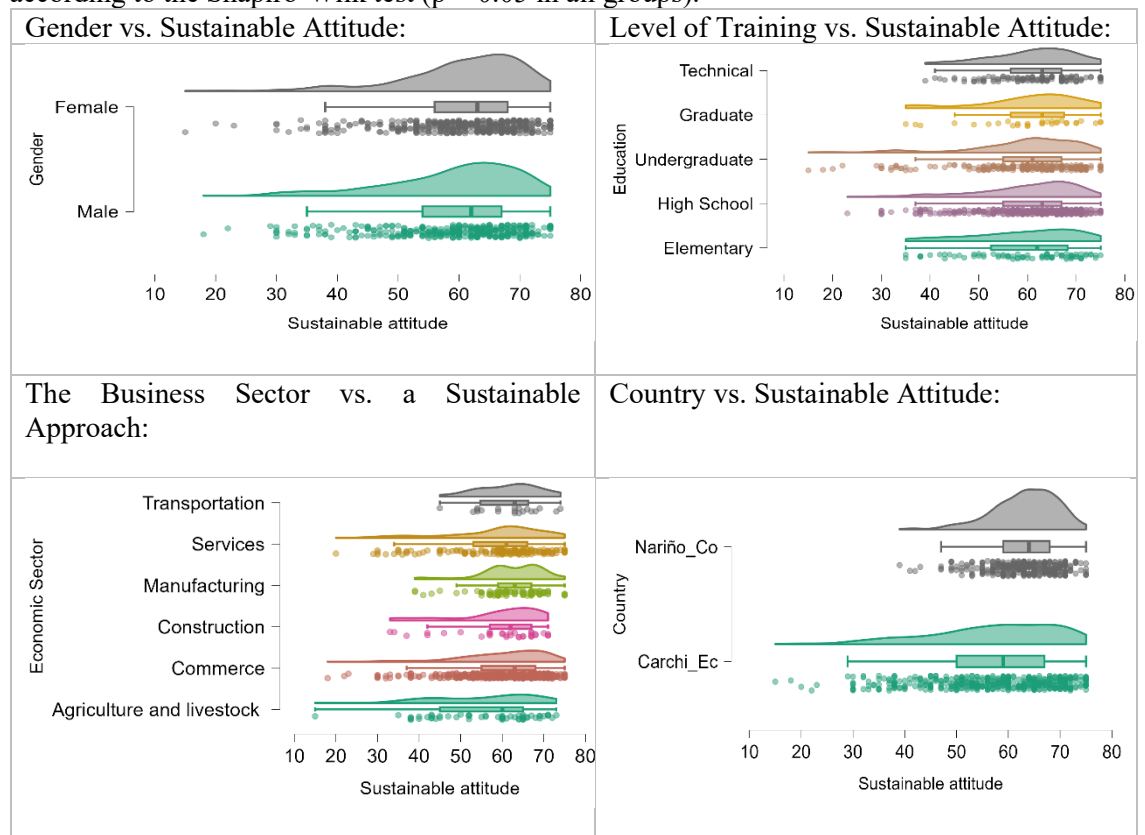
Source: Authored by the autor

### Measuring Instrument

To assess attitudes toward sustainability, a unidimensional scale was used, the reliability of which was verified using McDonald's omega coefficient, which yielded a value of 0.806 (95% CI: 0.786–0.825), indicating adequate internal consistency. The scale measures entrepreneurs' willingness to adopt sustainable practices.

### Statistical Analysis

JASP software (JASP Team, 2024) was used for data analysis. Descriptive analyses were conducted to characterize the sample in terms of the variables of interest. To test the hypotheses, nonparametric tests were applied because the data did not meet the assumption of normality according to the Shapiro-Wilk test ( $p < 0.05$  in all groups).



**Figure 1.** Scatter plots by variable group

Specifically, the following were used for this purpose:

- Mann-Whitney U test to compare two independent groups (gender and country)
- Kruskal-Wallis test to compare more than two independent groups (educational background and economic sector)
- Dunn's post-hoc test for multiple comparisons when the Kruskal-Wallis test was significant

All tests were conducted at a significance level of  $\alpha = 0.05$ .

## **Results**

### **Descriptive Analysis**

Of the sample, 355 business owners are men (43.4%) and 463 are women (56.6%). In terms of educational background, the distribution was as follows: elementary school (9.3%), high school (44.1%), undergraduate degree (28.2%), graduate degree (3.8%), and technical/vocational training (14.5%). In terms of economic sector, participants operated in: agriculture and livestock (7.1%), commerce (56.6%), construction (4.2%), manufacturing (10.8%), services (18.9%), and transportation (2.4%).

### **Hypothesis Testing**

#### **Gender Differences**

Descriptive statistics showed that female entrepreneurs had a slightly higher mean score on sustainable attitudes ( $M = 60.72$ ,  $SD = 9.94$ ) compared to male entrepreneurs ( $M = 59.07$ ,  $SD = 10.84$ ). The Mann-Whitney U test indicated that this difference was statistically significant ( $U = 75,276.00$ ,  $p = 0.039$ ), with a small effect size according to the biserial rank correlation ( $r = -0.084$ ). This result supports H1.

#### **Differences in Educational Background**

The mean scores for sustainable attitudes were as follows: elementary school ( $M = 59.36$ ,  $SD = 10.76$ ), secondary ( $M = 60.05$ ,  $SD = 10.13$ ), undergraduate ( $M = 59.33$ ,  $SD = 11.50$ ), graduate ( $M = 60.39$ ,  $SD = 10.68$ ), and technical/technological ( $M = 61.50$ ,  $SD = 8.19$ ). The Kruskal-Wallis test did not reveal any significant differences between these groups ( $H = 1.148$ ,  $df = 4$ ,  $p = 0.887$ ).

Dunn's post-hoc comparisons confirmed the absence of significant differences between the different educational levels (all  $p > 0.05$ ). Therefore, H2 is not supported by the empirical evidence.

#### **Differences by Economic Sector**

Descriptive statistics by sector showed the following means: agriculture and livestock ( $M = 55.86$ ,  $SD = 12.35$ ), commerce ( $M = 60.51$ ,  $SD = 10.05$ ), construction ( $M = 59.06$ ,  $SD = 10.80$ ), manufacturing ( $M = 62.32$ ,  $SD = 7.60$ ), services ( $M = 58.73$ ,  $SD = 11.56$ ), and transportation ( $M = 61.60$ ,  $SD = 7.39$ ). The Kruskal-Wallis test revealed marginally significant differences ( $H = 10.862$ ,  $df = 5$ ,  $p = 0.054$ ).

Dunn's post-hoc comparisons identified significant differences between the agriculture and trade sectors ( $z = -2.615$ ,  $p = 0.009$ ), as well as between agriculture and manufacturing ( $z = -2.870$ ,  $p = 0.004$ ).

However, after applying Bonferroni and Holm corrections for multiple comparisons, these differences did not reach the level of significance ( $p_{\text{Bonf}} > 0.05$ ,  $p_{\text{Holm}} > 0.05$ ). A marginally significant difference was also observed between manufacturing and services ( $z = 1.956$ ,  $p = 0.05$ ). H3 receives partial support.

#### **Differences by Country**

Entrepreneurs in Nariño, Colombia, exhibited a significantly more favorable attitude toward sustainability ( $M = 63.29$ ,  $SD = 6.24$ ) than entrepreneurs in Carchi, Ecuador ( $M = 57.17$ ,  $SD = 12.23$ ). The Mann-Whitney U test confirmed that this difference was statistically significant ( $U = 60,071.00$ ,  $p < 0.001$ ). This result provides strong support for H4.

## **Discussion**

The objective of this study is to analyze differences in attitudes toward sustainability among business owners in the Ecuador-Colombia Border Integration Zone (ZIF), taking into account factors such as gender, educational background, economic sector, and country. The findings are presented below, based on current literature and the theory of planned behavior.

### **Gender Differences in Attitudes toward Sustainability**

The results confirm the existence of significant differences in attitudes toward sustainability based on gender (H1), with female entrepreneurs exhibiting a slightly more favorable attitude than male entrepreneurs. This finding is consistent with previous studies suggesting that women tend to exhibit greater concern for environmental and social issues (Zelezny et al., 2000; Santos et al., 2023; Chen et al., 2022). The difference, although statistically significant, has a small effect size ( $r = -0.084$ ), which is consistent with the findings of Erul et al. (2024), who identified gender as one of the predictors of attitudes toward sustainable events, albeit with nuances in its influence. From the perspective of TPB, this difference can be explained by the fact that women entrepreneurs may perceive greater behavioral control over sustainable practices, possibly due to greater awareness of environmental and social issues. Subjective norms may also play an important role, as societal perspectives on women's roles in caregiving and preservation could influence their attitudes toward corporate sustainability. These findings align with those documented by Braun (2010) and Hechavarría et al. (2019) regarding the greater propensity of women-led firms to adopt sustainable practices.

### **The Influence of Academic Education**

Contrary to Hypothesis 2 (H2), no significant differences were found in sustainable attitudes based on educational attainment. This result contradicts previous studies suggesting a positive relationship between educational level and favorable attitudes toward sustainability (Leal et al., 2024; Hamdan et al., 2024; Vicente-Molina et al., 2013). The absence of significant differences among the various educational levels (primary, secondary, undergraduate, graduate, and technical/vocational) suggests that, in the specific context of the Ecuador-Colombia IBC, formal educational level is not a determining factor in sustainable attitudes.

From the perspective of the TPB, this finding could indicate that formal academic education does not necessarily change behavioral or attitudinal beliefs regarding sustainability in this specific context. It is possible that other factors, such as practical experience, informal learning, or local business culture, have a greater influence on the formation of these attitudes than formal education. This interpretation aligns with the recommendations of Szulc-Obłozza & Żurek (2024) regarding the need to replicate studies across multiple geographic regions to draw broader conclusions, as contextual factors can significantly moderate these relationships.

### **Differences by Economic Sector**

The results showed marginally significant differences in sustainable attitudes by economic sector (H3), with the manufacturing sector by exhibiting the most favorable attitude, and it was followed by transportation and commerce, while the agricultural sector showed the least favorable attitude. Although these differences did not reach the conventional level of significance after statistical adjustments, the observed trends warrant consideration.

These sectoral variations can also be interpreted through the TPB, where different sectors face

varying normative, regulatory, and market pressures that influence entrepreneurs' normative beliefs and perceived behavioral control. For example, the manufacturing sector, which exhibited the most favorable attitude toward sustainability, may be subject to greater normative demands and sustainability pressures, as suggested by Gaki et al. (2025) and Halkos and Skouloudis (2018). The lower score for the agricultural sector may reflect specific barriers or contextual factors that reduce the perceived behavioral control needed to implement sustainable practices in this sector.

These findings are partially consistent with the findings of Cerdá-Suárez et al. (2023) and Sharma et al. (2023), who note that different sectors face specific challenges related to sustainability and respond to them in different ways. The differences identified, although marginal, suggest the importance of developing sustainability strategies tailored to the specific characteristics of each sector.

### **Differences by Country**

From the TPB perspective, this finding can be explained by variations in the regulatory, institutional, and socioeconomic environments between the two countries, which affect both subjective norms and perceived behavioral control. Different regulatory frameworks, economic incentives, and social pressures can significantly shape business attitudes toward sustainability. This result is consistent with the findings of Rosário et al. (2024) and Matten and Moon (2008) regarding how national contextual factors determine variations in sustainability perceptions and practices.

The findings also support the observations made by Cerdá-Suárez et al. (2023) regarding the need to adapt sustainability initiatives to the specific economic and geographic context of each country. The identified differences may reflect what Abdelwahed et al. (2022) and Dariah et al. (2022) describe as environmental, business, and behavioral factors that have a positive and significant impact on the business sustainability of SMEs and on countries' economic structures.

### **Theoretical and Practical Implications**

The findings are highly significant from both theoretical and practical perspectives. From the perspective of the TPB, it is evident that attitudes toward sustainability are significantly influenced by factors such as gender and national context, which affect both normative beliefs and perceived behavioral control. The lack of a significant influence from formal education level and the marginal differences between sectors suggest that, in this specific context, other factors carry greater weight in shaping these attitudes.

In practical terms, these findings suggest that it is necessary to implement policies and projects to promote sustainability that are tailored to gender and economic sector and, in particular, adapted to the socioeconomic and institutional realities of each country within the ZIF. Particular attention should be given to capacity building and the removal of barriers to sustainability in the agricultural sector, as well as to studying the conditions that foster a more positive attitude toward sustainability among Colombian business leaders for the potential transfer of knowledge and best practices.

### **Limitations and Future Research Directions**

This research has certain limitations that should be taken into account. First, because we measured attitudes rather than actual behaviors, we cannot determine whether these differences in attitude translate into specific sustainable business practices—an aspect that the TPB identifies as fundamental. Second, the study did not explore the specific mechanisms through which gender or national context influence attitudes, which limits the explanatory power of the findings.

Future research could address these limitations through longitudinal studies that assess both

attitudes and actual sustainable behaviors, more in-depth analyses of the mediating mechanisms between sociodemographic variables and attitudes, and qualitative studies that delve deeper into the contextual differences identified. Likewise, it would be valuable to explore, as suggested by Leal et al. (2024), the relationship between knowledge, attitudes, and sustainable behaviors in this border context.

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