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**Are Environmental Concerns enough to increase purchase
intention of plant-based protein products?**

A moderation effect study in the Portuguese market

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Dissertation

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ARE ENVIRONMENTAL CONCERNS ENOUGH TO INCREASE PURCHASE INTENTION OF PLANT-BASED PROTEIN PRODUCTS?

By

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Master Thesis / Project Work presented as partial requirement for obtaining the master's degree in data-Driven Marketing, with a specialization in Market Research and CRM

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STATEMENT OF INTEGRITY

I hereby declare having conducted this academic work with integrity. I confirm that I have not used plagiarism or any form of undue use of information or falsification of results along the process leading to its elaboration. I further declare that I have fully acknowledge the Rules of Conduct and Code of Honor from the NOVA Information Management School.

Beatriz Carvalho

Lisbon, February 29th, 2024

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To my mom, for always believing in me and being my number 1 fan.

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ABSTRACT

One of the primary causes of an increase in the popularity of plant-based diets is environmental concerns. This study aims to investigate the relationship between environmental concerns and the intention to buy plant-based protein products—as well as whether other factors like diet type and product quality have an effect on this relationship. To achieve it, a quasi-experimental study was conducted through a survey, collecting responses from 274 Portuguese, both vegetarian/vegan or animal-protein eaters, in order to assess their perspective on the topic. The results of the conducted survey show that type of diet definitely reinforces the importance of environmental concerns when purchasing plant-based protein products, especially in animal-protein eaters. It also shows that, when the products are high-quality, a higher level of environmental concerns increases purchase intention of the products. Finally, when combining both factors, environmental concerns positively influence purchase intention in animal-based dieters when the products are high-quality, and negatively influence plant-based dieters when the products are low-quality. These results suggest that, despite environmental concerns' positive effect on purchase intention of plant-based protein products, other factors like type of diet or product quality must not be ignored. The results will be discussed, and their implications for the marketing area explored.

KEYWORDS

Plant-based protein; Type of diet; Environmental Concerns; Purchase Intention

Sustainable Development Goals (SGD):



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LIST OF ABBREVIATIONS AND ACRONYMS

PI	Purchase Intention
EC	Environmental Concerns
TD	Type of Diet
PC	Product Quality
PB	Plant-Based
AB	Animal-Based

1. INTRODUCTION

Plant-based food has grown in popularity in recent years, being among the fastest-growing categories within the food sector and gradually capturing more supporters (Deloitte, 2019). Plant-based diets have also gained visibility as a viable alternative to traditional meat-based diets as worries about climate change and human health have grown ((Graça, Godinho, et al., 2019);(Sridhar et al., 2023)). Concerns about animal welfare alongside health and environmental consciousness are usually the main forces behind this diet change (Chen, 2022). But despite being smaller than omnivores in percentage, the number of vegetarians and vegans has grown considerably in recent years (Alcorta et al., 2021). Alongside the growth trend on plant-based food segment and diets, it is crucial to understand if environmental concerns drive or not purchase intention of these kind of products, considering that other factors like type of diet or product quality might interfere in this relationship.

This paper's primary goal is to explore the relationship between environmental concerns and the intention to purchase plant-based protein products, as well as whether other factors such as diet type and product quality have an impact on this relationship. In order to achieve it, quantitative data was used, collected from a pre-built survey chosen as the research method (Watson, 2015). A total of 274 valid responses were obtained from Portuguese citizens who answered questions about their demographics, type of diet, and degree of environmental concern, and were exposed to an experimental design about products quality, allowing this factor's influence to be tested. Respondents were randomly exposed to questions about either high- or low-quality plant-based protein products.

Considering all stated above, and to guide and develop this paper, two research questions were created with the aim of being answered to throughout this dissertation:

- Are Environmental Concerns enough to increase purchase intention of plant-based products?
- How does type of diet and product quality increase impact the relationship between environmental concerns and purchase intention?

This project will be divided into five important chapters. It starts with the literature review section, where all the variables that are going to be analyzed are supported with theory from prior research, and based on that, the hypothesis are formulated and sustained, as well as the study's conceptual model. Then a chapter about methodology is presented, where all the descriptive data is shown and analyzed, in order to understand our sample. Jumping into the results section, it is here where it will be assessed the validity of the hypothesis, adding the main findings to each. All the finding will then be discussed in the next chapter, the discussion, where they are compared to pre-existent literature on the topic and take some useful insights out of that. Last but not least, a conclusion chapter is presented, inserting the main findings of the study, its limitations, as well as directions for future research.

2. LITERATURE REVIEW

The literature review required to fulfill the objectives of this paper is presented in this chapter, along with the paper's conceptual model. The results of purchase intention will be examined first, with a focus on the findings related to plant-based protein products. Following the understanding that the urge to purchase plant-based products is increasing due to environmental concerns, a chapter is dedicated to this factor and how it impacts purchase intention of plant-based protein products. Additionally, the impact of type of diet and the perceived quality of the product will be investigated to determine, once more, how these factors affect consumers' intentions to purchase plant-based protein products.

2.1. PURCHASE INTENTION OF PLANT-BASED PROTEIN

Purchase intention is commonly understood as a crucial factor that motivates and encourages consumers to make actual purchases of products and services (Zhuang et al., 2021). Plant-based alternatives companies are challenging conventional animal agriculture to meet the global demand for protein consumption, providing an opportunity for both new and established brands to develop new products to fill the current market gap. However, some critical issues such as cost, taste and texture, quality control, nutritional profile, and regulatory concerns remain unresolved in order for Plant-based meat alternatives to be widely adopted by all stakeholders (Choudhury et al., 2020). Plus, concerns regarding promotion, availability and visibility in store are also among the factors that influence plant-based food purchasing (Gravely & Fraser, 2018). Focusing on the retailers' role to disseminate plant-based products, evidence from the same authors cited above has shown that supermarkets play a dual role in enabling and limiting consumers' plant-based protein consumption, because they are increasing the availability of Plant-based options, but on the other hand they rely on basic in-store marketing strategies for these products (Gravely & Fraser, 2018). Based on these authors' findings, they state that retailers' role is relevant because efforts to increase consumption of environmentally sustainable alternative proteins may be ineffective unless food retail environments support these food changes. Considering all stated, it is safe to say that all those factors are important to consider, ensuring plant-based products purchase.

Studies have shown that the strength of the relationship between buyers' stated intentions and their ultimate purchase behavior varies depending on the type of product, being the intentions more correlated with 1) durable products than non-durable products, and 2) short-term horizons than long term horizons (Morwitz et al., 2007).

What leads to a higher purchase intention of plant-based products?

2.1.1. Environmental Concerns

Environmental knowledge is described as an extensive comprehension of the principles, relationships, and facts relating to the natural world and its main ecosystems (Fryxell & Lo, 2003). Customer's intentions to buy environmentally friendly products are greatly influence by their level of environmental knowledge (Kanchanapibul et al., 2014).

Sustainability is a wide concept that can experience various interpretations since it can be used in many different contexts. Some authors inclusively say that sustainability is an everlasting buzzword that changes overtime and where politics and ideas can meet (Scoones, 2007). Although, considering this theme, the term sustainability will be mainly applied to situations that may influence plant-based protein consumption.

Lately, the meat industry is facing significant changes and advances in technology and policies, which are both key factors to execute good practices in this field. It is stated that all strategies behind the assurance of sustainability in meat production must equally meet its production and consumption factors (Kumar et al., 2022). Compared to meat-based diets, plant-based ones are more sustainable considering the perspective where they require a considerably less quantity of natural resources and have a smaller environmental impact. Nonetheless, when thinking over the world's growing population, and consequently higher demand for animal products, the current food system is becoming unsustainable (Sabaté & Soret, 2014). These conclusions reached by Sabaté & Soret are sustained by other authors like Salter, who claims that the concern this trend is causing can lead to an unsustainable pressure on the environment, which might be exacerbated by the effects of climate change (Salter, 2017). Concerns about sustainability are becoming more prevalent when considering the future of vegetarian and vegan diets as individuals look to balance personal responsibility with a high quality of life for themselves and future generations (Leitzmann, 2014). The same author also highlights people's concern about climate change and the planet's destruction itself. Additionally, the author emphasizes how worried people are about both climate change and the planet's ultimate damage.

Authors like (van der Meer et al., 2023), claim that replacing animal-derived proteins with plant-based proteins brings environmental benefits. Other authors deep dive into the topic, and find out that environmental concerns have significant impact on the purchase of plant-based meat (Chen, 2022), which is a kind of plant-based protein. According to Ajzen's Theory of Reasoned Action (TRA), behavioral intention is strongly correlated with attitudes and subjective norms, and actual behavior is correlated with behavioral intention (Ajzen, 1991). When applied to this study's topic, it is possible to state that if someone is concerned with the environment (attitude), might have the intention to buy plant-based products (behavioral intention), which consequently leads to the actual purchase intention of plant-based products (actual behavior). Considering this, the first hypothesis is presented as it follows:

H1: Higher environmental concerns positively predict the purchase intention of plant-based protein products.



Figure 1 - Hypothesis 1

2.2. OTHER FACTORS THAT INFLUENCE PURCHASE INTENTION OF PLANT-BASED PROTEIN

2.2.1. Type of diet

Plant-based food growth is one of the highest in the food sector among many categories (Deloitte, 2019), having expectations to disruptively continue to grow until 2023 (Statista, 2021). There are different kinds of diets that boost plant-based consumption, ones being more extreme than others. However, these concepts are not viewed only as diets, but also as a way of living and a movement (Greenebaum, 2012). An in-depth overview will be performed in some of them, mainly the vegetarian and the vegan diet.

Studies on effects of vegan diets say that is crucial that it includes a wide variety of products, and the apparent benefits can only arise when the diet is carefully planned and monitored (Katonova et al., 2022). Another concept that has been arising is flexitarianism/semi-vegetarianism, which includes people who opt for a fully plant-based diet in the majority of meals, but does not fully exclude animal derivatives (Derbyshire, 2017). Different types of flexitarianism were verified, being the three types: light, medium and heavy, varying considering the number of meatless meals done during the week. The author also shows that 19.3% of the surveyed population in his paper is either meat-avoider, meaning vegan or vegetarian, or heavy flexitarian (Dagevos & Voordouw, 2013). The concept should not instantly be interpreted as a first step towards veganism or vegetarianism, because it is not necessarily the case. It is also stated that this movement is having gradually more supporters all over the world (Dagevos, 2014).

Due to all the focus allocated to this topic, it is safe to say that not only adults, but also younger age groups now have easier access to plant-based options, mainly through school canteens. Studies have shown that encouraging schools to serve more plant-based food has the potential to benefit public health, social welfare, economic development, community well-being, and environmental preservation (Roque et al., 2022). Plus, parents who reported being influenced by their children's desires, such as current food preferences and requests, had children with less healthy food preferences. This relationship suggests that children's food preferences and requests influence not only their own food choices, but also those of their parents (Russell et al., 2015). Considering this, it's safe to state that providing plant-based options to children can influence their parents' diets.

The choice of changing the diet adopted by someone to another is most likely a decision supported by some specific factors. Literature supports that behavior is influenced by three main components, being them capability, opportunity and motivation (Graça, Godinho, et al., 2019). Graça also states, in another article wrote with Truninger, that ethics and health are the two main reasons that motivate the transition to a Plant-based diet (Graça, Truninger, et al., 2019).

A study conducted in Belgium, it was discovered that vegetarians were more likely to consider meat production as something unhealthy and bad for the environment than people that include animal-protein products in their diets (Mullee et al., 2017). It is also know that a growing number of people have been adopting plant-based diets in recent years (Alcorta et al., 2021).

Considering the stated findings, two hypotheses were created, one having precedence towards the other:

H2a: Plant-based diet positively predicts the purchase intention of plant-based protein products.



Figure 2 - Hypothesis 2a

H2b: The relationship between environmental concerns and purchase intention is moderated by type of diet.

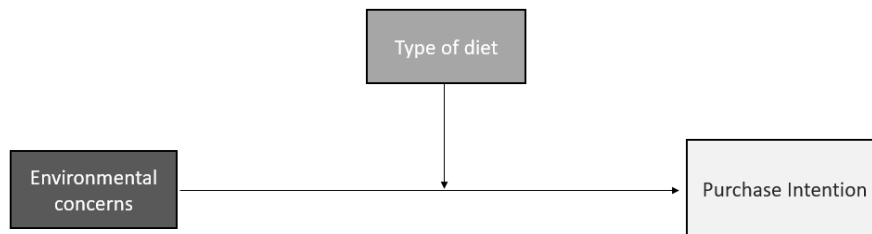


Figure 3 - Hypothesis 2b

2.2.2. Perceived quality of the product

Perceived quality, which reflects how customers feel about the relative benefit of a specific good or service, is a requirement for behavioral intention and satisfaction. It is defined as a customer's assessment of a product's overall benefits over competing goods (Zeithaml, 1988). Consumers assess items using the cues provided in the product manual, usually weighting factors like price, design, and brand to determine the perceived quality of the product before deciding whether or not to purchase it (Ruswanti et al., 2016). Several studies support that the perceived quality of a certain product is positively related to its purchase intention (Konuk, 2018) (Asshidin et al., 2016). The studies that served as an example evaluate what's the influence of private label's perceived quality in its purchase intention (Konuk, 2018), and in imported versus local products (Asshidin et al., 2016), and in both, perceived quality seems to have a positive role in purchase intention. When we move on to the purchase intention of plant-based products, prior research has also shown that perceived quality definitely has an important role. It was found that people who believe that organic production has a higher quality, as well as better for the environment, purchase more organic food (Denver et al., 2023);(Wier et al., 2008).

H3a: High perceived product quality positively predicts the purchase intention of plant-based protein products.



Figure 4 - Hypothesis 4a

H3b: The relationship between environmental concerns and purchase intention is moderated by the perceived quality of products.

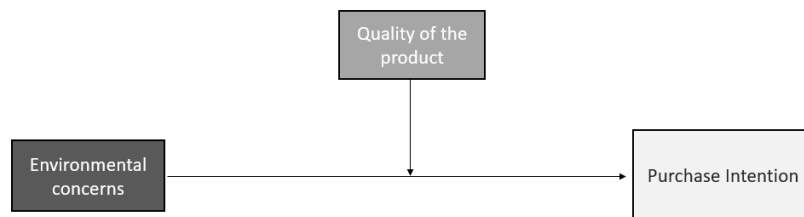


Figure 5 – Hypothesis 3b

Considering all stated above, a final hypothesis was constructed in order to evaluate the relationship among all relevant factors.

H4: The relationship between environmental concerns and purchase intention is moderated by type of diet and quality of products.

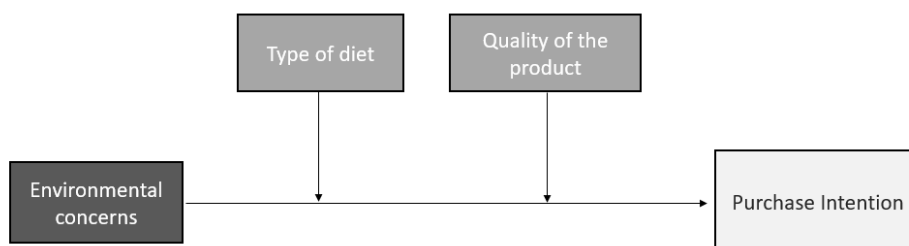


Figure 6 – Hypothesis 4

This model represents the way this dissertation's research questions will be answered. In order to achieve it, a quasi-experimental design study was performed that targeted vegans and vegetarians living in Portugal, as well as animal-based dieters. Each respondent will be faced with one out of two options: three high-quality plant-based food protein products, or three low-quality plant-based food protein products.

3. METHODOLOGY

The entire foundation of this study is based on quantitative data, which was gathered using a survey constructed on the platform Qualtrics. Quantitative data seeks to collect data using measurement, analyzing that data for trends and relationships, and using surveys and experiments as the main research methods (Watson, 2015). It also addresses the concept of independent (IV) and dependent variables (DV), as well as other issues related to measurement, like validity or errors (Watson, 2015).

3.1. SAMPLE

The following study was constructed using an experimental design experience, collecting answers from people with more than 18 years old living in Portugal. In order to recruit as many participants as possible, the survey was shared in social media, whether in groups that promote plant-based lifestyle and/or diet, among friends and family and with the NOVA IMS students.

The survey collected 274 valid answers, from which 196 were female (71.5%) with an average of 32,2 years old, 77 were male (28.1%) with an average of 30,4 years old and 1 other (0,4%) with an average of 25,0 years old. The average salary of the total sample accounts for 1223,9€, being the average salary for females 1188,3€, for males 1310,9€ and 1500,0€ for others. When it comes to education level, the respondents have an average of 15,7 education years. Regarding respondent's type of diet, 88 were vegetarian (32,1%), 36 were vegan (13,1%) and 150 had other regime that included animal protein (54,7%), meaning that 45,3% of the respondents adopt a plant-based diet. The demographics separating these two groups are shown in table 2:

Table 1 - Respondents' Demographics

Demographics	Total (N=274)		Vegetarian/Vegan (N=124)		Incl/animal protein (N=150)	
	Frequency	%	Frequency	%	Frequency	%
Age						
18-24	75	27%	26	21%	49	33%
25-34	120	44%	56	45%	64	43%
35-44	41	15%	27	22%	14	9%
45-54	23	8%	10	8%	13	9%
55-64	10	4%	2	2%	8	5%
65+	5	2%	3	2%	2	1%
Gender						
Female	196	72%	96	77%	100	67%
Male	77	28%	27	22%	50	33%
Other	1	0%	1	1%	0	0%
Nº of school years						
<= 9	2	1%	1	1%	1	1%
10 - 12	43	16%	20	16%	23	15%
13 - 15	78	28%	38	31%	40	27%
16 - 17	108	39%	44	35%	64	43%
>17	43	16%	21	17%	22	15%
Avg. monthly net salary						
No income	47	17%	18	15%	29	19%
1€ - 740€	12	4%	5	4%	7	5%
741€ - 1100€	76	28%	30	24%	46	31%
1101€ - 1400€	72	26%	39	31%	33	22%
1401€ - 1700€	25	9%	11	9%	14	9%
1701€ - 2000€	17	6%	9	7%	8	5%
> 2000€	25	9%	12	10%	13	9%

The age range of 25 to 34 years old is the one that exhibits the highest frequency among the respondents in both groups, with females making up the majority. In terms of the number of school years, respondents who identify as vegetarians/vegans and/or animal protein eaters most frequently fall between the ages of 16 and 17. This sample matches with prior research that finds a pattern in a plant-based dieter profile, stating they are usually females with on average 35 years old (Michalak et al., 2012). Nonetheless, when comparing average monthly salary, vegans and vegetarians make more money than the other group.

Since the survey was only valid for people currently living in Portugal, statistics regarding the district of residence were also collected, as shown in the table 3 bellow:

Table 2 - Respondents' District of Residence

District of Residence	Total (N=274)		Vegetarian/Vegan (N=124)		Incl/animal protein (N=150)	
	Frequency	%	Frequency	%	Frequency	%
Aveiro	10	4%	2	2%	8	5%
Beja	0	0%	0	0%	0	0%
Braga	14	5%	7	6%	7	5%
Bragança	1	0%	1	1%	0	0%
Castelo Branco	0	0%	0	0%	0	0%
Coimbra	7	3%	4	3%	3	2%
Évora	0	0%	0	0%	0	0%
Faro	3	1%	2	2%	1	1%
Guarda	0	0%	0	0%	0	0%
Leiria	7	3%	4	3%	3	2%
Lisboa	61	22%	32	26%	29	19%
Portalegre	0	0%	0	0%	0	0%
Porto	145	53%	61	49%	84	56%
Santarém	4	1%	2	2%	2	1%
Setúbal	15	5%	6	5%	9	6%
Viana do Castelo	2	1%	1	1%	1	1%
Vila Real	2	1%	1	1%	1	1%
Viseu	3	1%	1	1%	2	1%

Meaning that the majority of the respondents currently reside in Porto (53%), followed by Lisboa (22.0) and Setúbal (5.7%). Porto is also the district where 49% of vegetarians and vegans are from.

Finally, as previously mentioned, the respondents were randomly presented to one out of two possible scenarios: one where the products depicted were high quality products, or another where the products quality was low. Table 4 shows how were those two scenarios reflected in this study's sample:

Table 3 - Quality Groups

Quality groups	Total (N=274)		Vegetarian/Vegan (N=124)		Incl/animal protein (N=150)	
	Frequency	%	Frequency	%	Frequency	%
High Quality (Q+)	127	46%	55	44%	72	48%
Low Quality (Q-)	147	54%	69	56%	78	52%

Table 4 - Demographic Means

	Avg Age	Avg school years	Avg net income	t-test	p-value
High Quality (Q+)	31.09	15.84	1133.25	4.374	n.s
Low Quality (Q-)	31.86	15.65	1309.92		
Plant-based diet (PB)	32.12	15.76	1256.34	-5.519	n.s
Animal based diet (AB)	30.99	15.73	1205.46		

In table 4, the average age, school years and net income are presented per quality and dietary group. None of these demographic variables were significative to explain differences in any of the groups.

3.2. PROCEDURE

The survey was conducted using matrix question type, with a 7-point Likert scale in all of them. Only demographic questions had text entry and/or multiple-choice questions.

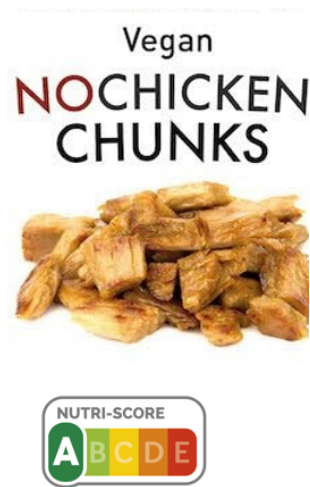
A survey was then chosen as the main instrument for this study. The first step involved asking the respondents to read and provide their consent to standard information, where to participate in the research, they had to declare they were at least eighteen years of age, that they lived in Portugal, that they were aware that their participation in the study could end at any time, for any reason, and that it was entirely voluntary. The same set of questions was then presented to each respondent in order to assess their level of environmental concerns, from 1- Strongly disagree to 7- Strongly agree. After, they were asked answers to questions regarding purchase intention and quality perception (with the same scale labels mentioned for environmental concerns) about three different plant-based protein products, where each participant was randomly assigned to one of two groups: high quality or low-quality products. To be able to assess information about their purchase intention and quality perception of those plant-based protein products, three distinct plant-based protein options—vegan chicken, chickpeas, and tofu - were presented to the participant, which answered questions about whether they would purchase each of the products presented, as well as their quality perception for each. Various kinds of plant-based protein were presented in order to ensure variability of products, in order to exclude bias based on personal taste.

Each product picture was shown accompanied with its nutritional information and nutri-score. Nutri-score is a color-coding (from dark green to dark orange) and alphabetical (from A to E) label, that aims, in a simple and understandable way, to inform consumers about the overall nutrition value of a certain product, based on the products composition and comparing them to similar ones (Hercberg et al., 2022). “A” (dark green) corresponds to the best rating, and “E” (dark orange) to the worst.

The two groups were distinct from one another in terms of quality; one group evaluated high-quality products (with nutri-score A and the corresponding nutritional information), while the other group presented low-quality products with nutri-score D and the corresponding nutritional information.

An example of how the products pictures were presented to the participants in the survey for both high-quality and low-quality product is shown in Figures 7 and 8:

Price per unit (175g): 5,73 €



Per 100g:

Fat	2,6	Gram
Saturated fats	0,4	Gram
Carbohydrates	12,0	Gram
Carbohydrates > of which sugar	0,5	Gram
Dietary fiber	6,0	Gram
Protein	6,5	Gram
Salt	0,93	Gram

Figure 7 - High-quality product example

Price per unit (175g): 5,73 €



Per 100g:

Fat	17,0	Gram
Saturated fats	9,5	Gram
Carbohydrates	14,0	Gram
Carbohydrates > of which sugar	5,0	Gram
Dietary fiber	2,5	Gram
Protein	6,5	Gram
Salt	0,93	Gram

Figure 8 - Low-quality product example

There was a significant difference between the two experimental groups for their perception about the quality of the products presented ($t(272) = -4.647$, $p < 0.001$, High Quality = 4.53, Low Quality = 3.67), ensuring the effectiveness of the manipulation performed.

Lastly, participants answered demographic questions regarding their type of diet, gender, age, district of residence, education level and average net salary.

Table 5 shows all the constructs and items used in the survey:

Table 5 – Constructs and items

Constructs	Item	Reference
Consumer's degree of greenness / Sustainability (S)	S1: I would describe myself as environmentally responsible. S2: I care about buying environmentally friendly products. S3: When I purchase products, I try to make efforts to buy products that are low in pollutants. S4: If I understand the potential damage to the environment that some products can cause, I do not purchase those products. S5: I have purchased light bulbs that were more expensive but saved energy. S6: I make every effort to reduce the use of plastic bags. S7: I have convinced members of my family or friends not to buy some products which are harmful to the environment. S8: I am concerned about the current environmental state the world is in. S9: It is of no use worrying about environmental issues: I can't do anything about them. S10: I will not buy a product if the company which sells it is environmentally irresponsible.	(Datta, 2011)
Purchase Intentions (PI)	PI1: If I was going to buy plant-based protein, the probability of buying this product is high PI2: The probability that I would consider buying this product is high PI3: The likelihood that I would purchase this product is high	(Grewal et al., 1998)
Perceived Quality (PQ)	PQ1: The product appears to be of good quality PQ2: The product appears to be durable PQ3: The product appears to be reliable	(Grewal et al., 1998)

3.3. DATA ANALYSIS

IBM SPSS Statistics version 29 was the tool used to perform all the analysis for this study. In order to understand in depth the sample through descriptive data, frequencies and t-test analysis were conducted for all demographic variables. Furthermore, simple regressions were performed to understand if both the independent variable and the moderators predict the dependent variable, making it possible to answer H1, H2 and H3. To answer the rest of the hypothesis, two simple and one double moderation were performed, following Andrew F. Hayes model 1 and model 2, respectively (Hayes, 2017). All significance tests were performed based on a 95% confidence interval, meaning that $p\text{-value} \leq 0.05$.

4. RESULTS EVALUATION

4.1. DATA VALIDATION

The study started by understanding if the dependent variable (DV), purchase intention of plant-based protein products, was positively predicted by the independent variable (IV), environmental concerns. To assess the extent to which the independent variables could predict purchase intention, one simple linear regression was performed.

A significant prediction was found ($F(1,274) = 4.993$, $p = .026$), meaning that purchase intention of plant-based protein products is predicted by a person's level of environmental concerns. The R^2 was 0.018, meaning that environmental concerns explain approximately 1.8% of the variance in purchase intention of plant-based protein products. For each unit increase in environmental concerns, it is verified an increase of approximately 0.026 units in purchase intention ($\beta = 0.026$). Using a confidence interval (CI) of 95%, it is correct to state that we can be 95% certain that the slope to predict purchase intention of plant-based protein products from environmental concerns is between 0.003 and 0.048.

H1 is confirmed.

Despite the positive prediction stated above, there are other variables that may also predict a higher purchase intention of plant-based protein products. These two variables are type of diet and product quality. To evaluate it, two more linear regressions were performed.

Starting with type of diet, a highly significant prediction was found ($F(1,274) = 19.129$, $p = <.001$), meaning that purchase intention of plant-based protein products is predicted by the type of diet that a person adopts. The R^2 was 0.062, meaning that type of diet explains approximately 6.2% of the variance in purchase intention of plant-based protein products. For each unit increase in type of diet, it is verified a decrease of approximately 0.709 units in purchase intention ($\beta = -0.709$). In other words, purchase intention of plant-based protein products decreases in animal-protein eaters. Using a confidence interval (CI) of 95%, it is correct to state that we can be 95% certain that the slope to predict purchase intention of plant-based protein products from type of diet is between -1.028 and -0.390.

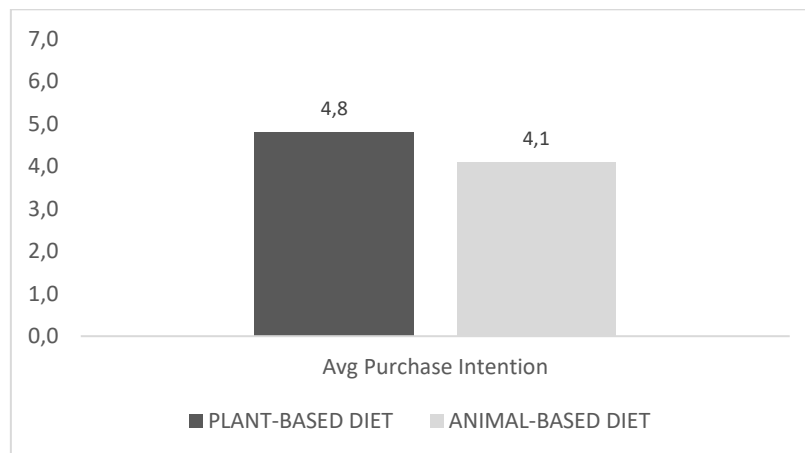


Figure 9 – Purchase intention means

On average, it is possible to see a higher purchase intention of plant-based protein products on plant-based dieters, rather than on animal-based protein dieters.

H2a is confirmed.

Both type of diet and quality of products have a positive relationship with the purchase intention of plant-based protein products. In this paper, the objective is to understand if these variables contribute to increase or decrease the positive effect that already exists between environmental concerns and purchase intention of plant-based protein products. To achieve it, two simple moderations will be performed, using model 1 of Andrew F. Hayes. The results of the first one are shown in Table 6:

Table 6 - Moderation H2b results

Model	β	p	LLCI	ULCI
Constant	11.4742	0.0000	6.5202	16.4282
Environmental Concerns (EC)	-0.1113	0.0162	-0.2019	-0.0207
Type of diet (TD)	-4.5960	0.0011	-7.3354	-1.8566
EC x TD	0.0731	0.0047	0.0226	0.1237

By analyzing table 6, it is possible to see that all scenarios are significative ($p\text{-value} \leq 0.05$). With the presence of type of diet, the relationship between environmental concerns and purchase intention is negative, meaning that purchase intention decreases -0.1 units by each unit increase in environmental concerns ($\beta = -0.1113$). With type of diet, the relationship with purchase intention is inverse, meaning that animal-protein dieters decrease -4.6 units in the scale of purchase intention ($\beta = -4.5960$). However, when looking at the results of the moderation, the interaction becomes positive, which means that, combined together, environmental concerns and type of diet increase 0.07 units in the scale of purchase intention ($\beta = -0.1113$). It is important to analyze the effects on environmental concerns and purchase intention per dietary group. In order to assess that, figure 10 and table 7 are presented:

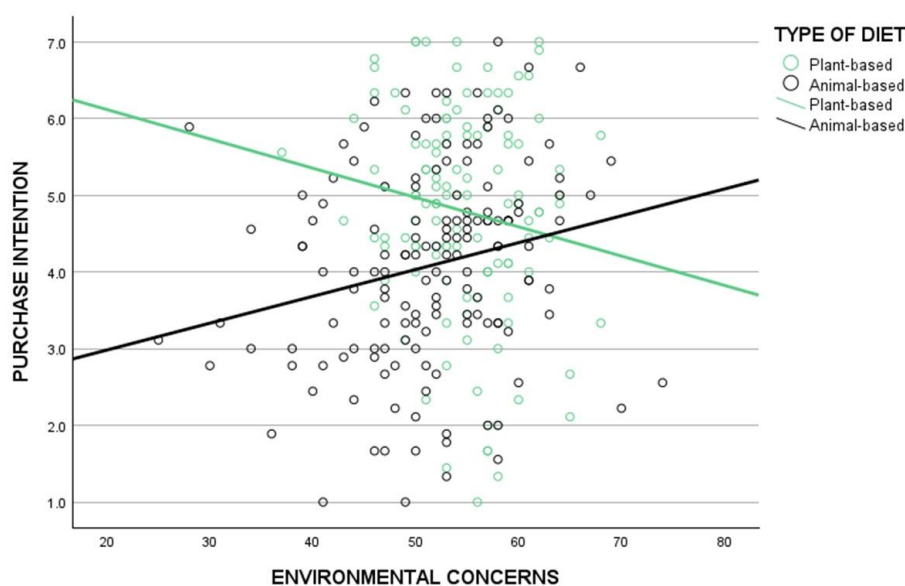


Figure 10 - Scatterplot – type of diet

Table 7 - Conditional effects - type of diet

Diet	β	p	LLCI	ULCI
Plant-based	-0.0382	0.0845	-0.0845	0.0052
Animal-based	-0.0350	0.0083	0.0091	0.0609

Figure 10 demonstrates that when environmental concerns increase, so does the purchase intention of plant-based protein products among animal-based dieters. In contrast, the trend for plant-based dieters is the exact opposite, with their environmental concerns driving down their purchase intention. This effect is only significant for animal-based dieters (p -value = 0.0845), which means that the highest their environmental concerns, the biggest increase in purchase intention of plant-based protein products; however, in plant-based dieters, as the interaction is marginally significant (p -value = 0.0083), it is possible to identify an eventual trend where environmental concerns lead to a lower purchase intention of plant-based products by vegans/vegetarians.

Therefore, H2b is verified.

Moving on to quality of product, another highly significant prediction was found ($F(1,274) = 30.458$, $p = <.001$), meaning that purchase intention of plant-based protein products is predicted by the quality of products. The R^2 was 0.101, meaning that quality of products explains approximately 10.1% of the variance in purchase intention of plant-based protein products. For each unit increase in product's quality, it is verified a decrease of approximately 0.876 units in purchase intention ($\beta = 0.876$). In other words, purchase intention of plant-based protein products increases if the products have a higher quality. Using a confidence interval (CI) of 95%, it is correct to state that we can be 95% certain that the slope to predict purchase intention of plant-based protein products from product's quality is between 0.564 and 1.189.

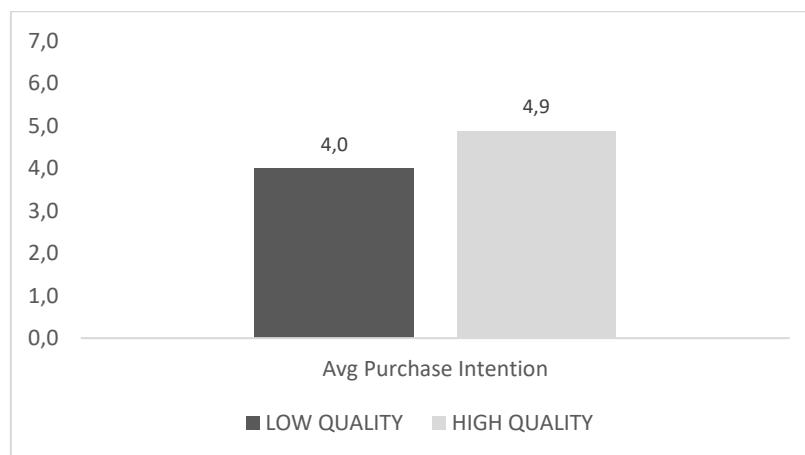


Figure 11 - Product's quality means

On average, it is possible to see a higher purchase intention of high-quality plant-based protein products, rather than on low-quality plant-based products.

H3a is confirmed.

Heading to the second moderation with product quality as a moderator, the results of the first one are shown in Table 8:

Table 8 - Moderation H3b results

Model	β	p	LLCI	ULCI
Constant	4.5913	0.0148	0.9058	8.2768
Environmental Concerns (EC)	-0.0285	0.4152	-0.0971	0.0402
Product quality (PQ)	-1.1232	0.3333	-3.4049	1.1585
EC x PQ	0.0384	0.0781	-0.0043	0.0811

By analyzing table 8, it is possible to see that, this time, not all scenarios are significative (p -value ≤ 0.05). With the presence of product quality, the relationship between environmental concerns and purchase intention is not significative (p -value = 0.4152). The same happens between product quality and purchase intention. It becomes not significative with the presence of environmental concerns (p -value = 0.3333). However, when looking at the results of the moderation, the interaction becomes marginally significative (p -value = 0.0781) which means that, combined together, environmental concerns and product quality increase 0.04 units in the scale of purchase intention ($\beta = -0.0384$). It is important to analyze the effects on environmental concerns and purchase intention per product quality group. In order to assess that, figure 12 and table 9 are presented:

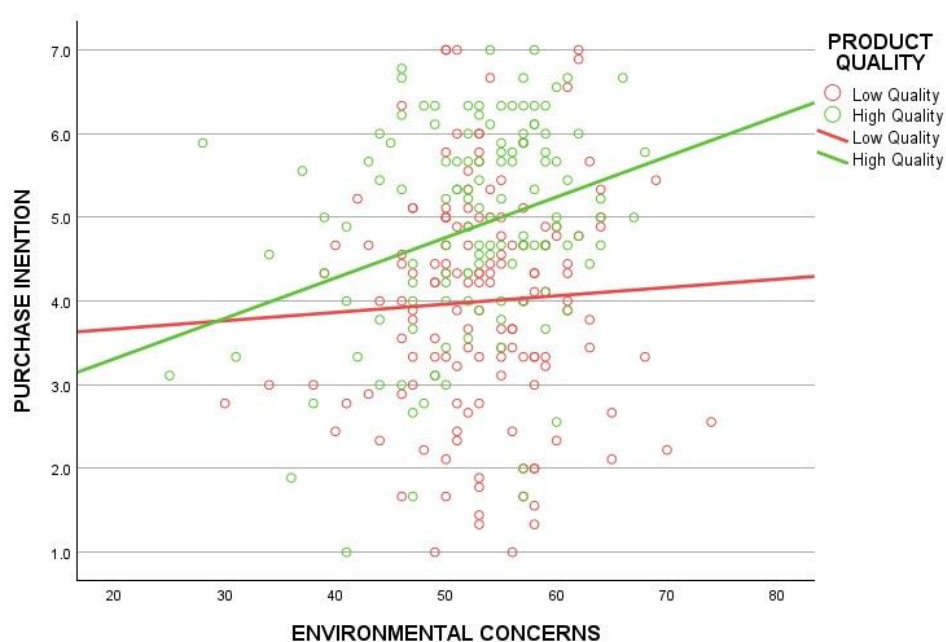


Figure 12 – Scatterplot – product quality

Table 9 - Conditional effects - product quality

Diet	β	p	LLCI	ULCI
Low-quality	0.0099	0.5299	-0.0211	0.0410
High-quality	0.0483	0.0013	0.0189	0.0777

According to table 9, the effect is only significant for high-quality group (p-value = 0.0013). Figure 7 demonstrates that when environmental concerns increase, so does the purchase intention of plant-based protein products among high-quality products.

Therefore, 3b is verified.

Finally, in order to understand if H6 is verified, a last moderation will be performed, and this time a double moderation, using model 2 of Andrew F. Hayes in IBM SPSS statistics. Table 8 shows the double-moderation results:

Table 10 - Double-moderation H4 results

Model	β	p	LLCI	ULCI
Constant	12.3245	0.0000	6.8274	17.8216
Environmental Concerns (EC)	-0.1523	0.0033	-0.2534	-0.0512
Type of diet (TD)	-4.4513	0.0008	-7.0241	-1.8784
EC x TD	0.0701	0.0040	0.0226	0.1175
Product quality (PQ)	-0.8296	0.4559	-3.0171	1.3580
EC x PQ	0.0331	0.1125	-0.0078	0.0741

As shown in table 10, the relationship between environmental concerns has purchase intention is significant (p-value = 0.0033), being safe to say that, for each unit increase of environmental concerns, purchase intention decrease -0.15 units ($\beta=-0.1523$). The type of diet was related to Purchase intention (p-value = 0.0008): Omnivorous participants points less 4.45 units in the scale of Purchase intention ($\beta=-4.4513$). The positive b-coefficient for the significant interaction predictor (p-value = 0.0040) indicates that the Environmental concerns effect becomes more positive for the group of Omnivorous participants. However, product quality was not related with purchase intention, neither the relationship between Environmental concerns and Quality of the product on Purchase intention (p-value > 0.05).

The effects on environmental concerns and purchase intention per type of diet for each quality group are assessed in bellow figure 13 and table 11:

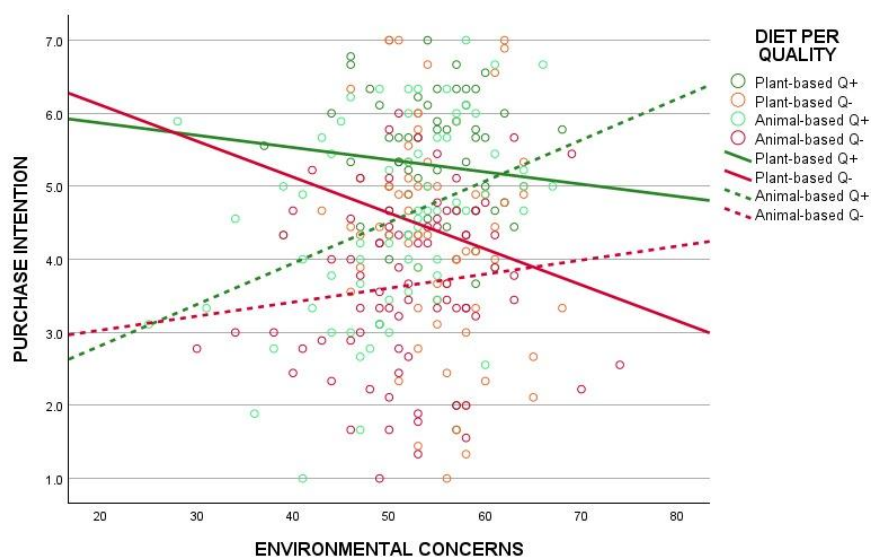


Figure 13 - Scatterplot – diet per quality

Table 11 - Conditional effects - diet per quality

Model	β	p	LLCI	ULCI
Plant-based Q+	-0.0160	0.4992	-0.0624	-0.0305
Plant-based Q-	-0.0491	0.0312	-0.0937	-0.0045
Animal-based Q+	0.0541	0.0005	0.0238	0.0844
Animal-based Q-	0.0210	0.2156	-0.0123	0.0543

The effect is only significant for plant-based dieters purchasing low-quality products (p-value = 0.0312) and for animal-based dieters purchasing high-quality products (p-value = 0.0005). This means that purchase intention of low-quality plant-based protein products decreases in plant-based dieters when increasing their levels of environmental concerns. The exact opposite happens with animal-based dieters, whose purchase intention of high-quality plant-based protein products increases when their levels of environmental concerns expand.

H4 is not verified, since only moderation by type of diet is significant, and therefore, a double moderation was not validated.

5. DISCUSSION

This dissertation's primary goal is to determine whether eating an animal-based or plant-based diet when buying high- or low-quality plant-based protein products affects the relationship between environmental concerns and the intention to buy this sort of products.

It was discovered that, as previously demonstrated in developed literature (Mostafa, 2007) (Chen, 2022), environmental concerns elevate consumers' intentions to purchase plant-based protein products. Results also showed that type of diet also affects purchase intention of plant-based products, stating that vegans and vegetarians are more likely to purchase these kind of products when comparing to animal-protein eaters (Estell et al., 2021). This inference could be explained by the fact that animal-protein eaters have a wider range of protein available since their diet is not so restrictive, while plant-based eaters have not (Brytek-Matera, 2020). In addition to this, the analysis on the product's perceived quality made possible to confirm that purchase intention of plant-based protein products increases with the products quality, meaning that high-quality products lead to a higher purchase intention (Konuk, 2018) (Asshidin et al., 2016). Other studies also suggest that an in-depth evaluation of a product's quality can be the main reason why customers end up buying a certain product (Ruswanti et al., 2016). A high perceived quality can also be one of the reasons why consumer loyalty to a certain product or store increases (Coelho do Vale et al., 2016), which can be one of the explanations for the higher purchase intention generated by high-quality plant-based products.

Furthermore, research results indicate that the more concerned about the environment animal-based dieters are, the more likely they are to purchase plant-based protein products. That could be explained by evidence demonstrating that a significant number of western meat eaters are already drawn to environmental reasons for implementing meat-reduction tactics like meatless days (Sanchez-Sabate & Sabaté, 2019). The same study verified the exact opposite, stating that ecological concerns for plant-based dieters serve more as an additional justification for vegans/vegetarians' dietary habits than as the primary driving force behind their complete renunciation of animal products. This could explain the fact that the interaction for plant-based dieters between environmental concerns and purchase intention was only marginally significant.

The intention to purchase high-quality plant-based protein products is another factor that, according to the study's findings, rises with an increased awareness of environmental concerns. Prior research has shown that customers may buy more organic food if they believe it is of a better quality comparing to other products (Wang et al., 2020), and the same is happening with the respondents of this survey.

Ultimately, two groups' significant interactions were revealed by the results. On the one hand, this study discovered that consumers of animal protein who also have higher levels of environmental concerns are more likely to purchase high-quality plant-based protein products. On the other hand, plant-based dieters who are more concerned about the environment are less likely to intend to purchase low-quality based plant-based protein products. A study has shown that nutrition knowledge and greater food skills were linked to better diet quality (Aasland et al., 2023). The same study has shown that omnivores reveal a lower level in both of those competences when compared to vegans, that scored highest on both comparing to other diets. This knowledge gap indicates that the criteria for quality assessment of products might differ in both dietary groups and is proven by another study developed in the area, that found that the diet followed by each consumer leads to a different product

perception. The same study found that while vegans and vegetarians focus on the clean label status in order to categorize products, while omnivores were not able to make that separation (Noguerol et al., 2021). Since the products used in this research were all plant-based protein products sold in retailers, the inexistence of a clean label in the products presented might have affected the quality perception by plant-based dieters.

6. CONCLUSIONS

This dissertation concludes that people who eat meat are more likely to think of packaged plant-based protein products as environmentally friendly substitutes. This pattern points to a big chance for businesses looking to create plans that rely on addressing environmental issues. More specifically, those who consume animal protein would be the primary target audience for these kinds of initiatives. Companies can effectively capture the interest and attention of this group of people by highlighting the environmental benefits of plant-based alternatives, which could lead to a widespread adoption of more sustainable dietary choices. Oppositely to what happens with animal-based dieters, the study has revealed an interesting trend among plant-based dieters: an inverse relationship exists between their intention to purchase low-quality plant-based protein products and increased environmental concerns. Unlike meat-eaters, this group is not receptive to environmental sustainability-focused tactics. Plant-based dieters' purchasing decisions are greatly impacted by their preference for quality over environmental factors. Due to this trend found in consumer behavior, marketing strategies designed for meat eaters cannot be applied to vegans or vegetarians. Rather, to effectively engage with this particular group, strategies addressing quality might be a way to achieve it.

6.1. LIMITATIONS AND FUTURE RESEARCH

This study approaches a first understanding in the Portuguese population in regards of the influence environmental concerns has in the purchase intention of plant-based protein products, and the effect that type of diet and product quality have on that interaction. However, the study has some limitations that are worth highlighting. The fact that all three products shown in the survey were packaged products sold in supermarkets, by not embracing other types of plant-based proteins, might have biased the analysis for some people. Despite environmental concerns clearly having an impact on purchase intention of plant-based protein products, prior research shows that health concerns can be one of the reasons why people are switching to a plant-based diet (Leitzmann, 2014). Future research would be necessary to understand if it also predicts a higher purchase intention of plant-based products in the Portuguese market. Research on other possible moderators that have an effect of the relationship between environmental concerns and purchase intention would add value. Also, considering our findings majorly helps companies on how to target animal-protein dieters on how to purchase their products, future research on how to attract plant-based dieters in Portugal to purchase plant-based protein products in retailer surfaces would be interesting.

BIBLIOGRAPHICAL REFERENCES

- Aasland, L. M., Groufh-Jacobsen, S., Larsson, C., Margerison, C., Medin, A. C., Mulkerrins, I., & Van Daele, W. (2023). Food literacy and diet quality in young vegans, lacto-ovo vegetarians, pescatarians, flexitarians and omnivores. *Public Health Nutrition*, 26(12), 3051–3061. Cambridge Core. <https://doi.org/10.1017/S1368980023002124>
- Ajzen, I. (1991). The theory of planned behavior. *Theories of Cognitive Self-Regulation*, 50(2), 179–211. [https://doi.org/10.1016/0749-5978\(91\)90020-T](https://doi.org/10.1016/0749-5978(91)90020-T)
- Alcorta, A., Porta, A., Tárrega, A., Alvarez, M. D., & Vaquero, M. P. (2021). Foods for Plant-Based Diets: Challenges and Innovations. *Foods*, 10(2). <https://doi.org/10.3390/foods10020293>
- Asshidin, N. H. N., Abidin, N., & Borhan, H. B. (2016). Perceived Quality and Emotional Value that Influence Consumer's Purchase Intention towards American and Local Products. *7th International Economics & Business Management Conference (IEBMC 2015)*, 35, 639–643. [https://doi.org/10.1016/S2212-5671\(16\)00078-2](https://doi.org/10.1016/S2212-5671(16)00078-2)
- Brytek-Matera, A. (2020). Restrained Eating and Vegan, Vegetarian and Omnivore Dietary Intakes. *Nutrients*, 12(7). <https://doi.org/10.3390/nu12072133>
- Chen, H.-S. (2022). Towards Environmentally Sustainable Diets: Consumer Attitudes and Purchase Intentions for Plant-Based Meat Alternatives in Taiwan. *Nutrients*, 14(18). <https://doi.org/10.3390/nu14183853>
- Choudhury, D., Singh, S., Seah, J. S. H., Yeo, D. C. L., & Tan, L. P. (2020). Commercialization of Plant-Based Meat Alternatives. *Trends in Plant Science*, 25(11), 1055–1058. <https://doi.org/10.1016/j.tplants.2020.08.006>
- Coelho do Vale, R., Verga Matos, P., & Caiado, J. (2016). The impact of private labels on consumer store loyalty: An integrative perspective. *Journal of Retailing and Consumer Services*, 28, 179–188. <https://doi.org/10.1016/j.jretconser.2015.10.003>

- Dagevos, H. (2014). Flexibility in the Frequency of Meat Consumption – Empirical Evidence from The Netherlands. *EuroChoices*, 13(2), 40–45. <https://doi.org/10.1111/1746-692X.12062>
- Dagevos, H., & Voordouw, J. (2013). Sustainability and meat consumption: Is reduction realistic? *Sustainability: Science, Practice and Policy*, 9(2), 60–69. <https://doi.org/10.1080/15487733.2013.11908115>
- Denver, S., Nordström, J., & Christensen, T. (2023). Plant-based food – Purchasing intentions, barriers and drivers among different organic consumer groups in Denmark. *Journal of Cleaner Production*, 419, 138256. <https://doi.org/10.1016/j.jclepro.2023.138256>
- Derbyshire, E. J. (2017). Flexitarian Diets and Health: A Review of the Evidence-Based Literature. *Frontiers in Nutrition*, 3. <https://www.frontiersin.org/articles/10.3389/fnut.2016.00055>
- Estell, M., Hughes, J., & Grafenauer, S. (2021). Plant Protein and Plant-Based Meat Alternatives: Consumer and Nutrition Professional Attitudes and Perceptions. *Sustainability*, 13(3). <https://doi.org/10.3390/su13031478>
- Fryxell, G. E., & Lo, C. W. H. (2003). The Influence of Environmental Knowledge and Values on Managerial Behaviours on Behalf of the Environment: An Empirical Examination of Managers in China. *Journal of Business Ethics*, 46(1), 45–69. <https://doi.org/10.1023/A:1024773012398>
- Graça, J., Godinho, C. A., & Truninger, M. (2019). Reducing meat consumption and following plant-based diets: Current evidence and future directions to inform integrated transitions. *Trends in Food Science & Technology*, 91, 380–390. <https://doi.org/10.1016/j.tifs.2019.07.046>

- Graça, J., Truninger, M., Junqueira, L., & Schmidt, L. (2019). Consumption orientations may support (or hinder) transitions to more plant-based diets. *Appetite*, 140, 19–26.
<https://doi.org/10.1016/j.appet.2019.04.027>
- Gravelly, E., & Fraser, E. (2018). Transitions on the shopping floor: Investigating the role of Canadian supermarkets in alternative protein consumption. *Appetite*, 130, 146–156.
<https://doi.org/10.1016/j.appet.2018.08.018>
- Greenebaum, J. (2012). Veganism, Identity and the Quest for Authenticity. *Food, Culture & Society*, 15(1), 129–144. <https://doi.org/10.2752/175174412X13190510222101>
- Hayes, A. F. (2017). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach*. Guilford publications.
- Hercberg, S., Touvier, M., & Salas-Salvado, J. (2022). The Nutri-Score nutrition label. *International Journal for Vitamin and Nutrition Research*, 92(3–4), 147–157.
<https://doi.org/10.1024/0300-9831/a000722>
- Kanchanapibul, M., Lacka, E., Wang, X., & Chan, H. K. (2014). An empirical investigation of green purchase behaviour among the young generation. *Journal of Cleaner Production*, 66, 528–536. <https://doi.org/10.1016/j.jclepro.2013.10.062>
- Katonova, A., Sheardova, K., Amlerova, J., Angelucci, F., & Hort, J. (2022). Effect of a Vegan Diet on Alzheimer’s Disease. *International Journal of Molecular Sciences*, 23(23). <https://doi.org/10.3390/ijms232314924>
- Konuk, F. A. (2018). The role of store image, perceived quality, trust and perceived value in predicting consumers’ purchase intentions towards organic private label food. *Journal of Retailing and Consumer Services*, 43, 304–310.
<https://doi.org/10.1016/j.jretconser.2018.04.011>
- Kumar, P., Abubakar, A. A., Verma, A. K., Umaraw, P., Adewale Ahmed, M., Mehta, N., Nizam Hayat, M., Kaka, U., & Sazili, A. Q. (2022). New insights in improving

- sustainability in meat production: Opportunities and challenges. *Critical Reviews in Food Science and Nutrition*, 1–29. <https://doi.org/10.1080/10408398.2022.2096562>
- Leitzmann, C. (2014). Vegetarian nutrition: Past, present, future¹²³. *The American Journal of Clinical Nutrition*, 100, 496S-502S. <https://doi.org/10.3945/ajcn.113.071365>
- Michalak, J., Zhang, X. C., & Jacobi, F. (2012). Vegetarian diet and mental disorders: Results from a representative community survey. *International Journal of Behavioral Nutrition and Physical Activity*, 9(1), 67. <https://doi.org/10.1186/1479-5868-9-67>
- Morwitz, V. G., Steckel, J. H., & Gupta, A. (2007). When do purchase intentions predict sales? *International Journal of Forecasting*, 23(3), 347–364. <https://doi.org/10.1016/j.ijforecast.2007.05.015>
- Mostafa, M. M. (2007). A hierarchical analysis of the green consciousness of the Egyptian consumer. *Psychology & Marketing*, 24(5), 445–473. <https://doi.org/10.1002/mar.20168>
- Mullee, A., Vermeire, L., Vanaelst, B., Mullie, P., Deriemaeker, P., Leenaert, T., De Henauf, S., Dunne, A., Gunter, M. J., Clarys, P., & Huybrechts, I. (2017). Vegetarianism and meat consumption: A comparison of attitudes and beliefs between vegetarian, semi-vegetarian, and omnivorous subjects in Belgium. *Appetite*, 114, 299–305. <https://doi.org/10.1016/j.appet.2017.03.052>
- Noguerol, A. T., Pagán, M. J., García-Segovia, P., & Varela, P. (2021). Green or clean? Perception of clean label plant-based products by omnivorous, vegan, vegetarian and flexitarian consumers. *Food Research International*, 149, 110652. <https://doi.org/10.1016/j.foodres.2021.110652>
- Roque, L., Graça, J., Truninger, M., Guedes, D., Campos, L., Vinnari, M., & Godinho, C. (2022). Plant-based school meals as levers of sustainable food transitions: A narrative

- review and conceptual framework. *Journal of Agriculture and Food Research*, 10, 100429. <https://doi.org/10.1016/j.jafr.2022.100429>
- Russell, C. G., Worsley, A., & Liem, D. G. (2015). Parents' food choice motives and their associations with children's food preferences. *Public Health Nutrition*, 18(6), 1018–1027. Scopus. <https://doi.org/10.1017/S1368980014001128>
- Ruswanti, E., Herlambang, B., & Januarko, M. (2016). The effect of brand, design, and price on intention to purchase mediated by quality perception at sport shoes X. *Journal of Economics, Business & Accountancy Ventura*, 19, 249. <https://doi.org/10.14414/jebav.v19i2.458>
- Sabaté, J., & Soret, S. (2014). Sustainability of plant-based diets: Back to the future. *The American Journal of Clinical Nutrition*, 100(suppl_1), 476S-482S. <https://doi.org/10.3945/ajcn.113.071522>
- Salter, A. M. (2017). Improving the sustainability of global meat and milk production. *Proceedings of the Nutrition Society*, 76(1), 22–27. Cambridge Core. <https://doi.org/10.1017/S0029665116000276>
- Sanchez-Sabate, R., & Sabaté, J. (2019). Consumer Attitudes Towards Environmental Concerns of Meat Consumption: A Systematic Review. *International Journal of Environmental Research and Public Health*, 16(7). <https://doi.org/10.3390/ijerph16071220>
- Scoones, I. (2007). Sustainability. *Development in Practice*, 17(4–5), 589–596. <https://doi.org/10.1080/09614520701469609>
- Sridhar, K., Bouhallab, S., Croguennec, T., Renard, D., & Lechevalier, V. (2023). Recent trends in design of healthier plant-based alternatives: Nutritional profile, gastrointestinal digestion, and consumer perception. *Critical Reviews in Food Science and Nutrition*, 63(30), 10483–10498. <https://doi.org/10.1080/10408398.2022.2081666>

- van der Meer, M., Fischer, A. R. H., & Onwezen, M. C. (2023). Same strategies – different categories: An explorative card-sort study of plant-based proteins comparing omnivores, flexitarians, vegetarians and vegans. *Appetite*, 180, 106315. <https://doi.org/10.1016/j.appet.2022.106315>
- Wang, J., Pham, T. L., & Dang, V. T. (2020). Environmental Consciousness and Organic Food Purchase Intention: A Moderated Mediation Model of Perceived Food Quality and Price Sensitivity. *International Journal of Environmental Research and Public Health*, 17(3). <https://doi.org/10.3390/ijerph17030850>
- Watson, R. (2015). Quantitative research. *Nursing standard (Royal College of Nursing (Great Britain) : 1987)*, 29, 44–48. <https://doi.org/10.7748/ns.29.31.44.e8681>
- Wier, M., O'Doherty Jensen, K., Andersen, L. M., & Millock, K. (2008). The character of demand in mature organic food markets: Great Britain and Denmark compared. *Food Policy*, 33(5), 406–421. <https://doi.org/10.1016/j.foodpol.2008.01.002>
- Zeithaml, V. (1988). Consumer Perceptions of Price, Quality and Value: A Means-End Model and Synthesis of Evidence. *Journal of Marketing*, 52, 2–22. <https://doi.org/10.1177/002224298805200302>
- Zhuang, W., Luo, X., & Riaz, M. U. (2021). On the Factors Influencing Green Purchase Intention: A Meta-Analysis Approach. *Frontiers in Psychology*, 12. <https://www.frontiersin.org/journals/psychology/articles/10.3389/fpsyg.2021.644020>
- Deloitte (2019) Plant based alternatives Retrieved from: [file:///C:/Users/s5750985/Downloads/deloitte-uk-plant-based-alternatives%20\(1\).pdf](file:///C:/Users/s5750985/Downloads/deloitte-uk-plant-based-alternatives%20(1).pdf).

