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Plant-based Protein Food Products: Perceptions from the Greek Food Industry

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Abstract.
The food industry is under pressure to improve food production and reduce its impact on the environment. Furthermore, consumers today are increasingly shifting to more sustainable diets. In this context, plant-based protein sources appear as a promising solution. This study investigates the perceptions of company representatives operating in Greece who produce or intend to produce, food products containing plant-based proteins. Based on 360 responses, this quantitative analysis a) identifies the main drivers and barriers for consumer acceptance of these products, b) ascertains the most popular choice (word and phrase) on their labels, and c) explores variations in key marketing factors such as organoleptic characteristics, price, and promotion of plant protein-based products versus those with animal protein sources. According to the findings, “human health” is the prevailing incentive to shift to the consumption of plant-based protein food products. Additionally, “reluctance” is the predominant barrier for consumers to change their eating habits. Regarding the use of words and phrases on labels, the word “plant-protein” and the phrase “high in vegetable protein” were found to be the most popular. Furthermore, there is an agreement that both the organoleptic characteristics and the promotional strategies of plant-based protein products and animal-based protein products, are or should be similar. Interestingly, the majority of respondents noted that the price of plant protein products is or will be higher compared to animal protein products. This study provides meaningful insights into the food and beverage industry and companies that either have or will have products with plant-based sources of protein.

Keywords: alternative proteins, alternative products, plant-based proteins, plant-based substitutes, food industry, business perceptions

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1. Introduction

The global food system is under constant pressure to meet the food needs of a rapidly growing world population and at the same time to maintain the balance of the ecosystem. Intensive food production is an important source of greenhouse gas emissions, it decreases biodiversity and natural resources, and contributes to other global adverse effects. Furthermore, the food sector can be characterized as traditional [1]. Today, however, there is an urgent need for fundamental change. The transition to a more sustainable food system, through the shift to healthier eating habits is critical. Nevertheless, in order to achieve sustainable food systems, the various stakeholders need to further develop the existing healthy food offerings and consider alternative food ingredients. The substitute of animal-based proteins, alternative proteins, is an opportunity to grow, increase profitability, enhance competitiveness, and develop an innovative character for food and beverage companies.

Today there is a considerable consumer shift to sustainable diets [2]. Several studies have examined plant based protein products. The majority of them focus on the consumer's side, such as consumer acceptance [3-7], their contribution to ecosystem sustainability [8-11], their impact on human health [12-15], and their technological feasibility [16-17]. However, the perception of the industry regarding plant-based proteins has not been studied extensively. A limited number of studies have examined the views of various stakeholders, such as producers, food and beverage industries, wholesalers and retailers of plant-based protein products. Moreover, in most cases researchers have relied on interviews with executives and/or business owners and other stakeholders in the supply chain to gather data [18-22]. This study fills the above gap by empirically investigating the factors that contribute to the transition to more sustainable food choices for consumers, based on plant proteins. The respondents' perceptions are analyzed to provide for appropriate solutions to the challenges and to propose an effective approach to the food and beverage companies that either offer or plan to offer food products with plant based sources of protein. The value of this study lies in the fact that it examines the perceptions of managers and employees in the food and beverage sector regarding the use of alternative protein sources in food. To the best of our knowledge, it is the first study in Greece that examines the potential of alternative protein sources in food from the industry's perspective.

The aim is to provide meaningful insights on products with plant sources of protein in Greece and propose specific actions to increase consumer acceptance of these products in this specific market. The focus is on the perceptions of firm representatives

who produce or intend to produce in the short run food products containing plant based proteins. More specifically, this study a) identifies the main drivers and barriers for consumer acceptance of plant-based protein products, b) ascertains the most popular choice (word and phrase) on labels of plant-based protein products, and c) explores variations in key marketing factors such as organoleptic characteristics, price and promotion of products with plant protein sources versus those with animal protein sources, as perceived by industry representatives.

1.1. Consumer acceptance of products with plant-based protein sources

This section discusses the motives and disruptive factors of consumers' acceptance of plant-based protein food products from the perspective of food and beverage companies.

1.1.1. Motivational factors

Human health, environmental awareness, and animal welfare are the main forces behind the addition of plant proteins to the food and beverage business product portfolio.

The strategy of developing products with alternative sources of protein aims to offer a "positive" experience and a pleasant dietary choice. Overall, as noted by Aschemann-Witzel, J., Gantriis, R.F., Fraga, P. and Perez-Cueto, F.J.A., 2020, there is a negative perception regarding the taste of plant based dishes. Thus, it is important to emphasize the organoleptic characteristics, in order to enhance their taste, as well as to make them more appealing to consumers. The development of alternative protein source products, that possess similar organoleptic characteristics with meat and other animal products will increase their familiarity with consumers who intend to reduce meat consumption but consider these options distant and exotic. However, groups of vegetarian consumers oppose this view and are interested in alternative food products completely differentiated from the conventional ones [23, 24].

However, there is a need to adjust the pricing policy of products with alternative protein sources and decrease consumer prices, in order to reach and attract a larger consumer segment. In order for meat consumers to include them in their regular diets, they should be introduced to these products and be provided with opportunities to taste them. Promotional initiatives such as price reductions or the offering of larger product

quantities at the same price, are critical as they will most likely encourage consumers of various food cultures to purchase and consume them [25-27].

Furthermore, the lack of familiarity for these products can be addressed by teaching consumers new cooking skills and techniques. For example, videos can be uploaded on the websites of food and beverage companies, cooking shows can feature plant-based protein products, and recipes may be added on food packaging. However, the adaptation to these new flavors may require time, as consumers need to gain the required cooking skills and begin to adopt such meals [28].

Moreover, developing familiarity with these products will make them suitable for both every day and festive meals. Thus, the needs of a larger group of consumers will be addressed and the product will be appealing to a wider consumer base and not just a market niche [29]. Eventually, as the shift to more sustainable diets continues meat and fish dishes will be replaced as the core of the festive meals by alternative proteins meals and the consumption of these products will increase as they become part of the consumers' every day diets [23].

Producers and marketers of alternative protein foods and beverages need to emphasize the health benefits of reducing meat consumption and other animal products, as well as to highlight the pleasure and pleasant experience of consuming plant-based protein products. Therefore, it is necessary for companies to link the development of their products with marketing and promotion initiatives to access, influence and increase consumer acceptance of alternative proteins. For example, traditional meat consumers are initially driven to reduce their consumption of animal products mainly due to health concerns. On the other hand, those who consciously follow a diet with limited intake of animal foods are influenced by health, environmental and animal welfare factors. Finally, consumers who follow a strict vegetarian diet are mainly motivated by animal welfare concerns. Therefore, companies of products with alternative sources of protein need to take advantage of the above-mentioned factors to educate consumers, increase awareness and change their eating habits, through information campaigns [28, 30].

Moreover, promotion strategies for products with alternative protein sources are a significant factor of consumer acceptance. In particular, attention should be paid to the labeling of these products and their content. The use on labels of indications on the plant source of the proteins enhances the motivation of individuals to purchase and consume them compared with indications regarding the absence of meat or with statements that the product is suitable exclusively to vegetarian consumers. Moreover, references to high protein and/or fiber content, enhance the consumers' purchasing intentions compared to the word "without" which refers to the absence of certain ingredients [23].

Today, food and beverage industry plays a key role in facilitating the shift to alternative proteins by developing plant-based products in which meat is either fully or partially replaced. However, it is crucial to minimize the inhibitory factors to the transition to plant based proteins and to enhance consumers' inclination to purchase these products based on specific motives [24].

1.1.2. Obstructive factors

In western societies, the main reasons that prevent the shift to a plant based protein diet, are psychological, social, cultural, and economic. According to literature, the barriers to increase consumption of plant-based proteins are:

1. The pleasure from consuming meat and other animal products.
2. The organoleptic characteristics of alternative protein sources.
3. The lack of knowledge in the preparation/cooking of these products, compared to conventional/animal food products.
4. The fear of consuming new foods-neophobia.
5. The concerns about health issues, such as possible nutrient deficiencies.
6. The reluctance to change current eating habits.
7. The higher cost to meet nutritional needs [4, 31].

The above challenges are related to consumers' acceptance and need to be addressed by the producers of alternative protein sources. It is important to stimulate consumers' interest, create a desire for alternative goods, to attract them and build customer loyalty [32].

Simultaneously, it is necessary for companies to address the challenges that impede the introduction of alternative protein products to the market. These include the pricing policy, the product promotion strategy, the organizational culture, the labor skills, the collaborations with suppliers, the production process, the distribution channels, the sources of financing and the liquidity, as well as the legal restrictions and framework [12, 32, 33].

At present, the technology used for the production of alternative protein foods is a major challenge for companies. Additionally, they need to address issues such as the selection of appropriate raw materials and the products' shelf life. Solutions to the above challenges are required to successfully produce and introduce plant based protein food

products into the market. Additionally, research on further developing plant protein products is needed in order to improve their organoleptic characteristics, to develop tastier products and to simplify their cooking [17, 25, 33, 34].

In addition, despite the abundance of plant protein sources in nature, their potential use and applications in the food sector, have not been significantly investigated. As a result, there is a limited variety of plant protein ingredients used in alternative foods and markets for plant-based products may soon be saturated due to limited options [25, 27, 35].

Furthermore, plant-based meat substitutes are an expensive alternative for consumers who want to adopt and follow a plant-based diet. Their high prices are the result of relatively limited consumer interest that prevents the production of large quantities and thus a decrease of production costs and of the relatively limited number of raw material suppliers [25]. Currently, the production of plant based protein sources requires more resources compared to conventional products, a fact that inevitably leads to a higher final price for these products compared to conventional animal based proteins. Overall, as Specht, L., Zaidel, M., Byrne, B. and Crosser, N., 2020 note the cost analysis of the distinct stages of the value chain is a valuable tool for corrective measures and will enable the industry to offer more affordable plant based protein products to consumers.

Technological innovation is expected to reduce production costs while maintaining quality, increase production capacity and optimize the processing methods of plant ingredients. However, it requires specialized equipment and skillful human resources, in order to develop unique and attractive products [19, 35].

In addition, the E.U. legal framework for alternative protein sources is a potential constrain for companies, who need to follow regulations on labeling of alternative products in order to introduce them to the E.U. markets. Often the legislation may be complex and confuse consumers. For example, it is not allowed to mention terms related to conventional animal products on the labels of vegetable substitutes for dairy products while on the label of vegetable substitutes for meat it is. This may cause misunderstandings and combined with the growing demand for ”clean” labels for low-processed and non-processed food products, it may result to additional costs and consequently higher final product prices [25, 27].

Today, the overall environment for plant based protein products is favorable there is a positive trend for these products as a result of the consumers’ increasing awareness of climate change, concerns about health problems and animal welfare and the reduction of ecosystem biodiversity However, although these issues may not be resolved in the

short term, other consumer trends may emerge and capture market share from the plant-based protein category of food products [19].

Furthermore, food neophobia, the reluctance of an individual to consume new foods, can also be a particularly difficult obstacle to address, because it averts consumers from testing and becoming familiar with these products and consequently from including in their regular diet [36]. Thus, a broader strategy and approach to promote products with plant protein sources is required to target not only individuals who follow a vegetarian diet, but consumers who out of curiosity may try these products. Thus, the display of different advertising messages addressed to all consumers, emphasizing and focusing on characteristics such as the overall consumption experience, taste, health, innovation and sustainability issues are essential to introduce this category of food products to consumers as an affordable and tasty choice [24].

Overall, if the above challenges are addressed effectively and efficiently, consumers most likely will shift to plant protein sources either to supplement their traditional animal protein food intake or fully to replace it. There are considerable opportunities for the food industry in this group of products as the positive trend grows at a global level [19, 37].

2. Research Methodology

The purpose of this quantitative research is to answer the following three research questions from the food producers' perspective:

1. What are the main drivers and barriers, as well as the predominant consumer group for consumer acceptance of plant based protein products?
2. What is the most popular choice regarding the labeling (word and phrase) of plant protein products?
3. What is the industry's perception on the key marketing factors (organoleptic characteristics, price and promotion), related to plant protein based products?

The target population of the study is food and beverage companies operating in Greece, who have launched or plan to launch food products with plant sources of protein. A questionnaire with closed type questions divided in three parts has been developed. The first contains questions regarding the respondents and their companies. More specifically, respondents were asked to indicate the department in which they work, the years of employment in the current company the company's location, its total

turnover, the total number of employees and the specific food subsector their company operates in. There are questions related to the main consumer drivers and barriers for acceptance of plant-based protein products. Then respondents are asked to identify the most popular choice regarding the labeling (word and phrase) of plant protein products. Finally, there are questions related to the respondents' perception on the "Organoleptic Characteristics", "Price" and "Promotion" variables for plant based protein food products. Considering the manager's time limitations, respondents were requested to record their answers on a five point Likert scale [38].

Probability sampling was used to eliminate research bias. A pilot survey was conducted to avoid incomprehensible questions and to minimize overall response errors. The web-based questionnaire (made and shared by Google Forms) was initially sent electronically to 12 members of the academic community with relevant experience and eight executives of food and beverage companies for their input, in order to ensure its clarity [39]. The appropriate modifications were made based on their suggestions. Next, an email was sent to a total of 2,433 Greek food and beverage companies operating in nine subsectors, registered in the Hellenic Food Control Agency (EFET). A cover letter was sent electronically (via e-mail and social networks) to the companies listed in the EFET database. It introduced the researchers, explained the purpose of the research and provided the link to the questionnaire. Furthermore, several mails were sent in order to increase the number of responses [40]. All the data were collected in 50 days. This short timespan allowed us to exclude potential biases caused by laggard respondents [41].

A response was requested only if the recipients were producers of plant-based protein food products or if they planned to launch such products. In total 360 usable questionnaires were collected from executives of food and beverage companies. This response rate (15,4%) is actually higher considering that that not all of the 2,344 companies are producing or plan to produce plant protein based food products Moreover, this response rate is considered to be favorable in research regarding small and medium companies [42].

3. Results

The value of Cronbach's alpha, 0.921 indicates the sample's excellent reliability and internal consistency. The largest percentage of respondents is employed in Quality Control Departments (28.33%), Marketing Departments (12.53%), Research and Development (10.83%), and Production Departments (10.00%). A total of 40.83% of the respondents

have been with their current employer for over six years, 30 % of them for up to three years and 10% for up to 10 years. Furthermore, the majority (86.70%) of the participating companies are of Greek interests. A large percentage (64.20%), are based in Attica, 10.80% are located in the geographical regions of Macedonia and Thrace, 7.5% in the Peloponnese and 6.50% in the region of Thessaly. In terms of numbers of employees, 36.67%) have up to 50 employees, 20.83% between 101-250 employees, 11.67% employ 51-100, 5.83% 251-400 employees, 4.14% 401-500 employees and 20.83% more than 500 ones.

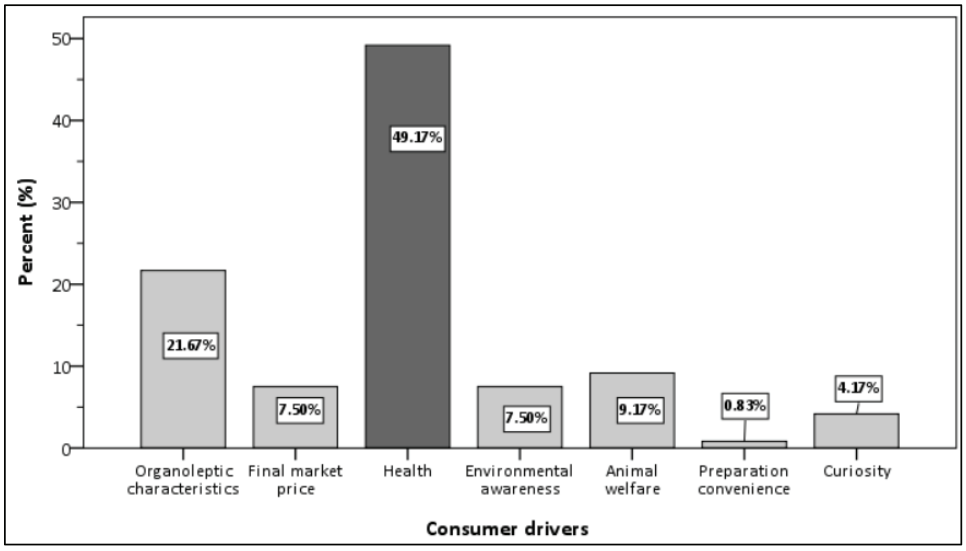
In addition, 30% of the companies in the sample are classified according to their turnover as very small to small (<10m euros/year), 16.67% as medium (10m-50 m euros/year), and 25% as large companies (50+m-250m euros/year). The remaining of the respondents stated that were not aware of their companies annual turnover. Finally, regarding the nine sub-sectors of food and beverage industry identified by the Hellenic Food Control Agency (EFET), 35.80% of the companies operate in the “baked goods, snacks, confectionery, pasta” or “other food products” sub-sector, 22.50% in the “dairy products and ice cream”’ one, followed by 18.30% in the “meat and meat products” subsector. Furthermore, a total of 5.80% of the companies operate in the “animal and vegetable oils and fats” sub-sector, while 5.00% in the “prepared and preserved fish and fish products”, the “cereal mill products, starches and starch products” and the “beverages” subsectors.

3.1. What are the main drivers, barriers and the predominant group for consumer acceptance of plant based protein products?

In regards to the drivers of consumer acceptance of products with plant based protein sources health concerns (49.17%) dominate over other consumer motivations, followed by the organoleptic characteristics (21.67%), as shown in Figure 1A.

On the contrary, factors such as reluctance to change current eating habits (25.00%), organoleptic characteristics (23.33%), ignorance of the positive effects of the consumption of plant based protein products (18.33%) and higher market prices (16.67%) are the main barriers to consumption (Figure 1B). In addition, the majority (60.60%) of respondents claim that products with plant based sources of protein are addressed to all consumer groups while 16.67% of the respondents believe that they addressed only to consumers who intend to reduce meat consumption.

1A



1B

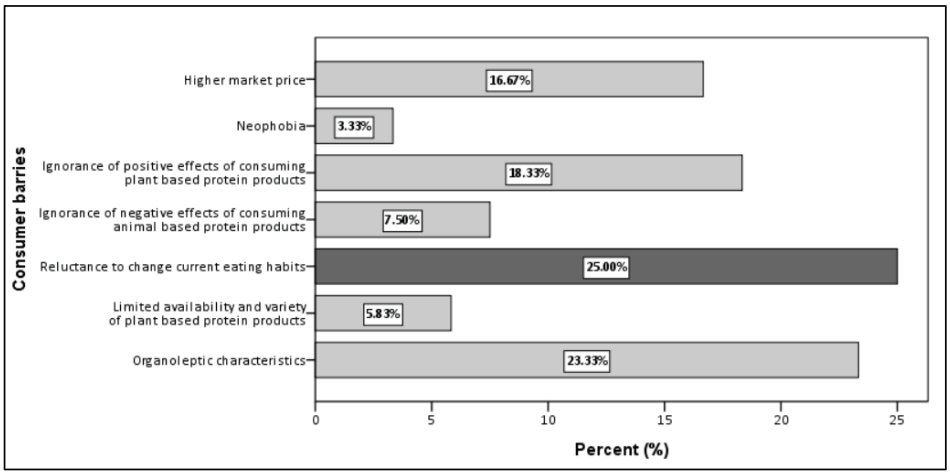


Figure 1: Drivers (A) and Barriers (B) of Consumer Acceptance of Plant Based Protein Products: The Perception of Food and Beverage Companies.

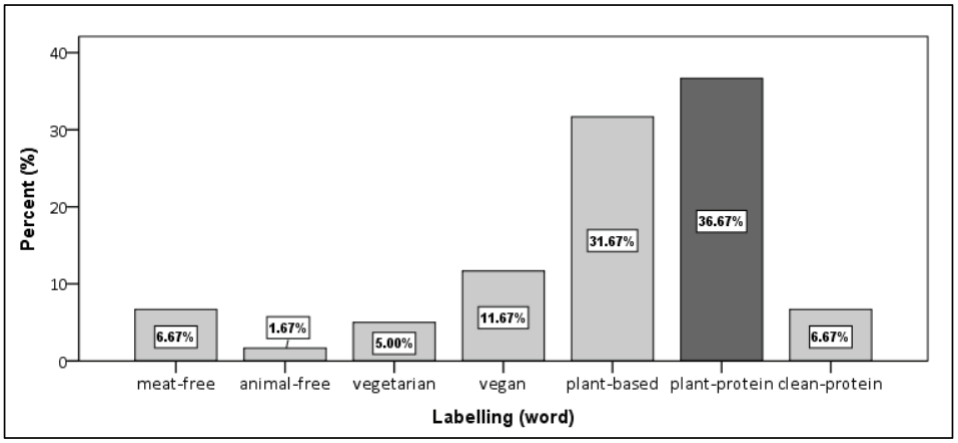
3.1.1. What is the most popular choice regarding the labeling of plant based protein products?

According to the findings, the most popular choice of words for the labels of plant-based protein food products is ”plant-protein” proposed by 36.67% of the business respondents, followed by 31.67% who suggested the ”plant-based” words and 11.67% who have chosen the word ”vegan” as the most appropriate word to be included on the labels (Figure 2A).

Regarding the most popular phrase to be included on the labels, the most popular (54.17%) is the ”High in plant protein” phrase, followed by the ”High in fiber” (17.50%)

one, and the ”No genetically modified ingredients” phrase suggested by 10.83% of the respondents. (Figure 2B).

2A



2B

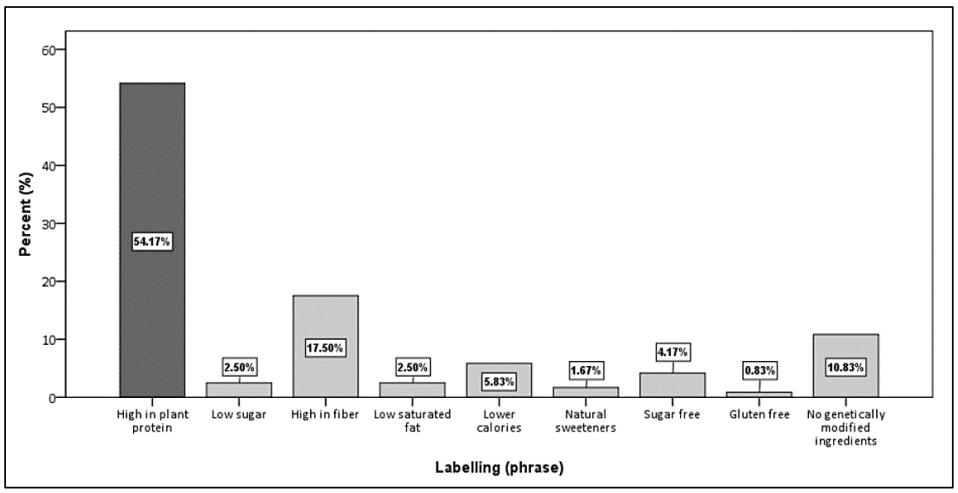


Figure 2: Choice of Words (A) and Phrases (B) for Labels of Plant Based Protein Products.

The variable “organoleptic characteristics” has an average value of 3.64 and a standard deviation of 0.94 where “price” and “promotion follow with an average/standard deviation 3.36 (+/-0.99) and 3.23 (+/-1.08) correspondingly. Therefore, most respondents have a neutral attitude and strongly agree that the organoleptic characteristics of the products with plant-based protein sources are or will be in the products they intend to launch, similar to those with animal protein sources.

The majority of the respondents (62.15%) agree or strongly agree that the organoleptic characteristics of products with plant based protein sources they are currently producing or plan to produce, are similar to those with animal protein sources. However, a total of

13.50% of them disagree or strongly disagree with the statement that the two types of food products have similar organoleptic characteristics (Figure 3).

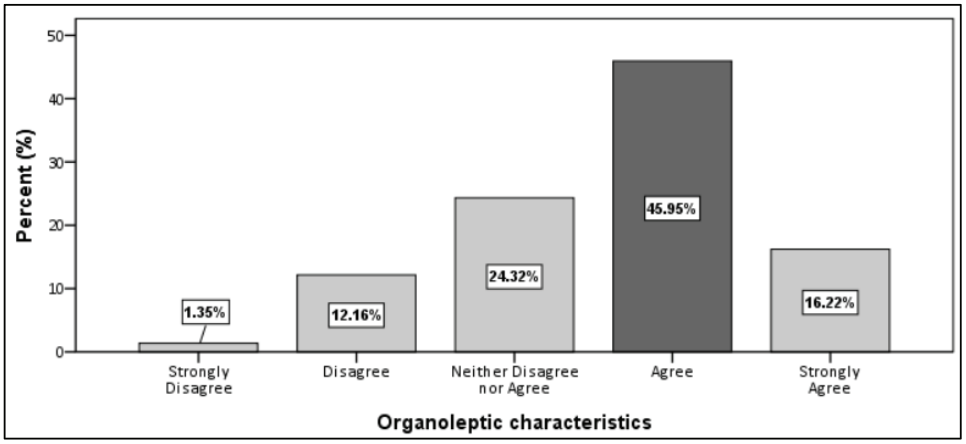


Figure 3: Degree of Similarity of Organoleptic Characteristics of Plant Based Protein Products compared to Animal Based Protein Products.

Furthermore, regarding the price of plant based protein products and animal based products the variable has an average value of 3.36 and a standard deviation of 0.99. Therefore, the majority of the respondents have a neutral attitude towards setting the prices of the plant protein source products higher compared to these with animal protein sources. The values of this variable are 2.37-4.35, i.e. the answers range from neither disagree/nor agree to agree. Approximately half of the respondents (45.95%) agree or strongly agree (6.76%) that the final price of their plant based protein food products is or will be higher compared to those with animal protein sources. A total of 31.08% of the respondents has a neutral position and 9.46% of them disagrees or completely disagrees (6.76%) to set the prices of plant based protein products higher compared to animal based protein products (Figure 4).

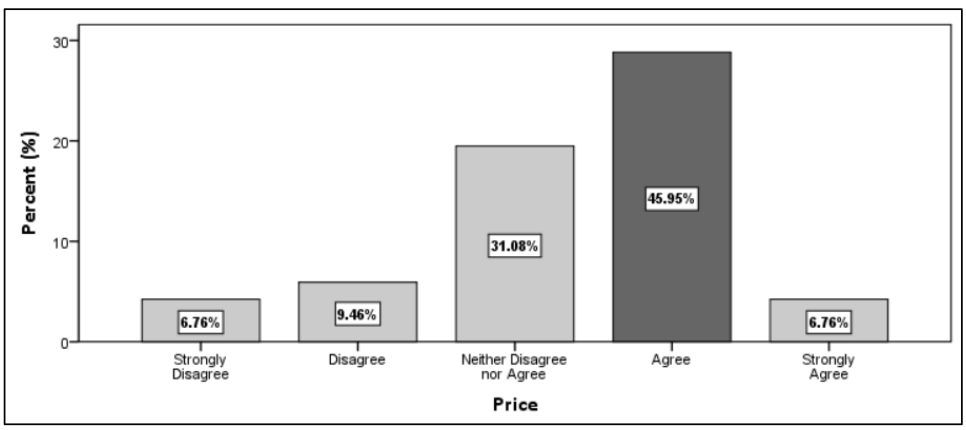


Figure 4: Price level of Plant Based Protein Products compared to Animal Based Protein Products.

In regards to the degree of similarity between the promotion strategy of plant based protein products and of animal based products, this variable has an average and standard deviation of 3.23 and 1.08 respectively. It appears that the majority of respondents have a neutral attitude regarding the similarity between the promotional actions for the two type of products. Furthermore, 50% of the participants agree or strongly agree, 20.27% have neither agree or disagree, while 24.32% disagree with the statement that promotion of plant protein based products is or should be similar to the promotion of conventional animal protein products (Figure 5).

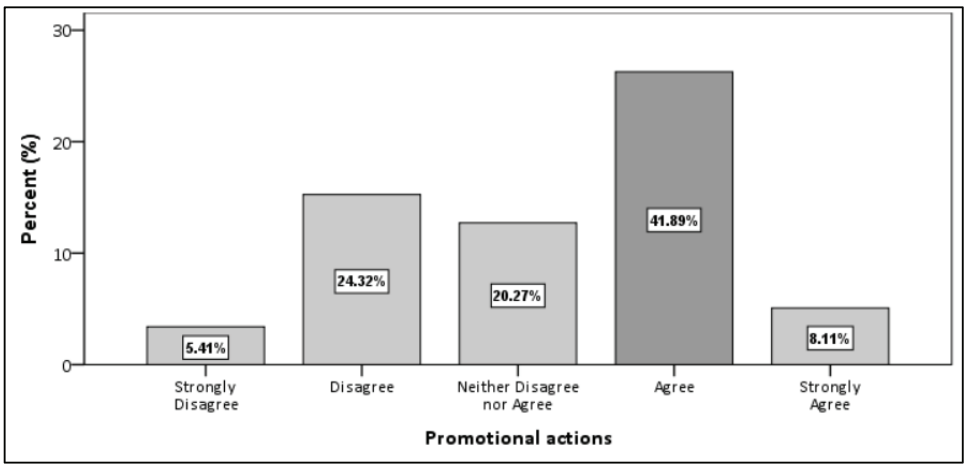


Figure 5: Level of Similarity of Promotional Strategy of Plant Based Protein Products compared to Animal Based Products.

4. Discussion

The purpose of this research is to examine the plant protein food industry's perception on i) the main drivers and barriers of the acceptance of plant-based protein products, ii) the most popular choice (word or phrase) on the labels of plant protein products and iii) key marketing factors, (organoleptic characteristics, price and promotion), related to plant protein based food products.

According to the findings, the executives of the Greek food and beverage companies believe that "human health" is the prevailing driving force for consumers to shift to the consumption of products with plant-based sources of protein. In addition, the largest percentage of respondents, consider the reluctance of consumers to change their current eating habits as the predominant barrier to change to plant-based protein-based dietary choices.

The majority of the respondents believe that plant-based protein products should be targeted to all consumers, regardless of whether or not they belong to a specific

consumer group. They believe, to a large extend, that these products are suitable and may address the needs of the general population and not just a niche of the total market. Contrary to this finding, a qualitative study of six food and beverage companies in Sweden that have launched vegetable protein products found that their common consumer target was the “Flexitarians” and not the general population [43]. The above discrepancies of the results between the two countries may be explained by the fact that consumer incentives to switch to alternative proteins vary by geography and culture [44, 45].

In regards to the use of words and phrases in the labeling of products with plant based protein sources, the word “plant-protein” and the phrase “high in vegetable protein” were found to be more popular among the industry’s managers. Similarly, a survey of adult consumers in the United States found that the use of the phrase “100% plant-protein” on a product label makes it more appealing compared to the use of the word “vegan”. On the other hand, according to a recent survey, the various stakeholders in the supply chain support the use of the words “plant-based” and “plant-protein” in products with plant protein sources, which are close to conventional animal products and are aimed at a wide range of consumers [27]. The use of “plant-based” and “plant-protein” words on the labeling of products with plant protein sources increases the consumers’ purchase intention compared to others such as “meat-free”, “vegetarian” and “vegan”, which may cause consumers to feel deprived and suggest a negative correlation with other consumer groups such as the omnivores. Overall, it is important to include on food labels information on human health benefits, such as high protein and/or dietary fiber [23].

Most respondents agree that both the organoleptic characteristics and the promotional strategy of plant-based protein products are or will be similar to those of animal protein-based products. This perception is rather critical considering that a recent study on Swedish consumers revealed that the organoleptic characteristics is the predominant obstacle and a major challenge for consumers’ acceptance [43].

However, a difference in pricing between plant based protein products and animal protein products was found.-The majority of respondents stated that they have or will have a higher pricing policy on products with plant protein sources compared to the conventional ones. This finding regarding the high cost of plant protein based products, is similar to a survey on Swedish participants [24]. This price difference can be justified by the extensive research needed to further develop plant based protein products and the high quality of ingredients used [43, 45].

Overall, the perceptions of the food industry representatives on the obstacles faced by the plant based protein sector identified in this study are in alignment with the findings of a recent study on EU consumers. The study underlines the need for the industry to overcome three main obstacles, more specifically taste, texture, and price [45].

5. Conclusion

This study provides meaningful information and insights to the food and beverage industry as consumers continue to shift towards more sustainable diets. It examines the perceptions of companies that either have launched or will in the future, products with plant based sources of protein a) on the main drivers and barriers for consumer acceptance of plant-based protein products, b) on the popular choice of word and phrase on the labels of plant-based protein products, and c) on the variations in organoleptic characteristics, price and promotion of products between the two categories of food products (plant and animal based proteins).

The findings have significant practical implications for consumer acceptance, more specifically drivers and barriers, the choice of words and phrases on labels, the organoleptic characteristics the promotion and pricing policy that enables food companies to more efficiently reach consumers. Overall, there are indications that this market has potential however companies need to be aware of the consumers' perceptions and beliefs regarding these products and consider several parameters when introducing foods with plant based proteins. Moreover, companies should be adaptable and flexible to meet the particularities of producing and marketing food products containing plant based proteins. The positive trend for these products is expected to continue as health and environmental concerns among consumers continue to rise. It is expected that in the future plant based protein food products will no longer be considered novelty products but established food choices for consumers and the market for these products will become mainstream.

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