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Understanding the Drivers and Barriers towards Sustainable Consumption: An Approach by Linking a Pedagogical Strategy of Active Learning with Adopting Sustainable Behaviors by Students

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Abstract. Adopting sustainable consumption behaviors is imperative for achieving better sustainable production and consumption patterns (SDG12). Individuals play a crucial role in this goal as both part of the problem and the solution. Consequently, various actors aim to address the factors influencing individuals' adoption of these behaviors. Among these actors, higher education institutions play a unique role due to their opportunity to guide future generations through Education for Sustainable Consumption (ESC) towards sustainable values, attitudes, competencies, and behaviors. Understanding the drivers and barriers individuals face toward sustainable consumption is crucial for actively pursuing sustainability. However, few efforts have addressed this problem based on the actual experiences of individuals, and even fewer have focused on students as individuals who will hopefully lead organizations with a sustainability mindset. This research aims to fill this gap by linking a pedagogical strategy of active learning to the adoption of sustainable behaviors. Using a qualitative approach, we analyzed the experiences that students reported over three academic semesters in an online forum. The findings reveal that barriers to adopting sustainable behaviors are mostly contextual, while internal factors motivate people to advance toward this type of practice. From this methodological approach, emergent factors provide insights that could guide future policies and strategies to achieve better sustainable consumption patterns.

Keyword:
Active Learning, Barriers, Drivers, Education for Sustainable Consumption (ESC), Sustainable Consumption Behaviors

1. Introduction

Human consumption exceeds the Earth's sustaining ability, imposing significant environmental challenges. Consequently, sustainable consumption is a major concern, linking human behavior to moral responsibility and the man-nature interrelationship [1]. Sustainable consumption is attributed to consumers' responsibility or co-responsibility in addressing environmental and social issues. To tackle these challenges and achieve a balance between human needs and the planet's capacity, promoting a more sustainable future is imperative [2]. For this purpose, sustainable consumption behaviors are essential (e.g., the consumption of organic products, the use of clean and renewable energy, proper waste management, and the research of goods produced by companies with zero impact) [3]. However, sustainable consumption is a complex phenomenon, and the adoption of such behaviors is influenced by many factors that can have either positive or negative effects [4]. These factors (personal, social, and institutional) can either drive (motivations) or impede (barriers) the actual action toward sustainable lifestyles, thus contributing to reducing or increasing the intention-behavior gap [5].

The complexity of sustainable consumption deserves comprehensive analysis, understanding gaps in the existing literature, and identifying enablers and barriers [6]. For instance, just in the purchasing phase, information, price, store-related factors, labels, and emotional aspects are just some examples of the external issues that can hinder or support sustainable purchasing behavior [7–9]. Moreover, consumption processes vary based on gender, age, education, income, and other factors, emphasizing the need for a nuanced understanding [5]. Additionally, different studies have found contrasting results regarding the causational effects of the same variable on the final consumption behavior of different types of products (see the analysis of Kim and Chung [10] and Barbarossa and Pelsmacke [11] about perceived behavioral control) [12].

Over the last two decades, there has been a proliferation of studies on the drivers of sustainable consumption, yet several discrepancies have impeded a clear and shared understanding of this phenomenon. Moreover, emerging fields of study, such as the circular economy, encourage continuous exploration of factors, individuals, and domains to understand the sustainable consumption phenomenon through different methodological approaches. The behavioral gap concern, identified in several contexts to achieve real sustainable action, is a clear warning that calls for more understanding of the factors driving and deterring sustainable consumption behavior. Several actors are called upon for this purpose (e.g., governments, businesses, NGOs) and higher education institutions are critical stakeholders because they train young people as future generations. Understanding young adults' sustainable consumption is crucial due to their transitional phase and potential influence as future leaders [5].

Young adults' consumption behavior is characterized by diverse needs, trends, contexts, and budgets, highlighting their importance as a focus for research. Moreover, young people's consumption decisions are influenced by personal values, social contexts, peer influence, and market availability [13]. For example, young individuals and their sustainable consumption processes focus more on acquisition than use and disposal, with barriers primarily in the acquisition phase and ecological dimension [5]. Thus, understanding drivers and barriers specific to young consumers is crucial for effectively implementing sustainability initiatives [2]. With this aim, innovative teaching-learning strategies should be developed and tested to improve sustainable consumption behaviors, encourage enablers, and address identified barriers [5].

Sustainable consumer behavior involves lifestyle changes [13] that are closely related to personal values and the social context in which an individual lives [2]. Therefore, real experiences of individuals' lifestyles are valuable for better understanding which drivers and barriers influence sustainable consumption. However, this follow-up of individuals' experiences is difficult. Therefore, much research in the field has focused on survey-based studies. Despite its complexity, more innovative and explorative research is still needed [12] and pedagogical strategies in higher education institutions could be a path to deep into the actual experience and lifestyles of people, for example in young people (students) as critical actors in the individuals' role in the achievement of sustainable consumption patterns.

Previous literature has identified several factors influencing sustainable consumption behavior, including personal and contextual variables. Nevertheless, most studies have focused on a single or few groups of factors, missing the opportunity to provide a comprehensive picture of such a phenomenon [12]. For instance, the examination of social and situational factors has been relatively neglected, being social norms, situational factors, and the availability of sustainable alternatives areas that merit more examination [14]. In addition, in the last two decades, studies have mainly focused on the Asian and European markets, and in the Americas, only the US market has been widely investigated. It would also be essential to expand the research to other contexts [12]. Because drivers and barriers identified in one context may vary in another context, there is a need for country-specific studies [15]. Finally, mixed results on variables influencing sustainable consumption mostly from survey-based previous research indicate that these factors deserve further exploration, hopefully through methodologies closer to the individuals' experience.

Because there is room for a more comprehensive understanding of both drivers and barriers toward sustainable consumption, higher education institutions could contribute to this purpose through pedagogical strategies (e.g., active learning), which, combined with research methods, allow a different way of capturing behavior and related information in a specific population of consumers like young adults (students). In line with these ideas, this study aims to explore whether new insights on drivers and barriers to sustainable consumption behavior could be gained by analyzing such behavior through the individual's experience. To do that, we have posed the following research questions:

- Which sustainable consumption domains are selected by individuals to behave sustainably in everyday life? (RQ1)
- Which factors encourage or obstruct the adoption of sustainable consumption behaviors? (RQ2)
- What changes in the identification of drivers and barriers toward sustainable consumption occur when starting from observing the consumer's own experience in their daily routine? (RQ3)

2. Theoretical Approach

2.1 Motivations Influencing the Adoption of Sustainable Consumption Behaviors

Several studies have been conducted to analyze the drivers of sustainable consumption. This literature has allowed for the identification of various motivations, including individual and contextual factors. Regarding individual factors, some inspiring theories of green consumer research have highlighted the role of values and moral norms [16] or were grounded in self-interest and rational choice (17,18). In a systematic review on drivers affecting green consumption (from 2000-2018), Testa et al. [12] identified five categories connected to individual aspects—socio-demographic aspects (e.g., gender, age,

level of education), intrapersonal values related to the environment (e.g., ecological values, altruism, collectivism, green self-identity, moral duty toward society, environmental awareness, environmental concern); intrapersonal values not related to the environment (e.g., personal values, frugality, long-term orientation); behavioral factors (e.g., habits, past behaviors, routine, purchase behavior, other green behaviors); and personal capabilities (e.g., perceived behavioral control (PBC), willingness to pay more for sustainable products, effort required for product utilization, specific abilities). These authors also found that fewer categories are related to external or contextual factors influencing green consumption (e.g., product features and accessibility, brand image, and other producers' related factors, social norms, and media) [12].

Empirical studies have highlighted how some drivers are relevant only for specific products. For instance, the “need for status” or willingness to represent fashion leadership is relevant for apparel products [19], infrastructure readiness is relevant for electric vehicles [20,21], and quality is relevant for remanufactured products [22]. In university students, factors such as perceived safety, nutritional value, freshness, taste, green perceived value, and health benefits positively correlate with organic food consumption [23–25]. Moreover, planning, stimulus control, and animal welfare drive successful adherence to plant-based diets [26–28].

In young adults, the acquisition processes sometimes prioritize branded products over sustainability, with limited knowledge about alternatives [5]. Motivations for sustainable food consumption include health considerations but may lack ecological or social motivations [5]. These factors (i.e., concerns about environmental impact) are likely to drive some young adults towards sustainable consumption when they understand the value chain and prices [5].

2.2 Barriers Influencing the Adoption of Sustainable Consumption Behaviors

Previous literature has extensively examined and identified a spectrum of 'barriers to action' that significantly hinder the adoption of sustainable consumption. These barriers, often recurring factors, encompass individual circumstances, public norms, and structures. For instance, personal capabilities, such as specific abilities or knowledge, can profoundly influence the adoption of sustainable behaviors [12]. Perceived behavioral control (PBC), a variable closely tied to individuals' ability to engage in a specific behavior, can also act as a barrier. This includes the inconvenience or additional effort required for product utilization, as well as unavailability [5,29,30]. Other individual factors, including habits, perceptions of no environmental impact, and greenwashing [31–33], can impede sustainable consumption behaviors [5].

Price is considered both a personal and external barrier. As a measure of PBC, price is a personal factor that sometimes impedes the adoption of sustainable behaviors [12]. For example, high prices for sustainable products are noted as a significant barrier for young adults, affecting their consumption decisions (e.g., organic food) [5]. Price is also linked to time constraints, lack of information, product access, shop stimuli, and other store-related issues as external factors that can impede green purchasing [7–9]. Producer or brand aspects may also deter purchasing. For instance, lack of awareness/advertising to consider sustainable alternatives [34,35], as well as lack of knowledge [12] or distrust in eco-labels and transparency in production processes [5].

Other context-related factors include festivity effects, infrastructure, contingent economic benefits, and social norms [12], including in the latter, social image and influence of family and friends [34,35]. As with drivers, some barriers may be specific to particular products or consumption domains. For example, barriers to buying organic food include unattractive perception [36], and barriers to a vegetarian diet include missing meat and concerns about nutrient intake [37].

2.3 Active Learning as a Pedagogical Strategy to Research Sustainable Consumption

Education has been recognized as a powerful tool for providing the necessary skills and competencies that enable individuals to grasp the concept of sustainable consumption and then integrate it into their lifestyles [38,39]. Consequently, higher education, a key player in Education for Sustainable Consumption (ESC) [38], is tasked with proposing pedagogical strategies that link the understanding of concepts to learners' actions and their personal experiences, for example, through active learning approaches [40].

Active learning is a teaching approach based on constructivism that emphasizes students constructing their knowledge. In this action-focused approach, students are considered autonomous agents capable of developing knowledge, attitudes, and values from their own experiences and reflections [40]. Therefore, students learn by actively developing knowledge and understanding [41]. While many pedagogical strategies have concentrated on fostering active learning through classroom activities, essential competencies for learning about sustainable development and consumption (e.g., critical and systemic thinking and exploring challenges inherent to a more sustainable life) [42] often occur outside the classroom, such as in everyday life experiences. Active learning activities developed beyond the classroom not only have the potential to develop competencies for sustainable consumption [38] but can also aid in researching related behaviors, allowing for an understanding of various aspects of sustainable consumption in the actual contexts where the phenomena occur [43]. To the best of our knowledge, this methodological approach has yet to be explored, enabling this research to contribute to existing literature.

2.4 Analytical Framework

As previous literature suggests, several factors may act as drivers or barriers, sometimes serving in a mixed role to either promote or hinder sustainable consumption behaviors. This research builds on this prior literature to define the analytical framework that will guide the understanding of drivers and barriers that could be discerned from the analysis of individuals' own experiences adopting sustainable consumption behaviors. As depicted in Figure 1, we constructed an analytical framework based on the proposals of Testa et al. [12] for drivers and Sheoran and Kumar [2] for barriers as complementary approaches grounded in systematic literature reviews.

Following the exploratory purpose of this research, we defined the initial categories of our analytical framework in terms of factors affecting sustainable consumption behavior without any valence (positive-drivers and negative-barriers). This specific categorization will depend on the findings after the analysis phase. We began by adopting six out of the seven main categories of factors proposed by Testa et al. [12]. We omitted the Socio-demographic category because our sample does not exhibit variability in sociodemographic factors, and therefore, this research does not analyze this information. We delineated contextual factors

by assigning a specific category to social norms. Finally, we incorporated some aspects mentioned by Sheoran and Kumar [2] that fit into some of the seven general categories.

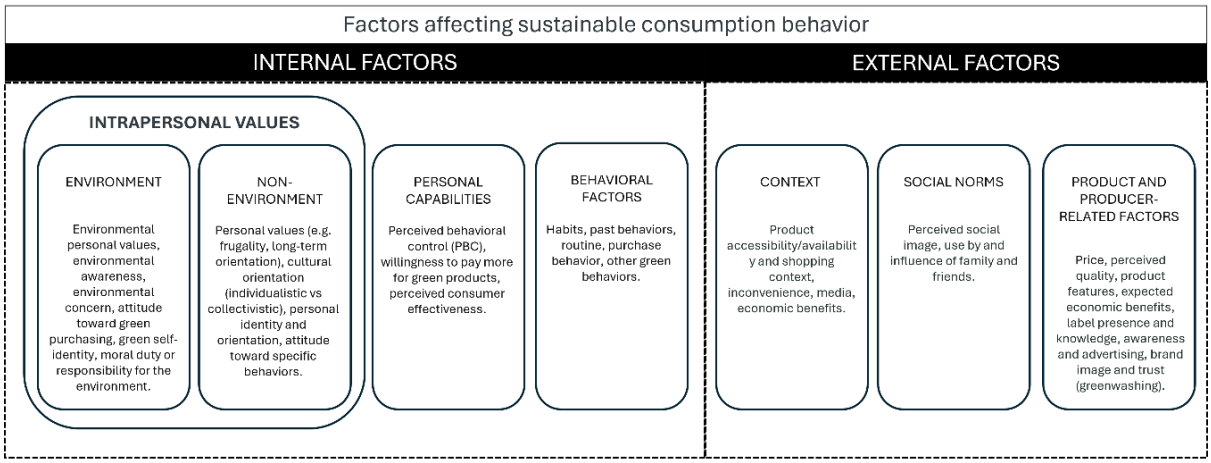

Figure 1. Analytical Framework

3. Methodology

3.1 Sample, Procedure, and Instruments

3.1.1 Context and Sample

We conducted an exploratory study based on a pedagogical activity with young adults in a business education setting, specifically within an undergraduate course on business sustainability. In this course, students explored the foundations of sustainability and the main aspects of developing a corporate sustainability strategy. At the start of the pedagogical activity, students had addressed only the origin and evolution of basic sustainability concepts and theories, such as sustainable development, corporate social responsibility, shared value, and stakeholder approaches.

The specific pedagogical activity underlying this research marked the conclusion of the stakeholder management topic, focusing on the consumer's role as a critical stakeholder in promoting and implementing sustainability policies, initiatives, or strategies. Although students possessed some foundational knowledge of sustainability, they lacked specific understanding of sustainable consumption and related behaviors, which they were most acquired during the activity.

Participants, comprising 39% females and 61% males, were third-year undergraduate Business Administration students at CESA, a private business school in Colombia, aged between 20 and 23 years. This activity spanned three academic semesters, involving 69 students who reported their experiences in adopting sustainable consumption behaviors over four weeks, as described in the pedagogical strategy below:

3.1.1.1 Overview

Each semester, students were invited to participate in creating a virtual community titled “Towards Sustainable Consumption.” The activity aimed to: 1) Foster understanding of the consumer's role in sustainability through adopting sustainable consumption behaviors; 2) Identify the role of organizations in promoting sustainable consumption behaviors; 3) Enhance sustainable consumption by creating a virtual community and designing a business proposal. This research focused on the development of the first objective.

3.1.1.2 Start

The initial phase lasted one week, during which each student researched the definition of sustainable consumption and identified related behaviors. Additionally, students measured their ecological footprint and based on these results, identified one behavior they could improve and committed to adopting over the subsequent weeks. They devised a plan to implement this behavior, setting specific goals and activities.

3.1.1.3 Development

The second phase spanned three weeks, during which students engaged in the behaviors they selected, primarily outside the classroom to capture real-life contexts, as sustainable behavior is highly context-specific [44]. Approximately every two weeks, students posted updates in a dedicated forum and on the academic platform Brightspace. While these posts included various information, this study focuses on the initial part, which consisted of experience reports responding to: "How is your experience adopting these behaviors in your daily routine?" Students reported both positive and negative aspects of their experience, including support from others, motivational factors, obstacles encountered, and progress according to their initial action plans. In addition to the extracurricular activities, in-class sessions over four weeks supplemented this learning with discussions on factors from previous literature concerning sustainable consumption and team activities related to their experiences and research on sustainable behaviors.

This study utilizes the individual experience reports to explore factors influencing the adoption of sustainable behaviors and to analyze these factors in terms of drivers and barriers to sustainable consumption.

3.2 Coding and Analyses

We initially analyzed the experience report data using a deductive coding approach, referring to the analytical framework defined in Section 2.4. Posts published as images were transcribed. First, all texts reported by each group (students in each semester) were compiled into a single document, organized by sustainable domain/behavior (e.g., water, waste, food, energy). The smallest semantic unit was used to define the unit of analysis. Consequently, a unit of analysis corresponds to a single expression, statement, or written idea associated with the experience of adopting a specific sustainable consumption behavior. As the instruction given to the students involved reporting their experience regarding both positive and negative aspects, these aspects (aggregated units) were categorized by domain/behavior. Aggregated positive and negative aspects of adopting sustainable behaviors in each domain were then assigned to the main categories defined in the analytical framework. Positive aspects are considered factors that encourage or motivate the adoption of the behavior (drivers), while negative aspects are viewed as factors that hinder adoption (barriers). Subsequently, following an inductive approach, emergent themes and new categories of analysis that arose from the data were included under "Others."

4. Results and Discussion

This study explored whether new insights on drivers and barriers to adopting sustainable consumption behavior could be gained by analyzing such behavior through the individual's experience. Utilizing a qualitative approach and a pedagogical strategy of active learning, we captured behavior and related information in young adults (students). The findings allow us to address the research questions as follows:

(RQ1) Which sustainable consumption domains are selected by individuals to behave

sustainably in everyday life?

Table 1. Sustainable Consumption Domains Selected by Students

Domains	2022-2	2023-1	2023-2	Total
Mobility	8	5	8	21
Food	9	3	4	16
Water	2	2	9	13
Energy	4	5	4	13
Waste (Plastics, recycling)	3	2	2	7
Shopping (clothing)	1	0	0	1

Table 2. Summary of Results for Waste, Water, and Energy

	WASTE	WATER	ENERGY
From Analytical Framework			
INTERNAL FACTORS			
INTRAPERSONAL VALUES			
Environment	Positive: -Awareness of environmental impact - Personal desire to contribute to the environment	Positive: - Awareness of environmental impact *(1) - Personal responsibility towards more sustainable consumption	Positive: - Becoming more aware of energy consumption based on experience
Non-Environment		Positive: - Personal satisfaction and motivation from positive experience	
PERSONAL CAPABILITIES	Negative: -Lack of clear knowledge about effective recycling practices	Positive: - Ability to influence others	Negative: - Difficulties in measurement and monitoring
BEHAVIORAL FACTORS	Negative: -Difficulty in changing ingrained habits	Positive: - Taking on the payment of the service -Change of habits*[2] Negative: - Difficulty in changing ingrained habits - Adjusting the bathroom routine to a shorter time *(3)	Negative: - Difficult to be consistent (forgetfulness)
EXTERNAL FACTORS			
CONTEXT	Negative: - Limitations of plastic-free products and alternatives - Expensive and hard-to-find plastic substitutes	Negative: - Cold weather hampers the mechanism created to fulfill the task	
SOCIAL NORMS	Positive: - Behavior of peers and	Positive: - Family support	Positive: - Family support

	WASTE	WATER	ENERGY
From Analytical Framework			
	close community - Family support		Negative: - Lack of family commitment (everyone supporting and contributing)
Others			
PRODUCT AND PRODUCER-RELATED FACTORS	Positive: - Discovery and availability of alternatives (thermoses; products that do not require plastic packaging)		Positive: - Access to technology (ease of finding energy-efficient products) Negative: - High initial investment in efficient appliances
PERSONAL CONVENIENCE	Negative: - Impractical (carrying a thermos can be uncomfortable and heavy)		Negative: - Lack of convenience (*4)
MECHANISMS CREATED BY INDIVIDUALS		Positive: - Use of reminder strategies *[5] - Use of time measurement strategies	Positive: - Power strips to just unplug one thing - Improvement in organization and recording
TANGIBLE EFFECTIVENESS			Positive: - Seeing the savings in consumption *[6]
PERSONAL WELLBEING			Positive: - Reducing device use at night improves sleep
ECONOMIC SAVINGS	Positive: - Economic savings		Positive: - Reduction in energy bills

Verbatims

*(1) *"The process has been motivating because with each action taken, a contribution is made to the care of the environment, and I am left with a clear conscience."*

*(2) *"Also, showering with cold water has made it easier for me to reduce my water consumption in the shower."*

*(3) *"Another negative aspect is the time in the shower, as I am working on completing my routine in 7 minutes to beat the 10 minutes, because as a woman, there are several products I need to apply."*

*(4) *"The process of unplugging and reconnecting devices can be tedious and time-consuming, especially in situations where you forget to plug them back in, resulting in uncharged devices."*

*(5) *"Although some days are complicated and I forget, next to the sink, I put a marker that serves as a visual reminder and has helped me a lot."*

*(6) *"When looking at the monthly electricity and gas bills, I noticed a significant reduction in consumption of almost 15%. These savings not only benefit my household's finances but also make me feel that I am making a positive change for the environment."*

Individuals selected various sustainable consumption domains. Most students opted for more sustainable mobility, followed by food. Sustainable food-related behaviors have been extensively studied, including analyses among young people (44–46); conversely, research on mobility behaviors is more limited. Saving resources, such as water and energy, equally captured the students' attention for acting as sustainable consumers, and waste management behaviors, such as reducing plastics and increasing recycling, were also noted.

Several studies have also delved into understanding this set of behaviors (see [47–51]). Shopping aroused the least interest among the young individuals analyzed. This finding is notable as purchase-related behaviors are frequently studied in sustainable consumption (e.g., [52–54]). Table 1 details the behaviors selected by students each semester. Importantly, students chose behaviors based on their interests and ecological footprints. Therefore, the domains analyzed in this study provide insights into the areas where there is potential to enhance young people's consumption patterns for a genuine, sustainable impact. Most behaviors selected by the students fall within the food, housing, and mobility areas, which are crucial concerning pollution and resource demands [5].

Table 3. Summary of Results for Mobility, Food, and Shopping

	MOBILITY	**FOOD**	**SHOPPING**
From Analytical Framework			
INTERNAL FACTORS			
INTRAPERSONAL VALUES			
Environment	Positive: - Contribution to the environment	Positive: - Improvement in environmental impact	
PERSONAL CAPABILITIES	Negative: - Need for great willpower	Positive: - Ability to influence others *[7]	Positive: - Ability to influence others (family members)
BEHAVIORAL FACTORS	Negative: - Difficulty in changing ingrained habits	Positive: - Change of habits *[8] Negative: - Difficulty in changing ingrained habits	
EXTERNAL FACTORS			
CONTEXT	Positive: - Participation in mobility events *[9] - Institutional and family support *[9.1] Negative: - Physical and logistical inconveniences *[10] - Safety and comfort	Positive: - Education about healthier options	
SOCIAL NORMS		Positive: - Family and friends support Negative: - Resistance from family members *[11] - Social pressure to maintain dietary habits	
PRODUCT AND PRODUCER-RELATED FACTORS	Negative: - Availability of scooters and bicycles	Positive: - Variety of alternatives	Positive: - Greater number of local brands (*12) Negative: - Lack of variety compared to large chains
Others			

	MOBILITY	FOOD	SHOPPING
From Analytical Framework			
PERSONAL CONVENIENCE	Positive: - Reduction in travel times	Negative: - Difficulties in managing shopping and preparation - Dependence on others	
MECHANISMS CREATED BY INDIVIDUALS	Positive: - Organization and planning (creation of WhatsApp groups to coordinate carpooling) Negative: - Coordination of schedules for car sharing	Positive: - Technological support (*13)	
PERSONAL WELLBEING	Positive: - Contribution to health - Improvement in personal relationships	Positive: - Improvement in health - Increased awareness of the impacts of consumed foods	
ECONOMIC SAVINGS	Positive: - Cost reduction (gasoline, maintenance, sharing expenses) 14)	Positive: - Reduction of waste and expenses - Increase in costs (*15)	Positive: - Saving by not buying what is not needed
EXPECTATIONS VS. REALITY	Negative: - Difference between initial expectations (ideal) and reality (adversities)*[16]	Negative: - Demotivation due to dietary restrictions	

Verbatims

*(7) *"Changing my eating habits has also led to an improvement in my family's habits, as they have tried to reduce meat consumption along with me."*

*(8) *"I organized a weekly meal plan to know exactly what I need to buy when I go to the market so that I don't spoil the food or buy too much"... "I have eaten much more balanced by having a meal plan and I have tried to avoid red meats."*

*(9) *"This week was car-free day and I had several meetings, and instead of ordering a taxi, I used an electric skateboard for my errands... "On Sunday, I used the bike lane to go to lunch in Usaquén instead of using a car, which reduced my gasoline consumption by 20% that week." *[9.1] "On the other hand, both CESA and my parents have supported the process (the university lends the skateboards and bicycles)."*

*(10) *"On the other hand, the charging points for the skateboard are hard to find because they are usually inside the establishments I go to, and on the other hand, charging times limit mobility."*

*(11) *"Despite the progress, there is always room for improvement, my parents still show resistance to change."*

*(12) *"The list of Colombian brands is growing, which expands my search options."*

*(13) *"Digital schedule: It has been a support in my diet, especially when I am not at home. It reminds me what I should eat during the day or serves as a guide to find something similar in a restaurant."*

*(14) *"Moreover, I no longer have to pay for parking or Ubers to move around or park the car, and I even don't pay for gasoline, so the percentage of savings has been very large."*

*(15) *"Eating healthy or better-quality food is more expensive. The shopping I did this week increased by about 25%."*

*(16) *"...the person who wants to change their behavior (in this case, me) tends to think of the best scenario (sunny days, without any accidents or scares from an unknown person), what this does is that it disappoints me from changing the behavior (difference between the idea and reality) and I'm no longer so committed to making that change."*

(RQ2) Which factors encourage or obstruct the adoption of sustainable consumption behaviors?

(RQ3) What changes in the identification of drivers and barriers toward sustainable consumption occur when starting from observing the consumer's own experience in their daily routine?

To address RQ2 and RQ3, we analyzed factors from the analytical framework initially defined based on previous literature, along with emergent themes categorized as "Others." First, through Tables 2 and 3, we summarize the main findings, categorizing them as positive (drivers) and negative (barriers) factors, and include verbatim excerpts that support these findings. Subsequently, we will provide a detailed description of each factor.

As previously discussed, to address Research Question 2 (RQ2), 'Which factors encourage or obstruct the adoption of sustainable consumption behaviors?' and Research Question 3 (RQ3), 'What changes occur in the identification of drivers and barriers to sustainable consumption when starting from the consumer's own experience in their daily routine?', we analyzed factors identified through the analytical framework as well as emergent themes. The detailed descriptions of each factor are presented as follows:

4.1 From the Analytical Framework

4.1.1 Intrapersonal values (Driver)

Intrapersonal environmental values (related to environmental awareness, responsibility, or contributions to the environment), acted as a driver across all behaviors. This finding is consistent with prior research that emphasizes the significance of environmental values, feelings of responsibility, and concern for engaging in sustainable behaviors [55–58]. However, our research reveals that this driver is not an antecedent of behavior, but rather something acquired during the experience, which subsequently motivates continued engagement with the behavior. Similarly, in the realm of *non-environmental intrapersonal values*, it was found that personal satisfaction and motivation stemming from positive experiences encouraged the adoption of behaviors, such as water conservation. Like the previous case, this favorable attitude emerges from the experience rather than preceding it. These findings align with prior literature that underscores the importance of focusing on observed behavior, rather than exclusively analyzing preceding factors such as attitudes and intentions [59, 60]. This approach helps to uncover new factors (motivators and barriers) that influence sustainable consumption behaviors.

4.1.2 Personal capabilities (Driver)

Rather than solely focusing on traditional personal skills such as perceived control capabilities, effectiveness, or willingness to pay, as typically suggested by the literature [59–63], the ability to positively influence others emerged as a significant motivator for adopting sustainable behaviors in water, food, and shopping domains. Given that the students live and interact daily with family and friends, their ability to positively impact these close social groups motivates them to adopt and maintain sustainable consumption behaviors. This influence is pivotal and synergizes with the crucial role of social support, primarily from family and cohabitants, in achieving sustainable consumption objectives, which will be elaborated upon later. Conversely, certain barriers related to personal capabilities were also identified. For instance, a lack of knowledge about effective recycling practices, which has been repeatedly highlighted in the literature as crucial for sustainable action [23–25,61], poses a significant challenge. In the energy domain, the absence of an effective system to measure and track savings hinders individuals' ability to monitor their progress, presenting another barrier. In terms of mobility, individuals must exert considerable willpower to overcome challenges and maintain consistency in their sustainable actions.

4.1.3 Behavioral factors (Barrier)

Changing ingrained or pre-established habits presents a barrier to various behaviors such as waste management, water conservation, and sustainable food practices. This finding aligns with literature identifying habits, past behaviors, and routines as strong influences on consumer behavior [12]. For instance, prior research has indicated that shopping habits for products with sustainable attributes (e.g., products with recycled packaging or bio-based personal care products) increase the likelihood of similar future purchases [64–66]. Similarly, literature suggests positive spillovers among sustainable consumption behaviors, where the adoption of one pro-environmental behavior can lead to the adoption of similar behaviors [67–72]. For example, students' participation in adopting other sustainable practices (e.g., energy-efficient cooking and sorting waste) has shown positive correlations with sustainable consumption in the food domain [14].

Conversely, the entrenchment of unsustainable habits among young people can create resistance to change and hinder the adoption of sustainable behaviors, such as adjusting the bathroom routine to shorter times or consistently turning off lights and unplugging unused devices. This resistance aligns with findings that habitual purchase of non-green products can negatively impact the relationship between environmental attitudes and green consumption [73]. Habit discontinuity has been highlighted as a driver for fostering positive behavioral changes [74,75].

Moreover, various behavioral factors were identified as motivators for sustainable action in specific areas. For instance, in water conservation, behaviors such as taking responsibility for public service bills, adopting the habit of cold showers, or showering at locations requiring speed (e.g., a university gym) promoted sustainable water consumption. In the food domain, adopting habits like meal planning facilitated more sustainable practices, such as diets incorporating alternative proteins and reducing food waste.

4.1.4 Context and social norms (Both Driver and Barrier)

This study highlights the importance of external factors in adopting sustainable consumption behaviors. Social norms, particularly the influence of family and friends, are crucial, especially for behaviors that predominantly occur at home, such as resources consumption (water and energy), recycling, and food choices. Family support can act as a significant driver, motivating sustainable practices, whereas a lack of commitment or resistance from these close social groups can be a substantial barrier. In sustainable mobility, support from institutions (e.g., universities) and family that facilitates access to sustainable transport options like skateboards or bicycles encourages their adoption. Conversely, in the domain of food, social pressure to maintain traditional eating habits, such as the consumption of red meats, often hinders the transition to more sustainable diets. This dynamic aligns with literature emphasizing the influence of social contexts, including parents and peers, on the preference for sustainable products and alternatives [65,76].

Regarding context, various factors predominantly act as barriers, affecting behaviors more significantly outside the home. For instance, in mobility, physical and logistical challenges, such as adverse weather conditions or inadequate infrastructure for electric vehicles, limit the adoption of sustainable transportation alternatives. In waste management, the scarcity of plastic-free product options, difficulties in finding substitutes, and their higher costs impede efforts to avoid single-use plastics. This issue aligns with

studies highlighting the challenges young people face due to the prevalence of plastic packaging in the food industry (44,77–79).

A notable finding from this research is that context can act as a barrier by countering mechanisms designed by consumers to promote sustainable behaviors—for example, cold weather making it challenging to reduce shower times by using cold water. However, context can also be a motivator when it fosters spaces for participation and education in sustainable practices, such as involvement in car-free days or the use of bike lanes, which reinforce the adoption of more sustainable transportation methods; likewise, education about healthier food options encourages more sustainable dietary choices.

Our research extends beyond previous studies that primarily focused on individual factors influencing sustainable consumption, which often examined intentions and attitudes rather than actual behaviors [12,80,81]. By grounding our analysis in the individual's experience, we identify both motivators and barriers that extend beyond the personal, underscoring the significant role of contextual factors in the adoption of sustainable behaviors. Furthermore, the final category of our analytical framework addresses external variables related to the product or producer, highlighting their influence on sustainable consumption.

4.1.5 Product and producer-related factors (Both Driver and Barrier)

This category presents mixed findings, as certain factors encourage the adoption of sustainable consumption behaviors while others impede it. For instance, in waste management, the discovery and availability of alternatives to plastics (e.g., thermoses for beverages and plastic-free packaging) serve as motivators for reducing the use of single-use plastics. Similarly, in food and shopping, the availability of various meat alternatives (e.g., chicken, fish, fruits, and vegetables) encourages the adoption of more sustainable diets. In retail shopping, the discovery that local brands can meet consumer needs, with an increasing array of sustainable clothing options, has been positive. However, the limited variety compared to large retail chains often poses a barrier to sustainable purchasing.

Likewise, limited product availability presents challenges in sustainable mobility, with a narrower range of bicycles and skateboards than might be desired. These observations underline the significant role that companies and organizations play in providing a broader range of sustainable products, services, and alternatives, as emphasized by previous literature [82]. Regarding energy consumption, young consumers perceive access to technology as beneficial; the availability of energy-efficient products motivates their use. Nevertheless, the high initial cost of these appliances is a significant barrier, echoing literature that identifies price as a major obstacle to sustainable purchasing behaviors among consumers, including young adults (2,5,44,79).

4.2 Emergent Drivers and Barriers (Others)

The methodological approach of this study highlights a unique set of factors emerging directly from individuals' experiences as they attempt to adopt sustainable consumption behaviors. This insight is a significant addition to existing literature. Addressing the research question 'What changes in the identification of drivers and barriers towards sustainable consumption occur when starting from observing the consumer's own experience in their daily routine?' (RQ3), the findings reveal that beyond the factors previously identified and analyzed in sustainable consumption literature, there are additional variables specific to the

consumption context that either motivate or hinder the adoption of such behaviors. These are detailed as follows:

4.2.1 Personal convenience (Driver and Barrier)

Personal convenience, influenced by the adoption of sustainable behaviors, emerged as a significant factor. In mobility, it served as a motivator for adopting more sustainable alternatives such as skateboards, bicycles, and mass transit systems, which helped individuals reduce their travel times. However, personal convenience also acted as a barrier when adopting other behaviors. For instance, in waste management, the practice of carrying a reusable thermos was sometimes deemed 'uncomfortable and heavy,' leading to practical inconveniences for students. In the realm of energy conservation, the tedious process of repeatedly disconnecting and reconnecting devices was seen as time-consuming, thus discouraging energy-saving behaviors. Similarly, in sustainable eating, logistical challenges associated with shopping and meal preparation, along with dependency on others for implementation (e.g., family members), presented significant hurdles. Previous studies have also highlighted these barriers, particularly among young people, in adopting more sustainable eating practices (44).

4.2.2 Mechanisms Created by Individuals (Driver)

Through the individual experiences analyzed, a unique factor emerged that is often overlooked in traditional research methodologies: the mechanisms created by individuals to support or enhance their adoption of sustainable consumption behaviors. Across various domains, students developed inventive strategies and tools that served as significant motivators. For instance, in water conservation, strategies like placing reminder notes on mirrors, using markers next to sinks, or setting timers and alarms helped reduce water use. Similarly, methods to decrease shower duration, such as using specific playlists or opting for cold showers, particularly after gym sessions, were effective individual innovations.

In the energy sector, students used power strips to connect multiple devices, enabling them to turn off all devices with a single action. They also developed methods to monitor and track their energy savings, enhancing their motivation to persist with these practices. This approach is linked to a broader driver termed "tangible effectiveness," where individuals can directly observe the impact of their efforts, such as noticeable reductions in energy consumption.

In the realm of sustainable eating, technological tools that track dietary plans supported shifts toward diets with reduced red meat consumption and more sustainable alternatives. Moreover, for mobility, students utilized digital platforms like WhatsApp to organize carpooling, enhancing transport efficiency by maximizing car occupancy.

It’s important to note that while these self-created mechanisms generally promote sustainable behaviors, they can occasionally present new challenges, such as difficulties in coordinating schedules for carpooling via WhatsApp, which may inadvertently become a barrier.

4.2.3 Personal well-being (Driver)

Personal well-being emerged as a significant motivator not only in anticipated areas such as food but also in energy conservation and sustainable mobility. In terms of food, the awareness of diet's impact on personal health and enhanced physical well-being encouraged the adoption of more sustainable eating habits. These findings align with

previous research on sustainable eating among young adults (14,83). In the domain of energy, practices that promote conservation, such as reducing electronic device usage at night, have been shown to improve sleep quality, thereby encouraging ongoing engagement with these sustainable behaviors.

In mobility, the physical activity associated with using sustainable transportation options like bicycles, skateboards, or walking was a key motivator. An unexpected but significant finding in the mobility sector was that sustainable practices, such as carpooling, not only reduced environmental impact but also enhanced social interactions and strengthened relationships with family and friends. This improvement in personal relationships further motivated individuals to engage in sustainable transport behaviors.

4.2.4 Economic savings (Driver)

Contrary to price being a barrier, as previously discussed, economic savings emerged as a significant driver for adopting sustainable consumption behaviors. Participants noted positive financial impacts across all areas analyzed: savings on water and energy bills; reduced costs associated with fuel, parking, and vehicle maintenance, or through sharing expenses via carpooling in the mobility sector. Additionally, in shopping and food, minimizing the purchase of unnecessary products and reducing food waste led to noticeable financial savings. However, it should be noted that in some sustainable eating practices, such as transitioning from animal-based to plant-based proteins, participants identified increased costs as a barrier to sustaining these behaviors.

4.2.5 Expectation vs. Reality (Barrier)

The discrepancy between initial expectations and actual experiences emerged as a barrier. Some participants expressed disillusionment and demotivation when they encountered greater difficulties and challenges than anticipated, leading to a sense of disappointment. For example, the expectation of ideal, incident-free days clashed with the reality of adverse weather conditions and other inconveniences. Additionally, dietary changes, particularly reducing meat consumption, posed psychological challenges in social settings, further exacerbating the difficulty of maintaining these behaviors.

5. Conclusions, Implications and Future Research

This research starts from an active learning pedagogical strategy and, from there, proposes a methodological approach different from those usually employed to study sustainable consumption behaviors and the factors involved in their adoption. This approach, based on the observation and specific self-report of the individual's own experience adopting sustainable consumption behaviors, allowed us to identify that, in this purpose of promoting new consumption patterns, the comprehensive analysis of internal and external factors to the individual is critical to having a complete understanding of the consumer and their process towards adopting more sustainable lifestyles. Consequently, it is expected that the findings of this research will also guide a more holistic perspective in which the design of training programs, as well as promotion strategies and policies, consider aligning both types of factors (i.e., internal and external) from understanding the role they can play as motivators or barriers in specific areas of sustainable consumption. Thus, the results of this research allow for the following conclusions, implications, and paths for future research:

Firstly, it is important to highlight that just as previous literature has focused more on aspects of the individual, our research shows that several factors (mainly motivators) fall more on the individual than on the context. Some of these factors have been previously noted by literature on sustainable consumption (e.g., environmental concern and the individual's responsibility towards the issue). However, from the analysis of the individual's own experience adopting the behavior, other factors emerge that are worth considering for future research, as well as supporting the design of policies and strategies for sustainable consumption. For example, knowing that young people are motivated by having the ability to positively influence others, as well as personal well-being and the economic savings derived from sustainable practices, can guide messages and communication strategies that highlight these possibilities. Similarly, the personal convenience derived from various sustainable consumption behaviors can be a factor to highlight when promoting this type of consumption.

The above does not mean that the external aspects of the individual lose importance. On the contrary, the context and social norms that emerge from the consumer's relationship with peers and family continue to be critical aspects that can support the process. One of the key contributions of our study is that by basing itself on the individual's own experience, it identifies motivators and barriers beyond the personal sphere and finds contextual factors as relevant variables that can impede the adoption of sustainable behaviors. Several involve logistical and infrastructure aspects that fall on actors such as the public sector. However, others are associated with the variety and availability of sustainable product and service alternatives; in this aspect, the private sector plays a significant role. This confirms that the transition to more sustainable lifestyles as a fundamental element for achieving sustainable development goals requires the joint action of multiple actors supporting the individual's role in this purpose. Future research could address the impact of actions from multiple actors on the adoption of sustainable consumption behaviors (involving internal and external factors of the individual).

A key aspect that emerges from this exploratory exercise is how the individual's ability to design mechanisms that lead them to achieve the proposed objectives becomes a motivator for sustainable consumption. From this finding, theoretical implications arise, as until now, literature has focused on identifying motivators and barriers, but little has been dedicated to exploring mechanisms to strengthen (the motivations) or overcome (the barriers). The analysis from the individual's own experience allows for this identification, going a step further and contributing to the current literature on factors involved in sustainable consumption and suggesting future research around mechanisms for advancing towards better consumption patterns. Similarly, there are practical implications, as this finding highlights the need to empower the individual when seeking behavioral change. In this case, an academic exercise led the students to set a clear goal and define activities to achieve it, as well as tools and resources to overcome obstacles during the process. Going forward, campaigns, programs, and strategies could consider designing material that communicates and calls for participation in sustainable actions and provides consumers with clear and simple tools to support their behavior. By taking the individual's own experience as a source of information and analysis, the approach of this research allowed

for the identification of valuable ideas about possibilities for such tools in different areas of sustainable consumption.

This study focused on young people (students) understanding their importance as consumers and future leaders in various areas (family and professional), and the relevance of their actions to implement sustainable initiatives effectively. Higher education institutions have the advantage of being close to this population group. They can intervene in their routines through innovative pedagogical strategies that promote sustainable consumption in these new generations. An important aspect identified from the students' experience is that setting a goal and organizing (i.e., defining specific activities and measuring progress) to meet it motivated the behavior even when they had not previously proposed it or if they had proposed it, they had not concretized it. Thus, the pedagogical activity gave them the input to adopt the behavior and analyze their experience, motivating the adoption of the same. This insight highlights the importance of education and pedagogical approaches based on active learning in achieving sustainability objectives, such as sustainable consumption. The above indicates that the practical implications derived from this research are not only directed at companies but also at institutions of higher education to design programs, strategies, and training initiatives in sustainable consumption. The insights obtained in this study about motivators, barriers, and mechanisms towards sustainable consumption can greatly contribute to this purpose.

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