



# Assessment of the Sustainable Level of Vending Machine Products in an Italian University

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**Abstract:** The aim of the analysis is to assess whether vending machines placed in a university context provide not only healthy but also environmentally and socially sustainable food products. Content analysis was performed to evaluate the sustainability of food products by examining the types of sustainability claims (both graphical and textual) found on food packaging. The analysis revealed a significant lack of sustainable food products sold from vending machines. This lack was confirmed by the low quantity of graphical and textual sustainability claims on packaging. Legislative, contractual, and economic issues were identified as the most plausible reasons for the lack of sustainable products. Demonstrating that vending machines do not provide sustainable food is useful for establishing a baseline for the development of subsequent legislative, environmental, behavioral, and product-related interventions in the university context.

**Keywords:** *Vending, Sustainability, Food Offer, Claims, Packaging, University, Content Analysis*

## Introduction

### Need for Change

The food sector is complex and heterogeneous (Weber et al. 2020) due to its negative effects on human health (Guyomard et al. 2012; Hall 2018), social inequality (Downs and Fox 2021; ILO 2018) and environmental pollution (Crippa et al. 2021; Notarnicola et al. 2017; Ritchie and Roser 2020). At the European level, these issues have been addressed by the Farm to Fork strategy (European Commission 2020), which incorporates and follows the sustainable development principles established by Agenda 2030 (FAO 2017) and acts as a compass for the food sector. According to the strategy, the design of a fair, healthy, and environmentally friendly food system should empower consumers to choose sustainable food, and all actors in the food chain (including retailers) should see this as an opportunity and their responsibility.

### The Role of Higher Education Institutions

Higher education institutions (HEIs) are perfect places for introducing sustainable changes and influencing people's behavior (Eatmon, Krill, and Rynes 2016; Stephens and Graham 2010). HEIs are considered "the engine of transformational sustainability" (Purcell, Henriksen, and Spengler 2019) and "co-creators" of an equitable and better society (Peer and

Stoeglehner 2013; Trencher et al. 2014) with enough power to influence the societal, economic, and environmental context (Beynaghi et al. 2016; Findler et al. 2019). Nowadays, one of their main responsibilities is to educate students (i.e., future leaders and professionals) (Cortese, 2003) to behave as sustainably as possible to decrease the high environmental and social burdens, including food consumption habits, associated with their current lifestyles (Bertossi and Marangon 2022; McDonough, Hendrickson-Nelson, and Plourde 2013; Migliorini et al. 2020). This mission entails implementing several types of interventions (Bertossi and Marangon 2022) to orient students' dietary behaviors toward food products not only "nutritionally adequate, safe and healthy" but also "protective and respectful of biodiversity and ecosystems, culturally acceptable, accessible, economically fair and affordable, while optimizing natural and human resources" (Burlingame and Dernini 2012, 294). Since encouraging students to adopt environmentally sustainable diets is notoriously difficult, implementing small changes in surrounding contexts (e.g., altering the availability of food by replacing unsustainable products with more sustainable solutions) can help to achieve this goal (Abrahamse 2020).

### The Vending Sector in HEIs

Vending machines are an essential food service in HEIs. Their role is to satisfy students' impulsive needs (e.g., the desire for sweets) by offering foods and beverages that are high in energy and added sugars (Byrd-Bredbenner et al. 2012; Faris et al. 2021; Park and Papadaki 2016; Rahi, Kawtharani, Hassan and Hassan 2022; Raposo et al. 2016). Aware of the effects produced by the consumption of such "junk food" on health (Bertéus Forslund et al. 2005; Hall 2018; Malik and Hu 2022), researchers have approached the vending sector in HEIs mainly from a nutritional perspective to slow down or prevent the onset of obesity among young adults, which has been shown to have increased over the years (Abdeen et al. 2017). Two of the most commonly implemented interventions within the environment of HEIs have been increasing the proportion of healthier food in vending machines (Bos et al. 2018; Grech and Allman-Farinelli, 2015; Hua and Ickovics, 2016; Rosi et al. 2017; Viana et al. 2018) and providing health information through posters and/or labels (Bos et al. 2018; Clarke et al. 2020; Rosi et al. 2017; Shi, Grech and Allman-Farinelli 2018; Stöckli et al. 2016). In general, such interventions usually start by examining the vending machines placed in university locations, assessing the nutritional profiles of the foods and beverages offered (Byrd-Bredbenner et al. 2012; Faris et al. 2021; Park and Papadaki 2016; Rahi et al. 2022; Raposo et al. 2016), and checking whether the food products are adequately visible and labelled (Park and Papadaki 2016). Demonstrating that the offered food products are not aligned with national nutritional guidelines and that the healthy options are difficult to identify can be very useful for establishing a baseline for the development of subsequent legislative, environmental, behavioral, and product-related interventions (Appelhans et al. 2018; Bos et al. 2018; Rosi et al. 2017; Stöckli et al. 2016; Taber, Chiriqui, Vuillaume and Chaloupka 2014;

Viana et al. 2018). Therefore, the same approach should be used when it comes to sustainable food (Bertossi, Troiano and Marangon 2022).

### Aims of the Study

The present study is exploratory in nature and aims to assess whether vending machines placed in an Italian university context provide not only healthy but also environmentally and socially sustainable food products. Given that assessing the sustainability levels of food products requires a complex, well-established, and accurate methodology, we evaluate the presence of sustainable food by conducting a content analysis—that is, by examining the types of sustainability claims (both graphical and textual) found on packaging.

## Material and Methods

### Content Analysis

Content analysis is a research method that has traditionally been used to study package design communication (Elliott 2008) to provide “a systematic and objective means to make valid inferences from verbal, visual, or written data in order to describe and quantify specific phenomena” (Downe-Wamboldt 1992, 314). In other words, content analysis involves checking what types of textual (e.g., words) and graphical (e.g., logos and images) claims are used to communicate certain kinds of messages to specific audiences (e.g., consumers) and establishing conclusions regarding a specific topic or a situation. For example, some authors have performed such analyses to evaluate whether and how manufacturers communicated products’ green attributes to consumers (Carlson, Grove and Kangun 1993; Polonsky et al. 1998), especially the green attributes related to food products (Elliott 2008), such as organic production (Chrysochou and Festila 2019) and healthiness (Festila and Chrysochou 2018).

For the purpose of the study, we examined both the amount and type of textual and graphical claims on product packaging with explicit and clear reference to nutritional, environmental, and social aspects. The main limitation of this approach is its superficiality, since it does not allow verification of if what the manufacturer declares on the packaging through text or logos corresponds to the truth (there is always a risk of greenwashing, namely making a product appear more sustainable than it actually is). Thus, through content analysis, it cannot be established for certain whether a product really has sustainable characteristics as claimed. Nevertheless, the methodology has proven to be easy and time-efficient, which makes it useful for establishing an exploratory overview of the topic. Furthermore, since 1) the objective of such claims is to overcome information asymmetry between consumers and producers (Petersen, Hartmann and Hirsch 2021), and 2) such claims are the only element consumers rely on to gain an idea of a product’s characteristics (Osservatorio Immagino 2022), evaluating the types of claims on packaging can be a means to draw conclusions on how consumers may perceive products in terms of sustainability.

## Screening and Classification

Before assessing the presence of sustainability claims, two students trained for the purpose of the study conducted a screening phase in January 2022 at the warehouse of the company operating the university's vending services. This phase involved selecting only food products that made up the 2021 offering and sold from vending machines located in twenty-one buildings on the university campus. Products sold in 2020, those introduced in early 2022, and those not in stock for commercial and supply reasons were therefore excluded. In this phase, the students were supported by the company's operators, and a total of ninety-three products were selected. After the screening phase, the students carried out an analysis of the selected products, noting the names of the products and their type (sweet snack, salty snack, fruit, water, sweet drink, energy drink, fruit drink, or carbonated drink), taking photos of each product and classifying the textual and graphic claims on the packaging into the following categories and sub-categories. The breakdown of the indications into these categories and sub-categories followed the scheme used by an Italian market survey with the aim of understanding people's consumption trends based on the type of indications on packaging (Osservatorio Immagino 2022).

### *Nutritional Sustainability Claims*

These concerned nutrition and lifestyle aspects. The 'nutrition claims' sub-category included all claims indicating either the presence ("rich in") or absence ("free from") of compounds or substances (e.g., "with fiber" or "without dyes"). Also included in this category were claims referring to food intolerance, such as 'gluten-free'. The 'lifestyle claims' sub-category, on the other hand, included claims referring to the suitability of a product for certain lifestyles or dietary needs (e.g., vegan, vegetarian, or celiac).

### *Environmental Sustainability Claims*

These concerned packaging, production type, and resource management. The "packaging eco-friendly properties" sub-category related information about an item's eco-friendly properties (e.g., "recyclable" or "made with a lower quantity of plastic"), the "production" sub-category indicated that clean production practices used (e.g., organic farming), and the "environmental resource management" sub-category referred to the protection of natural resources (e.g., FSC logo).

### *Social Sustainability Claims*

These concerned respecting workers' rights. The "social support" sub-category was evaluated by checking the presence of third-party certifications (e.g., FairTrade, Rainforest Alliance) or manufacturers' declarations (e.g., "slave-free production").

## Results

### General Results

Of the ninety-three products analyzed, there were forty-eight (52%) sweet snacks, nineteen (20%) salty snacks, ten (11%) carbonated drinks, five (5%) sweet drinks, five (5%) fruit drinks, four (4%) waters, one (1%) energy drink, and one (1%) item of fruit. Regarding the presence of claims on packaging, “free from” nutritional claims (general and those related to intolerances) were the most common, followed by “rich in” nutritional claims, claims on eco-friendly packaging properties, lifestyle production, environmental resource management, and social support (Figure 1).

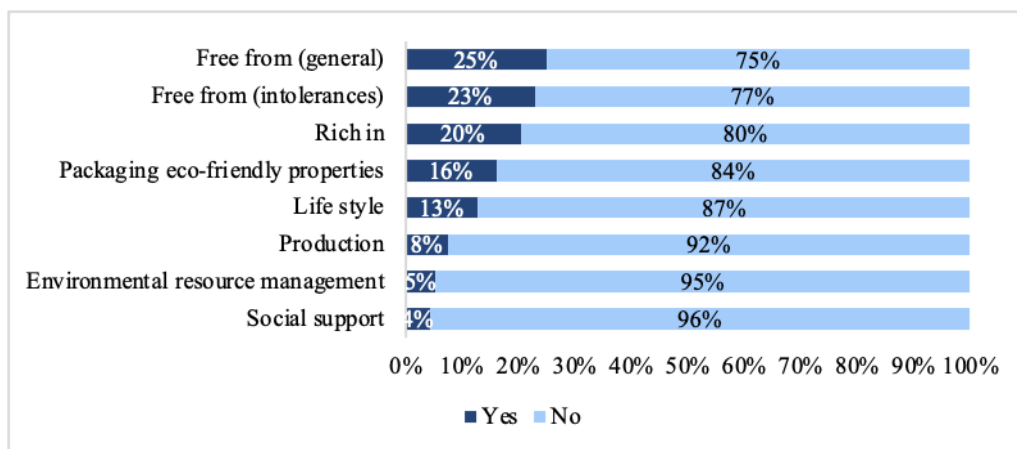


Figure 1: Percentage of Food Products (N = 93) Showing a Particular Type of Claim

### Nutritional Sustainability Claims

#### *Nutritional Claims*

The analysis revealed that twenty-three (25%) of the ninety-three products communicated nutritional sustainability using only textual “free from” claims related to the absence of compounds, while the remaining seventy (75%) did not provide such information (Figure 1, Table 1). We found that six products displayed only one claim on their packaging (e.g., “palm oil free”), nine displayed two claims (e.g., “preservative-free” and “without dyes”), three displayed three claims (e.g., “palm oil-free,” “without hydrogenated fats,” and “preservative-free”), and six displayed four claims (e.g., “without hydrogenated fats,” “preservative free,” “without dyes,” and “no GMOs”) (Table 1). Regarding the “free from” claims related to intolerances, we found these on only twenty-two (23%) out of the ninety-three products (Figure 1, Table 2). Only one claim was displayed on twenty-one products (e.g., “gluten free”), and just one product displayed three claims (i.e., “gluten free,” “without milk,” and “without eggs”) (Table 2). Such claims were communicated textually, except for the “gluten free” claim, which was also communicated graphically.

Furthermore, nineteen (20%) of the ninety-three products were found to have one or more “rich in” claims (Figure 1, Table 3). Specifically, we found that thirteen of these products displayed only one such claim on their packaging (e.g., “with extra virgin olive oil” or “with spelt”), five displayed two claims (e.g., “with figs” and “with kamut”), three displayed three claims (e.g., “with fiber,” “with sesame,” and “with puffed rice”), and two displayed five claims (e.g., “with Vitamin E,” “with cashews,” “with almonds,” “with blueberries,” and “with raisins”) (Table 3). All the “rich-in” claims found on packaging were communicated textually (Table 3).

Table 1: Textual “Free From” Claims

<i>1 Claim</i>	<i>No. of Products</i>
Palm oil free	2
Without hydrogenated fats	1
Without fat	1
Low in fat	1
<i>2 Claims</i>	
Preservative free; without dyes	5
Preservative free; with no added sugar	1
Preservative free; without hydrogenated fats	1
Palm oil free; 50% less fat	1
With no added sugar; without hydrogenated fats	1
<i>3 Claims</i>	
Without additives; preservative free; without dyes	2
Palm oil free; without hydrogenated fats; preservative free	1
<i>4 Claims</i>	
Palm oil free; preservative free; without added glutamate; without dyes	3
Without added flavourings; without added dyes; preservative free; no GMOs	2
Without hydrogenated fats; preservative free; without dyes; no GMOs	1
<i>Total</i>	
	23
<i>No Info</i>	
	70

Table 2: Textual and Graphical “Free From” Claims Related to Intolerances

<i>1 Claim</i>			<i>No. of Products</i>
Gluten-free			18
Without milk			2
Without yeast			1
<i>3 Claims</i>			
Gluten-free, without milk, without eggs			1
Total			22
No info			71
Gluten-free logo Used by three products in addition to the “gluten-free” textual information			

Table 3 Textual “Rich In” Claims

<i>1 Claim</i>	<i>No. of products</i>
With iodised salt	2
With extra virgin olive oil	2
100% fine Italian hazelnuts	2
With coconut	1
With spelt	1
Source of phosphorus	1
With puffed rice	1
With 100% Alpine milk	2
Red fruits	1
<i>2 Claims</i>	
With high fibre content; with sunflower seeds	1
With olives; with sesame	1
Figs; Kamut	1
With mother yeast; with Parmigiano Reggiano DOP	1
With quinoa; with brown rice	1
<i>3 Claims</i>	
With fibre; with sesame; with honey	1
With fibre; with sesame; with puffed rice	1
With high fibre content; with olives; with sesame	1
<i>5 Claims</i>	
With vitamin E; iron; phosphorus; magnesium; potassium	1
Vitamin E; cashew nuts; almonds; blueberries; raisins	1
<i>Total</i>	19
<i>No info</i>	74

*Lifestyle Claims*

Regarding lifestyle claims, twelve (13%) of the ninety-three products were specifically for vegan, vegetarian, or celiac consumers (Figure 1, Table 4). Seven products claimed to be for vegan consumers, two for vegetarian consumers, one for celiac consumers, and two for both vegan and celiac consumers. The remaining eighty-one products (87%) targeted consumers in general (Figure 1, Table 4). In contrast to nutrition claims, information related to lifestyle was mainly communicated through logos (e.g., the European V-Label or the Italian Vegan Ok label), except for the “product safe for consumers with celiac disease” claim (Table 4).

Table 4: Textual and Graphical “Lifestyle” Claims

<i>Products with textual information only</i>	No.	<i>Products with labels only</i>	No.	<i>Products with both textual information and labels</i>	No.
“Product safe for consumers with celiac disease”	1	EU vegan logo	5	“Product safe for consumers with coeliac disease” + Vegan OK logo	1
		EU vegetarian logo	2	“Product safe for consumers with coeliac disease” + EU vegan logo	1
		Vegan OK logo	1		
		ICEA vegan logo	1		
Total	1	Total	9	Total	2
<i>Products with no info</i>	81				



EU vegan logo ( $n = 6$ )      EU vegetarian logo ( $n = 2$ )      ICEA vegan logo ( $n = 1$ ).      Vegan OK logo ( $n = 2$ )

Environmental Sustainability Claims

*Packaging and Eco-Friendly Properties*

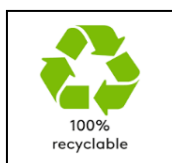
The results of the analysis revealed that only fifteen (16%) of ninety-three products explicitly informed consumers about the eco-friendly properties of their packaging, while the remaining products ( $n = 78$ ; 84%) did not provide such information (Figure 1, Table 5). Recyclability was the most frequent claim, with four products communicating it only through textual information (e.g., “100% recyclable” or “made with 25% recycled plastic”), three only through labels (e.g., 100% recycled logo), and five through both textual and



graphical representations (Table 5). In addition to recyclability, other properties communicated exclusively through textual information were “17% less plastic than the previous packaging” ( $n = 2$ ) and “14% lower CO<sub>2</sub> emissions than the previous packaging” ( $n = 1$ ) (Table 5).

Table 5: Textual and Graphical Claims about the Eco-Friendly Properties of Packaging Materials

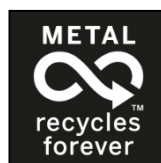
<i>Products with textual information only</i>	No.	<i>Products with labels only</i>	No.	<i>Products with both textual information and labels</i>	No.
17% less plastic than the previous packaging	2	Recyclable with paper logo	1	‘100% recycled plastic’ + 100% recyclable logo	3
100% recyclable	1	METAL recycles forever logo	1	‘Recyclable paper’ + 100% recyclable logo	1
Recyclable plastic	1	Triman logo	1	‘Fully recyclable’ + Recyclable with paper logo	1
Made with 25% recycled plastic	1				
Made with 30% recycled plastic	1				
14% lower CO <sub>2</sub> emissions than the previous packaging	1				
Total	7	Total	3	Total	5
<i>Products with no info</i>	78				



100% recyclable logo  
( $n = 2$ )



Recyclable with paper logo  
( $n = 2$ )



Metal recycles forever logo  
( $n = 1$ ).



Trima logo ( $n = 1$ )

### Production

Regarding production, five (5%) of the 93 products were produced via organic farming (Figure 1), a claim that was communicated on their packaging using labels (i.e., EU organic logo,  $n = 1$ ) or a combination of textual information and labels (e.g., “derived from organic farming” + EU organic logo,  $n = 4$ ). Two products (1%) claimed to be based on new and more sustainable recipes, while the remaining products ( $n = 86$ ; 92%) did not convey any information in this regard (Table 6).

Table 6: Textual and Graphical “Food Production” Claims

<i>Products with textual information only</i>	<i>No.</i>	<i>Products with labels only</i>	<i>No.</i>	<i>Products with both textual information and labels</i>	<i>No.</i>
New and more sustainable recipe	2	EU organic logo	1	Organic product + EU organic logo	3
				Derived from organic farming + EU organic logo	1
Total	2	Total	1	Total	4
<i>Products with no info</i>	86				



EU organic logo (n = 5)

*Environmental Resource Management*

Regarding environmental resource management, two products (2%) displayed the Forest Stewardship Council (FSC) logo to show that their packaging materials were obtained from correctly managed forests. In addition, five products (5%) used textual claims, namely “good for nature” (n = 1), “let’s help the environment” (n = 1), and “100% natural ingredients” (n = 3) (Table 7).

Table 7: Textual and Graphical “Environmental Protection” Claims

<i>Products with textual information only</i>	<i>No.</i>	<i>Products with labels only</i>	<i>No.</i>
100% natural ingredients	3	Forest Sustainable Council (FSC) logo	2
Let’s help the environment’	1		
Good for nature	1	Total	2
Total	5		
<i>Products with no information</i>	88		



FSC logo

## Social Sustainability Claims

Social sustainability was assessed in terms of manufacturers' support for farmers in their respective supply chains. Only four (4%) of the 93 products displayed textual or graphical claims on this topic (Figure 1). In particular, two products displayed only the Rainforest Alliance logo to convey that the raw materials were produced in countries where workers' rights are respected. Furthermore, two products displayed both textual and graphical claims about the respective companies' social support for cocoa and sugar farmers (Table 8).

Table VIII. Textual and Graphical “Social Support” Claims

<i>Products with labels only</i>	<i>No.</i>	<i>Products with both textual info and labels</i>	<i>No.</i>
Rainforest Alliance logo	2	Fair-trade sugar + AltroMercato logo	1
		The product supports improving the lives of cocoa farmers + Rainforest Alliance logo	1
Total	2		2
<i>Products with no information</i>	89		



Rainforest Alliance logo ( $n = 3$ )



AltroMercato logo ( $n = 1$ )

## Discussion

The goal of our exploratory study was to identify if vending machines placed in a university context provided not only healthy but also environmentally and socially sustainable food products. To this end, we conducted a content analysis to examine packaging claims, which allowed us to assess the sustainability levels of food products in the same way that consumers would. The analysis revealed a significant lack of sustainable food products sold at vending machines at the university, which was confirmed by the low quantity of graphical and textual sustainability claims on packaging. Except for the “free from” nutritional claims, information regarding the products' nutritional, environmental, and social sustainability was not very common.

In the following paragraphs, we discuss the results using two different but complementary perspectives. The first perspective is linked to the research methodology that was used and aims to explain the reasons for the lack of sustainability claims on packaging that was revealed by the content analysis. The second perspective attempts to provide possible (but not final) explanations for the lack of sustainable food products in vending machines.

Question 1: What is the reason for the lack of sustainability claims on food packaging in the university's vending machines?

The main explanation for this lack is legislative. The types of claims that consumers can find on food packaging can be mandatory or voluntary. Claims meant to highlight a certain sustainability feature of a food product usually fall into the second category. Although according to Euromonitor International (Biceika and Robles 2022) the development of such claims has increased significantly since 2020, their use on food packaging in Europe is not as easy as one might think due to the absence of clear regulations and certification procedures (Schifferstein, De Boer, and Lemk 2021). Current European laws and regulations ask for sustainability claims to be formulated in a clear, not misleading, and scientific manner to orient consumers toward sustainable food choices. However, explicit regulations and certification procedures exist only in the areas of nutrition and health (see European Commission Regulation No. 2006 and European Commission Regulation No. 1169/2011) and organic production (see European Commission Regulation 2018/848), while many other areas largely lack such regulations (e.g., regarding the use of “contributes to biodiversity,” “100% natural,” or “production without slaves” claims) (Schifferstein, De Boer, and Lemk 2021). This situation gives food producers a certain degree of freedom to choose whether, what and how to communicate to consumers and how (Brown et al. 2020; Schifferstein, De Boer, and Lemk 2021). Moreover, as sustainability generally involves multiple dimensions, each with its own complex set of considerations and possible implications (Brown et al. 2020), there are no official guidelines to determine whether a food product is sustainable. The content analysis performed in our study focused on elements whose communication depended on the producers' discretion as well as a misleading and often unclear legislative context. Therefore, the strong absence of nutritional, environmental and social claims that we identified cannot be considered as reliable proof of a real lack of sustainable product attributes. However, the opposite is also true, that is it is not even certain that products bearing such claims are truly sustainable (except, of course, those with regulated certifications, such as “organic farming” or “fair-trade”). In other words, the current legislative framework can lead to a product appearing as either less or more sustainable than it actually is (in the latter case, there is a risk of greenwashing).

The content analysis, unfortunately, did not allow us to clarify this aspect, for which other, more in-depth studies are needed that also include the producers of food and beverages. What is required is an intervention at a political and legislative level to create guidelines that help manufacturers communicate the sustainable characteristics of their products as effectively and truthfully as possible. This is one of the aims included in the European Green Deal and, in particular, the Farm to Fork strategy.

Question 2: What are the reasons behind the lack of sustainable food products in the university's vending machines?

The first and most important reason was economic. In the literature, concerns regarding profit losses brought about by more sustainable (especially healthier) vending initiatives constitute a commonly cited barrier that prevents retailers (as well as public and private institutions) from implementing these types of strategies (Grech and Allman-Farinelli 2015). The main goal of vending machines is to supply foods and beverages to satisfy students' temporary and impulsive needs (e.g., hunger or the desire for something sweet) (Cheval et al. 2017; Hoffmann et al. 2019). Hunger (an essential need) can hinder students from choosing sustainable products due to its influence on taste evaluations and preferences for specific foods (Hoffmann et al. 2019). Moreover, students often rely on their past experiences when making food selections. Therefore, it is possible that students using vending machines still tend to choose a "conventional" and "unhealthy" product that they know will satisfy their cravings over a new product, even if the new product is perceived as more sustainable and healthier. In light of this, we asked both the university purchasing office and the vending service provider if what we had hypothesized reflected reality. Both confirmed that, despite their good intentions to insert more sustainable products in line with European directives (EVA 2021), the food and beverage offerings in the vending machines responded to students' demand, which was still orientated towards traditional energy and sweet products.

The second reason, strictly linked to the first one, was contractual. In Europe, green public procurement (GPP), an important instrument in the context of sustainable consumption and production, is in force (Halonen 2021; Pacheco-Blanco and Bastante-Ceca 2016). It is defined as a process whereby public authorities (including universities) seek to procure goods, services, and work with a reduced environmental impact throughout their life cycles (European Commission 2008). Although the environmental and social impacts of the food sector have been known for many years, GPP criteria for food services (including catering services and vending machines) had not been particularly strict until an update in 2019 (European Commission 2019), the year of the European Green Deal and the publication of the Farm to Fork strategy to tackle the climate change crisis. Therefore, since 2019, public authorities have been encouraged to integrate stricter sustainability criteria in their tenders for vending services and to select providers whose food offerings exhibit greater compliance with the sustainability criteria (European Commission 2019). The current contract between the university and the vending service provider was dated before 2019 and therefore not updated to incorporate the new European criteria. This is because, according to the purchasing office, modification of the offerings did not necessarily require the signing of a new contract following the GPP rules (which would require, among other things, considerable time and cost) but was done by mutual agreement between the university and the service supplier.

## Question 3: What can be done to change the situation?

Several initiatives can be implemented with positive effects on both the supply and demand sides. First of all, what needs to be done is to intervene at a political and legislative level to create guidelines that would help manufacturers communicate the sustainable characteristics of their products as effectively and truthfully as possible. This is one of the aims included in the European Green Deal and the Farm to Fork strategy. In particular, the European Commission will examine ways to harmonize voluntary green claims and to create a sustainable labelling framework that covers, in synergy with other relevant initiatives, the nutritional, climate, environmental and social aspects of food products (European Commission 2020). This is crucial when considering the goal of sustainability claims, which is to overcome the information asymmetry between consumers and producers (Petersen, Hartmann, and Hirsch 2021; Plank and Teichmann, 2018) and to nudge consumers toward more nutritious, ecological, and fair consumption choices. In other words, packaging claims are the only elements that consumers rely on to gain an idea of a product's features. For example, if a product explicitly states that it has a healthy component, consumers may think that it supports their health. The same reasoning is valid for environmental and social claims. This is what is referred in the literature as the "halo effect," which is a cognitive bias whereby the initial assessment of the specific quality of a food product attribute has a strong impact or influence on the perception and expectation of other (undetected) attributes of the same product. Therefore, consumers may perceive the presence of sustainability claims on food products as meaning the real presence of sustainability features, encouraging them to purchase such products (Aitken et al. 2020; Anastasiou, Miller, and Dickinson 2019; Ballco, De Magistris, and Caputo 2019; Berry and Romero, 2021; Chen and Lee, 2015; Massey, O' Cass, and Otahal 2018; Román, Sánchez-Siles, and Siegrist 2017; Ruggeri, Corsi, and Nayga 2021; Tobi et al. 2019). However, the opposite is also true; that is, consumers may perceive the absence of sustainability claims on food products as a real absence of sustainability features, which can have severe consequences for the market. Indeed, consumers now expect food products to be accompanied by sustainability claims, and the absence of information on food packaging may lead to increased consumer skepticism and distrust of food services, making them less willing to purchase various food products (Goh and Balaji 2016; Nguyen et al. 2019; Tarabieh 2021). This fact has been previously reported in university contexts by Vecchio and Annunziata (2013), who discovered that 30 percent of Italian students who declared their willingness to purchase sustainable food products held back from purchasing them due to a lack of visible, clear, and transparent information.

Second, it is important to act on the offerings within the university. Although profit loss is a legitimate concern, studies have reported successful attempts to replace unsustainable products with more sustainable solutions while maintaining (and, in some cases, increasing) the volumes of both sales and profits. In their study, Viana et al. (2018) demonstrated that rearranging vending products and clearly labeling healthier ones resulted in students

purchasing much higher rates of healthier products without compromising financial performance. Rosi et al. (2017) and Roy and Liu (2020) obtained similar results by loading vending machines with healthier products on university campuses, while other authors have confirmed the feasibility of such a strategy in other contexts, such as hospitals (Griffiths et al. 2020) and workplaces (Yan et al. 2019). A strategy based only on such interventions, however, risks being ineffective without adequate institutional commitment to give sustainable food greater visibility and access. Several studies in the literature have shown how the creation of institutional policies geared towards improving consumers' health has led to a sharp decrease in unhealthy products found inside vending machines in various locations (Blake et al. 2021; Schwartz et al. 2020; Wickramasekaran et al. 2018). In their work, Blake et al. (2021) discussed the effects of the Deakin Food Charter, a sustainable university policy created with the goal of providing healthy, nutritious, and sustainable foods that satisfy both the food cravings of the students and the commercial needs of the vendor. The planned interventions were the classical approaches also performed in other studies, namely machine traffic light labelling, health-promoting machine branding, a review of machine placement and recycled bottle packaging. Over two years of monitoring, the adoption of such an inclusive and integrated policy has brought both nutritional and economic advantages. Furthermore, the strong commitment on the part of Deakin University motivated the service manager not only to adapt to the new university policy but also to improve it and implement the interventions made on campus in other contexts as well. However, the commitment to sustainable development should concern not only institutions but also the vending companies themselves. Therefore, for the society of the future, vending companies should reconsider their position as mere passive suppliers of food and beverages, be more proactive and actively collaborate with HEIs in developing policies and interventions that 1) provide an enabling environment for learning sustainable preferences, 2) overcome barriers that prevent the expression of sustainable preferences, 3) encourage people to re-evaluate their existing unsustainable preferences, and 4) stimulate a positive food systems response (Hawkes et al. 2015).

## Conclusions

HEIs have been described as compasses for developing a sustainable society and are important for bridging the gap between government and society thanks to policies and tools to bolster initiatives that lead to sustainable practices.

The provision of more sustainable food products (i.e., those that are healthy and eco-friendly while respecting human rights) is one of the many ways in which institutions, including HEIs, can contribute to the sustainable development of society. The content analysis revealed a significant lack of sustainable food products sold in vending machines, which was confirmed by the low quantity of graphical and textual sustainability claims on packaging. Although replacing unsustainable products with more sustainable solutions is one of the most commonly implemented interventions with regard to vending machines, such a strategy may sometimes not be easy due to both external (e.g., legislative) and internal (e.g.,

consumer demand) factors. We believe that these are the most plausible reasons for the absence of healthy as well as environmentally and socially sustainable food products in the vending machines in the Italian university used as a case study.

A study considering only one university and only ninety-three products will not allow for general conclusions to be made on the sustainability of the entire sector, although the results of the study can be taken as a starting point for the development of an enabling environment to overcome barriers to sustainable preferences and to encourage students to re-evaluate unsustainable preferences at the time of purchase while stimulating a food system response. Future research should explore this issue by implementing different types of interventions, such as modifying food availability and observing whether this strategy influences student behavior and institutions' total revenue. Furthermore, future research could replicate the study in other universities or contexts to compare results and provide broader conclusions on the topic.

### **Informed Consent**

The authors have obtained informed consent from all participants.

### **Conflict of Interest**

The authors declare that there is no conflict of interest.

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