



Applying Q methodology to explore food system stakeholders' perspectives on the marketability of alternative protein products

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ABSTRACT

The transition towards sustainable food systems for the future requires innovations that balance nutritional adequacy, environmental performance, and social acceptance. Alternative protein (AP) products have gained attention for their potential to offer sustainable, nutritious, and protein-rich food options. However, their market penetration remains limited and constrained by factors such as high prices and limited availability across retail and food service channels. This study explores food system stakeholders' perspectives on the marketability of AP products to identify sustainable strategies to overcome barriers and leverage enablers for their commercialization. Experts from NGOs, research and technology centres, academia, consultancy, associations, and culinary institutes participated in a Q-methodology study, leading to the identification of five distinct discourses. Findings highlight critical determinants of marketability, including product characteristics such as taste and ultra-processed classification, structural factors including limited consumer knowledge and food innovation, and policies and regulations such as subsidies and lobbying power. The results emphasize that addressing these barriers requires coordinated, multi-level interventions in order to support the sustainable future growth of the AP sector.

1. Introduction

Over the past decades, the alternative protein (AP) sector has undergone considerable transformation. Since its emergence in the 1990s, the sector has attracted growing interest from multinationals and corporations, which have accelerated the integration of plant-based (PB) products into the mainstream. Today, consumers across Europe and North America encounter AP products in major supermarkets and fast-food chains, highlighting their growing normalization and integration into mainstream global food markets [1]. Market revenues for AP products are projected to rise from USD 17.9 billion in 2025 to over USD 1.1 trillion by 2040, potentially capturing up to 60% of the global meat market [2]. As of 2022, the global AP market was valued at approximately USD 77 billion, with the United States holding the largest share, followed by Europe [3]. This expansion is occurring alongside rising societal awareness of the environmental, health, and ethical challenges posed by current patterns of animal protein production and consumption [4,5]. Consequently, there is growing interest in AP products, which offer considerable potential to mitigate these concerns by reducing reliance on conventional protein sources [6,7]. Although the sector has

experienced notable growth, AP products remain a niche food category, highlighting the need to better understand the various barriers that limit their broader adoption [8–11]. Most existing research on alternative proteins has primarily focused on consumer perceptions, often emphasizing product-level factors such as taste, price, health considerations, or environmental concerns [12]. In contrast, significantly less attention has been paid to the perspectives of key stakeholders operating within the food system who play a crucial role in shaping supply chain dynamics, product availability, and market acceptance [13].

In the present paper, stakeholder theory is applied as theoretical lens to understand the relevance of stakeholders in shaping food systems. Stakeholders interact by influencing or being influenced by a company's objectives [14]. Within the food system, they play a critical role in driving commercialization and market creation, especially in the case of food innovations. This perspective highlights that commercialization is not solely a firm-led activity, but rather a societal and political process involving a network of actors operating across micro- and macro-level contexts [15]. Stakeholders hold a systemic view of market dynamics and consumer behaviour, allowing them to understand both the adoption and mainstreaming of AP products. They actively contribute to

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defining the conditions, opportunities, and barriers that influence the market penetration of this product and thus AP product commercialization. The application of stakeholder theory allows to broaden the focus of marketability beyond the perspective of individual companies and consumers to encompass the diverse and macro level perspectives of multiple stakeholders.

To address the literature gap concerning the marketability of AP products, the present study places the knowledge, perceptions, and experiences of food system stakeholder intermediaries at the centre of analysis. The study seeks to answer the following research question: what perspectives exist among European food system stakeholders regarding the marketability of AP products? In doing so, it aims to offer a comprehensive understanding of the marketability of AP products, ultimately contributing to a more sustainable and healthy food system. This study makes several contributions to existing literature. First, it offers a theoretical contribution by demonstrating the applicability of Q-methodology as a tool for investing in marketability. While prior research has employed Q-methodology to examine diverse issues across food value chains [16], among which stakeholder perspectives on potential future developments in the cultivated protein sector [17], its application in investigating marketability remains novel. Second, this study contributes to literature on AP products' marketability by integrating findings from previous consumer studies with novel results drawn from the perspective of stakeholders. Through the lens of stakeholder expertise, the factors shaping the marketability of AP products are critically examined, either reinforcing or debating findings from prior studies. A closer understanding of these factors may inform both industry actors and decision-makers to increase commercialization of AP products through higher marketability.

2. Literature review

2.1. Stakeholders' role in AP food system

Stakeholders are individuals or groups who affect or are affected by economic goals and whose support is essential for the success of a market [18]. The contribution of stakeholders in supporting the growth of a sector is widely acknowledged by the literature, including in the AP sector [13,19]. Within academic discourse, the perspectives of stakeholders are prominently featured to underscore their critical role in shaping the evolution of the AP market, positioning them as key experts on the current state and future trajectory of the market. The stakeholders mostly engaged include academics [20], policymakers [21], industry representatives [21], consultants [2,22], chefs and food services [23,24], farmers [25–27], and NGOs [28,29].

2.2. Factors shaping marketability

The AP market extension in the last decades pushed past research interest in understanding the factors influencing the marketability of AP products, trying to highlight strategic paths to improve the competitiveness of the sector [2,13,30].

A substantial body of literature emphasizes the importance of product characteristics as central attributes influencing the marketability of AP products. Unsatisfactory taste and texture reduce sensory performance for consumers. Premium price limits their affordability, impacting altogether on marketability [10,31–36]. Consumer perceptions regarding the nutritional profile of AP products further hinder their market acceptance. Specifically, AP products are often viewed as nutritionally inferior to traditional animal-based products [8,37–40]. Furthermore, these products are frequently perceived as overly processed and less satiating [21,41–44]. Product format has also emerged as a relevant factor in enhancing marketability [45,46]. AP products tend to replicate format familiar to consumers such as burgers, strips or snacks, reducing neophobia towards these novel sources [8]. Several studies also highlight that ready-to-eat formats, which requires minimal

cooking skills, are particularly appealing to consumers, thereby improving accessibility and acceptance [8,11]. One study also express concern around alternative protein ingredient choices in light of allergenicity concerns associated with ingredients such as insects, soy, and gluten [47]. The impact of products' characteristics over marketability has prompted companies and research institutions to invest heavily in food innovation and product development [42].

Company-specific factors also play a significant role. For example, according to Brooker et al. [8], marketing strategies vary along different AP brands, with different attributes used to market products including nutritional label, packaging claims, and dietary patterns. Other studies suggest that PB marketability benefits from marketing campaigns with clear promotional messages and strong brand identity able to retain consumers [30,48,49]. Moreover, larger firms benefit from established relationships with retailers and broader customer networks, conferring them competitive advantages in the AP market [50,51]. The gap between large and small AP companies is exacerbated by low scaling up capabilities for start-ups and small AP companies due to technological barriers and lack of economic resources, negatively impacting their marketability [2]. On this context, private investments play a key role by supporting AP companies, especially start-ups and small companies, boosting market growth and marketability [52]. AP academic literature has highly examined the contribution of private investments in the AP sector. For example, Bulah et al. [53] show that the PB market growth was boosted by investment in the industry by meat processor companies, followed by the participation of retailers in the market. However, recent reports noted a decrease in private investments in the AP sector, associated with a slowdown in AP products' sales [54]. Practitioners associated with these phenomena macroeconomic issues such as lower propensity to invest and lower consumer purchasing power [54,55]. These factors contribute to bringing uncertainties around the future of the AP sector, negatively impacting its marketability. Another growing challenge for AP companies is the need to differentiate their products. Currently, the market suffers from limited product differentiation and limited shelf space in retail environments that constrain marketability. Increasing differentiation and broader product range could not only expand product variety but also enhance consumer interest and retailer engagement [30]. In addition to that, previous scholars highlights the importance of expanding AP products availability across food service and retailers to increase their marketability [30].

Beyond product and company characteristics, the literature underscores that AP products benefit from marketing narratives centred on sustainability and animal welfare [30,35,56–58]. These narratives are particularly effective when targeting specific consumer segments such as women, flexitarians, and younger generations, who are more positively inclined to incorporate AP products, especially PB, into their diets [35,39,59–61]. Despite this, consumers' knowledge about AP products remains low, leading many scholars to call for targeted education initiatives, policy interventions, and marketing campaigns to raise awareness and support marketability [13,62]. Furthermore, social settings and traditional dining habits limit consumers' acceptability of AP products, resulting in lower marketability [8,61].

Finally, regulatory frameworks and public policy significantly influence AP product marketability. Notably, novel food regulations, which require many AP sources to get pre-market approval, pose barriers to swift product launches and hinder technological innovation [63]. Labelling restrictions further affect consumer acceptance by limiting how products can be described or marketed [42,64]. Scholars have suggested that subsidies for AP production and the inclusion of AP products in national dietary guidelines could support broader adoption by reducing prices and legitimizing consumption [65–68]. Reaching these policy pathways could be prompted also by a greater influence of AP lobbies. At the moment, the AP sector presents a weaker lobbying power, compared to the conventional meat industry, limiting both market opportunities and policy influence [42,67].

3. Method

This study adopts the Q methodology to explore which factors influence the marketability of AP products. Unlike traditional variable-centred approaches, Q methodology focuses on person-centred factor analysis, examining correlations between individuals' viewpoints rather than between variables [17]. This mixed-methods approach is especially effective in addressing emerging and multi-faceted topics, as it combines the statistical rigor of quantitative research with the depth of qualitative thematic analysis [69,70]. Given the novelty and multidimensionality of the AP sector, the method's capability to capture diverse perspectives makes it particularly appropriate. This research drew on recent Q studies [17,69–72] and followed the methodological framework outlined by McKeown and Thomas [73].

3.1. Data collection

3.1.1. Questionnaire definition

The Q methodology research concourse, which refers to the broad set of all possible opinions, arguments, and viewpoints on a given topic [74], was constructed based on insights derived from the review of relevant scientific literature. The review led to the formulation of a broad pool of statements related to the marketability of AP products. From this foundation, the initial tentative concourse included 71 statements.

To enhance the relevance, several rounds of discussion were conducted within the research team to refine the wording and improve the overall clarity of the statements. The reduction process aimed at reducing the number of items in the Q-set ensuring that no redundancies or repetitions remained, while covering all the themes emerged from the literature. The research team ensured that all critical themes were represented by categorizing the statements in domains and merging redundant statements. The iterative refinement process led to a final Q concourse composed of 34 statements (Table 1). Prior to the main data collection, a piloting phase was conducted with a selected group of experts who had not participated in the development of the Q sample. This phase aimed at assessing the usability of the Q-sort procedure and ensure that the final set of statements was clearly understood and accurately interpreted. Feedback obtained during piloting informed minor adjustments to the sorting procedure and the selection of the online tool. Subsequently, the final data collection was carried out using the QMethod software [75], which offered a robust interface for both sorting and data analysis.

Participants were selected based on their expertise and competencies in relation to the marketability of AP products and their roles as stakeholders within the food system. The selection of knowledgeable stakeholders was essential for guaranteeing valid answers. To ensure diversity in perspectives, efforts were made to recruit experts from a range of demographic and professional backgrounds. The P-set included 35 experts from civil society, academia, culinary institutes, and the public sector, all engaged in the middle segment of the food system, selected to ensure a comprehensive range of expert perspectives (Table 2).

3.1.2. Interviewing process

Interviews were carried out either online or in person between April and June 2025. No financial incentives were offered or provided. Prior to participation, interviewees received information about the study's objectives, the expected duration of the interview, and their right to withdraw at any point without consequence. They also received an information sheet on data privacy and anonymization, gave informed consent via signed forms, and granted permission to record the qualitative interview segments. The research protocol was approved by the Bioethical Committee of the University participating in the research.

The discussion focused on alternative proteins as a whole. To ensure a shared understanding, the interview began providing the following

Table 1

List of statements for the final concourse with references.

N.	Statement	Reference	Domain
1	Environmental concerns influence the marketability of AP products	Samad et al., 2025; Hu et al., 2019; Zulfa et al., 2023;	Values
2	Ethical concerns regarding animal welfare influence the marketability of AP products	Katz-Rosene et al., 2023	Values
3	Taste influences the marketability of AP products	Liu et al., 2024; Messina & Messina, 2025; Qaim et al., 2024	Sensory properties
4	Texture influences the marketability of AP products	Samad et al., 2025	Sensory properties
5	Nutritional profile influences the marketability of AP products	Cutroneo et al., 2022; Cheng, 2025; Rivera et al., 2022;	Nutritional aspects
6	The marketability of AP products is negatively affected by the belief that conventional proteins have a better nutritional profile compared to AP	Brooker et al., 2022; IPES Food, 2022; Dong et al., 2024;	Nutritional aspects
7	The perception that AP products are less satiating compared to conventional protein products limits their marketability	De Boer & Aiking, 2018; Malek & Umberger, 2021	Nutritional aspects
8	The marketability of AP products is challenged by the perception that they are ultra-processed	Andreani et al., 2023; Morais-da-Silva et al., 2022	Nutritional aspects
9	The food format of AP products can serve as an important factor in their marketability	Alae-Carew et al., 2022; Brooker et al., 2022; Lee et al., 2020	Convenience
10	Food innovation in food technology and product development makes AP products more attractive and marketable to consumers	Blanco-Gutiérrez et al., 2020; Lurie-Luke, 2024	Product development
11	Larger companies have an advantage in the marketability of AP products compared to smaller companies	Reis et al., 2023; Tian & Kamran, 2023	Product development
12	In the AP food category, companies struggle to differentiate their AP products from competitors and enhance their marketability	Rini et al., 2022; Johansson et al., 2023	Product development
13	AP products are often ready-to-eat and require no additional cooking skills, which enhance their marketability	Brooker et al., 2022; Beacom et al., 2021	Convenience
14	Traditional dining habits and social settings discourage the marketability of AP products	Brooker et al., 2022; Zaleskiewicz et al., 2024	Social setting
15	The allergenicity of some AP ingredients influences their marketability	Rajpurohit & Li, 2023	Product development
16	Marketability of AP products is limited by consumers' perception of these products as expensive	Nguyen et al. 2022; Apostolidis & McLeay, 2016	Price
17	The higher price of AP products compared to conventional protein products limits their marketability	Springmann, 2024	Price

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Table 1 (continued)

N.	Statement	Reference	Domain
18	Targeting younger consumers improves the marketability of AP products	Zaleskiewicz et al., 2024; Gomez-Luciano et al., 2019; Samad et al., 2024	Consumer profile
19	Targeting women improves the marketability of AP products	Gomez-Luciano et al., 2019; Samad et al., 2024; Graça et al., 2015; Zaleskiewicz et al., 2024	Consumer profile
20	Consumers' low knowledge of AP limits the marketability of AP products	Amato et al., 2023; Verneau et al., 2016	Consumer profile
21	Marketability of AP products is limited by challenges in industrial scale up production	de Moraes et al., 2023	Scalability
22	Targeting flexitarians improves the marketability of AP products	Toribio-Mateas et al., 2021	Consumer profile
23	Subsidies could play a key role in boosting the marketability of AP products	Newton et al., 2024; Duluins et al., 2022	Policy & regulations
24	The marketability of the AP sector is influenced by the level of private investment it receives	Lurie-Luke, 2024; Bulah et al., 2023	Financial investment
25	The integration of AP products into national dietary guidelines plays a significant role in promoting their adoption and enhancing their marketability	Hundscheid et al., 2022	Policy & regulations
26	Compared to the conventional meat sector, the AP industry's limited lobbying power reduces the marketability of AP products	Blanco-Gutiérrez et al., 2020; Newton et al., 2024	Policy & regulations
27	Novel food regulations negatively affect the AP sector's innovation capability and hinder AP products' marketability	Reinhardt & Monaco, 2025	Policy & regulations
28	Labelling and naming regulatory restrictions limit the marketability of AP products	Blanco-Gutiérrez et al., 2020; Spatola et al., 2024	Policy & regulations
29	Greater food service availability of AP products plays a key role in their marketability	Beacom et al., 2021; Zaleskiewicz et al., 2024; Clark & Bodgan, 2019	Availability
30	The uncertainty about future demand for AP products reduces their overall marketability	Johansson et al., 2023	Scalability
31	A strong brand enhances the marketability of AP products by building trust and recognition	Rini et al., 2022	Marketing
32	A broader product range of AP products on retailers' shelves widens consumer choice and boosts their marketability	Rini et al., 2022	Availability
33	Marketing campaigns boost the marketability of AP products	Brooker et al., 2022; Rini et al., 2022	Marketing
34	Companies with broad product portfolios tend to market AP products more effectively than companies with a narrow-specialized portfolio	Rini et al., 2022	Product offer

Table 2

Sample of interviewed experts.

Variable		Frequency	Percentage (%)
Gender	Female	24	68.6
	Male	11	31.4
Country	Total	35	100
	Belgium	7	20.0
	Italy	7	20.0
	Netherlands	5	14.3
	Poland	3	8.6
	Spain	3	8.6
	France	3	8.6
	Denmark	3	8.6
	Germany	2	5.7
	United Kingdom	1	2.9
	Switzerland	1	2.9
Sector	Total	35	100
	NGO	9	25.7
	Food consultancy & associations	9	25.7
	Academia	8	22.9
	Research and technology centres	6	17.1
	Culinary institutes	3	8.6
	Total	35	100
Level of expertise in the AP sector	1 Very low	0	0
	2 Low	0	0
	3 Somewhat low	1	2.8
	4 Moderate	7	20.0
	5 Somewhat high	13	37.2
	6 High	10	28.6
	7 Very high	4	11.4
	Total	35	100

definitions: i) “Alternative proteins are protein sources derived from non-traditional origins, including plant-based, insect-based, fungi-based, marine-based, and microbe-based proteins”; ii) “Marketability is the ability of a product to be successfully positioned and sold in the market while meeting consumer needs and complying with safety, environmental, legal, and performance standards” [32]. The concept of marketability diverges from others constructs related to consumer evaluation and demand estimation. Consumer acceptance captures willingness to try or adopt a product, and willingness to pay reflects the maximum price an individual is prepared to pay, representing a monetary expression of preference rather than acceptance [76]. Market potential, instead, denotes the aggregate sales opportunity in a given market, combining the size of the target population, expected purchase frequency, and achievable price levels [77].

The data collection phase included three steps. First, a pre-sort task was administered to familiarize participants with the statements. During this phase, respondents were asked to categorize each statement into one of three initial groups reflecting their immediate reaction: least agreement, neutral, and most agreement. This pre-sorting allowed participants to engage with the content on a preliminary level, easing them into the sorting process and facilitating a more reflective evaluation in the subsequent step. Second, participants completed the Q-sorting task, where they were required to rank all statements along a quasi-normal distribution grid ranging from −5 (least agreement) to +5 (most agreement) (see Fig. 1). Each statement was allocated a unique position within the distribution based on the participant's degree of agreement. This forced-ranking process encouraged respondents to comparatively assess all statements, prioritizing those they strongly agreed or least agreed with, thereby capturing the subjective viewpoint in a structured manner. Third, following the Q-sort answers, a brief debriefing interview was conducted. During this discussion, participants elaborated on their sorting choices and provided further qualitative insights, allowing the interviewer to capture additional nuances and contextual explanations relevant to their responses. Interviews lasted between 20 and 45 min.

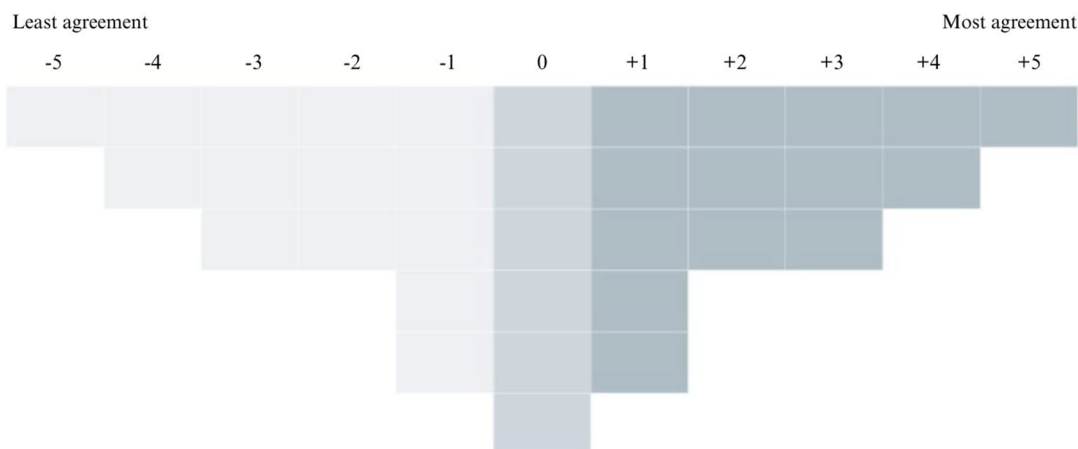


Fig. 1. Q-method fixed quasi-normal distribution. Values are ranked in a range from -5 to $+5$, covering a total of 34 items.

3.2. Data elaboration

The data elaboration initiates by selecting Pearson correlation to assess the linear association between individual Q sorts, in line with established procedures in Q methodology [78,79]. Based on the correlation matrix, the research team performed Principal Component Analysis (PCA) and retained a number of factors, using a Scree plot to visually identify the Eigenvalue curve to determine factor relevance and to exclude components with minimal explanatory power [71] (Table 3). Subsequently, the Varimax rotation allowed to optimize factor clarity and enhance interpretability by maximizing the variance of loadings within each factor. An orthogonal Varimax rotation was selected as it maximizes the variance of squared loadings, producing factors that are uncorrelated and easier to interpret when independence is a reasonable assumption [80]. This step facilitated the identification of distinct participant groupings with coherent response patterns.

The team initially tested solutions with seven, six, and five factors. The five-factor solution was retained based on a combination of statistical and substantive criteria, providing the most interpretable and conceptually meaningful factor structure. Statistical criteria included the total explained variance, the number of significantly loading Q-sorts, and the associated Eigenvalues for each extraction model [71]. Only Q sorts with loadings exceeding the 0.01 significance level threshold were included in the interpretation of the factors [75]. The five-factor solution explained 47.46% of the cumulative variance and included 32 significantly loading Q-sorts, with each factor defined by four to eight Q-sorts. This distribution ensured that each factor was supported by a sufficient number of Q-sorts, thereby enhancing their robustness and interpretability of the solution.

In contrast, the six-factor solution explained slightly more variance (52.21%) but was supported by fewer significantly loading Q-sorts overall (26), and two of its factors had only two exemplars each. According to Watts and Stenner [17], a factor requires at least two significantly and uniquely loading Q-sorts to be considered interpretable, although a greater number enhances both its reliability and the clarity of its underlying viewpoint. Similarly, Brown [69] emphasizes that factor reliability improves as more participants define a given

perspective, thereby reducing the margin of error in interpreting item rankings.

Beyond these statistical considerations, the five-factor solution demonstrated stronger empirical coherence. Each factor displayed internally consistent ranking patterns and was characterized by clearly distinguishable statements, facilitating the identification of distinct and theoretically meaningful perspectives. Taken together, the five-factor structure represented the most parsimonious yet substantively rich solution, balancing explanatory power with factor stability and conceptual clarity.

Factor loadings were examined after Varimax rotation, and Q-sorts were assigned to a factor if they loaded significantly and uniquely on that factor. Using this criterion, 32 Q-sorts were retained as defining sorts: eight for Factor 1, seven for Factor 2, eight for Factor 3, four for Factor 4, and five for Factor 5. Q-sorts with non-significant or cross-loadings were excluded from interpretation to ensure that each factor reflected a distinct and coherent viewpoint.

Finally, the team strengthened the statistical output with a qualitative analysis to uncover the subjective meanings and belief structures underpinning each factor [81].

4. Results

Each of the 5 identified factors represents a shared pattern of perspectives among experts. To illustrate these perspectives, factor arrays were computed to represent the idealized Q-sort for each factor, based on weighted averages of participants' rankings (Table 4). These arrays also serve as the basis for identifying distinguishing and consensus statements [82].

Discourse 1. "Policy-driven marketability: structural and governance support"

This perspective combines the view of eight respondents, and places strong emphasis on structural and institutional conditions as key determinants of market success for AP products. Subsidies are regarded as crucial to enhancing commercial viability, underscoring the role of external support in accelerating the sectoral development, opposing this view to Discourse 4. According to RTC4, "providing subsidies to companies or to startups could sort of take away a bit of the price or the financial burden from consumers [...] making it a bit more attractive". A major concern for these stakeholders is the AP industry's comparatively limited lobbying power relative to the conventional meat sector. This reflects a belief that the AP sector operates within a politically uneven landscape where the lack of strong institutional backing may hinder its growth. Within this institutional framing, taste also emerges as an important factor. In contrast, respondents aligned with this viewpoint do not perceive product differentiation within the AP sector as a pressing

Table 3
Factor characteristics.

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
Eigenvalues	9.167	3.166	2.743	2.412	2.084
% Explained Variance	26.19	9.05	7.84	6.90	5.950
Cumulat. % Expln. Var.	26.19	35.24	43.1	49.97	55.92
Humphrey's Rule	0.552	0.32	0.246	0.335	0.259
Standard Error	0.169	0.169	0.169	0.169	0.169

Table 4

Factor arrays.

N.	Statement	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Z Score variance
S1	Environmental concerns influence the marketability of AP products	−1	2	4	−5	−1	1.542
S2	Ethical concerns regarding animal welfare influence the marketability of AP products	−3	2	2	−3	1	0.982
S3	Taste influences the marketability of AP products	4	5	5	2	4	0.293
S4	Texture influences the marketability of AP products	3	1	3	1	2	0.123
S5	Nutritional profile influences the marketability of AP products	−1	2	3	0	1	0.335
S6	The marketability of AP products is negatively affected by the belief that conventional proteins have a better nutritional profile compared to AP	0	3	−2	0	−3	0.607
S7	The perception that AP products are less satiating compared to conventional protein products limits their marketability	−3	−1	−5	−1	−4	0.323
S8	The marketability of AP products is challenged by the perception that they are ultra-processed	2	0	4	4	1	0.319
S9	The food format of AP products can serve as an important factor in their marketability	0	1	0	−1	0	0.028
S10	Food innovation in food technology and product development makes AP products more attractive and marketable to consumers	−2	4	−4	3	5	1.430
S11	Larger companies have an advantage in the marketability of AP products compared to smaller companies	1	−4	0	4	0	1.090
S12	In the AP food category, companies struggle to differentiate their AP products from competitors and enhance their marketability	−4	−3	−3	−3	−2	0.077
S13	AP products are often ready-to-eat and require no additional cooking skills, which enhance their marketability	−1	−5	−1	1	0	0.802
S14	Traditional dining habits and social settings discourage the marketability of AP products	−1	1	0	0	−4	0.467
S15	The allergenicity of some AP ingredients influences their marketability	−4	−3	0	−1	0	0.428
S16	Marketability of AP products is limited by consumers' perception of these products as expensive	1	−2	2	3	1	0.376
S17	The higher price of AP products compared to conventional protein products limits their marketability	3	0	3	0	1	0.336
S18	Targeting younger consumers improves the marketability of AP products	0	3	−3	2	0	0.447
S19	Targeting women improves the marketability of AP products	−2	3	−4	1	0	0.873
S20	Consumers' low knowledge of AP limits the marketability of AP products	0	0	1	5	2	0.547
S21	Marketability of AP products is limited by challenges in industrial scale up production	−3	0	−1	−2	−1	0.189
S22	Targeting flexitarians improves the marketability of AP products	0	4	2	−2	−1	0.594
S23	Subsidies could play a key role in boosting the marketability of AP products	5	−1	1	−4	3	1.630
S24	The marketability of the AP sector is influenced by the level of private investment it receives	1	−2	−2	−1	−2	0.258
S25	The integration of AP products into national dietary guidelines plays a significant role in promoting their adoption and enhancing their marketability	3	0	−1	−2	2	0.514
S26	Compared to the conventional meat sector, the AP industry's limited lobbying power reduces the marketability of AP products	4	−1	−3	−1	−2	0.781
S27	Novel food regulations negatively affect the AP sector's innovation capability and hinder AP products' marketability	−2	−2	0	−3	4	1.332
S28	Labelling and naming regulatory restrictions limit the marketability of AP products	−1	0	1	−4	−1	0.428
S29	Greater food service availability of AP products plays a key role in their marketability	1	1	0	0	3	0.278
S30	The uncertainty about future demand for AP products reduces their overall marketability	−5	−3	−1	1	−3	0.622
S31	A strong brand enhances the marketability of AP products by building trust and recognition	1	1	−1	3	−1	0.316
S32	A broader product range of AP products on retailers' shelves widens consumer choice and boosts their marketability	2	−1	1	0	−3	0.453
S33	Marketing campaigns boost the marketability of AP products	2	−1	1	2	3	0.170
S34	Companies with broad product portfolios tend to market AP products more effectively than companies with a narrow-specialized portfolio	0	−4	−2	1	−5	1.168

issue, nor do they consider allergenicity to be a significant barrier to market expansion. They also strongly reject the idea that uncertainty about future demand for AP products threatens the sector's commercial prospects. Finally, neutral but distinguishing positions further reinforce the policy and governance-oriented nature of this discourse. Stakeholders express limited concern for company-level strategies such as product portfolio breadth, and they remain indifferent toward demographic targeting. There is no notable support for the idea that focusing on younger consumers, flexitarians, or women would enhance marketability.

Discourse 2. “Product-focused strategy: Innovation and targeting”

This discourse represents the perspective of seven respondents. This group of stakeholders places product-driven innovation and strategic market segmentation at the centre of AP product marketability. Taste is identified as a top priority. Closely tied to this is their strong endorsement of food innovation, both technological and product development, as a key driver of commercial differentiation. Strategic consumer targeting, particularly toward flexitarians, is also a defining feature of this discourse distinguishing it from other discourses. Tailored value propositions and precise positioning are viewed as more effective than broad, undifferentiated market approaches. In contrast, company-level

structural factors, such as business size or portfolio breadth, are deemed irrelevant. NGO3 mentions that “if you have a very narrow specialized portfolio, but you have very successful products, it can be an advantage”. Furthermore, this group strongly rejects the idea that convenience alone can ensure marketability, as the ease of use is not regarded as a core value driver. Interestingly, according to these stakeholders “the ultra-processed aspect doesn't tend to come up when people are asked to generate their own list of factors shaping AP food selection” (NGO4). Whereas the ultra-processed classification is viewed more negatively in other discourses, emphasizing their clear focus on product appeal and innovation.

Discourse 3. “Sustainability- and Transparency-driven strategy: environment and ingredient list”

This strategy is shared by eight respondents and, as in Discourse 2, there is strong emphasis on taste as a central driver of AP product marketability. However, what clearly sets them apart is their focus on environmental concerns as driver of marketability, and the negative perception of AP products as ultra-processed, identified as a serious barrier to market growth. Unlike other discourses, this group does not endorse the idea of targeting specific consumer segments as an effective strategy. As respondent CON7 explained, “Younger generations and

women are already buying these products, they're the natural consumers. It makes sense to consider them, but they don't represent significant growth potential. The real challenge is finding ways to engage those who are still distant or sceptical". Moreover, they do not believe that innovation in food technology or product development significantly enhances the attractiveness or marketability of AP products. The lower satiating power of AP products compared to conventional proteins is not an issue for this group. As one respondent (RTC2) noted, satiety is not a relevant concern; instead, any perceived lack of value is primarily linked to the higher price point. Allergenicity and novel food regulations are not considered worth noting elements for marketability. Overall, this perspective focuses on the prioritization of environmental impact and consumer perceptions over regulatory or ingredient-related challenges.

Discourse 4. "Legitimacy-driven strategy: addressing the knowledge gap and structural frictions"

This discourse receives the agreement of four Q-sorts, and it emphasizes consumer knowledge limitations and systemic imbalances as key barriers to the marketability of AP products. The lack of public awareness and understanding are perceived as the core challenge to wider adoption. This is coupled with a strong perception that the association of alternative proteins with ultra-processed foods significantly undermines consumer trust, mirroring concerns also raised in Discourse 3 and opposed to Discourse 2. However, unlike other discourses, this one reflects a broader scepticism toward the AP sector itself. It shows little confidence in institutional or policy-based interventions as opposed to Discourse 1. Stakeholders rate subsidies negatively as it is the idea that environmental concerns play a significant role in food choices. Interestingly, regulatory barriers such as naming or labelling restrictions are not perceived as significant obstacles. This view is supported by respondent RTC1, who emphasized that regulations, particularly those concerning safety assessments and labelling, are not barriers but essential prerequisites for market access and consumer trust. Discourse 4 focuses on deeper, structural issues, such as power asymmetries between large and small companies, and an overall lack of consumer readiness. As CON3 points out, "larger companies have more advantages than the small ones" thanks to higher funding availability as producing high-quality alternatives involves costly, complex processes, where know-how matters more than the raw materials themselves. Only large companies, they argue, can afford the necessary infrastructure. Finally, concerns related to product attributes, such as nutritional profile or variety, are also dismissed by this group. What emerges is a viewpoint defined by distrust: not just in the consumer's familiarity with AP, but in the broader viability of the sector to overcome perceptual and structural friction without fundamental changes in public trust and communication.

Discourse 5. "Tech-centric driven strategy: advancing product functionality in stable regulatory framework"

This perspective highlights food technology and product development as the main drivers of marketability for AP products. Five respondents were significantly associated with this viewpoint. In addition to taste, what defines this group is their emphasis on innovation and simultaneous concern that novel food regulations act as a major constraint, directly limiting innovation and ultimately hindering the sector's ability to bring products to the market. The concern around novel food regulation differentiates this discourse from others, especially Discourse 4. CUI2 highlights that "without guidance or support from food authorities, producers lack the confidence to invest in R&D because they cannot be sure these products will be allowed on the market". Respondents associated with this perspective dismiss concerns around traditional dining habits or social eating contexts. CON8 notes that "alternative products can naturally fit into dining experiences and that such habits do not determine consumer acceptance". Likewise, broad product portfolios or company size are not viewed as strategic assets; specialization and technical excellence in being innovative and

Table 5

Factor loadings.

Q-Sort	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
RTC4	0.70273	−0.1209	−0.01038	0.43772	0.09939
CON6	0.61659	0.38264	0.04888	0.11684	0.17086
NGO2	0.65453	−0.12787	0.09607	−0.4133	0.42944
NGO5	0.64132	0.17534	0.38325	0.12537	−0.08772
RTC6	0.62278	0.11666	0.17672	0.0359	0.11196
ACA8	0.57996	0.22148	−0.03584	0.34237	−0.00745
NGO8	0.60998	0.23771	0.30338	−0.09371	0.26581
ACA3	0.62435	0.02516	0.1328	−0.14283	−0.12049
NGO9	0.21876	0.50534	0.25939	0.23344	0.02095
NGO4	0.12371	0.57095	0.36949	0.39752	−0.02843
NGO3	0.06143	0.69543	0.17543	−0.11903	0.1636
CON1	0.09842	0.624	−0.05164	0.10335	0.08834
CUI3	0.35453	0.46121	0.09278	−0.35182	0.31034
RTC5	0.09229	0.56372	0.1674	−0.20529	0.16395
ACA7	0.00979	0.86537	−0.05101	−0.04878	0.02815
CON4	0.22612	−0.28163	0.60098	0.19732	0.38946
NGO6	0.0418	0.11286	0.64711	0.19256	0.05929
ACA4	0.03246	−0.02802	0.67233	−0.23238	0.17822
RTC2	0.35365	0.26402	0.48004	0.03473	0.25871
CON7	0.2826	0.08704	0.71593	−0.2004	−0.041
ACA5	−0.02545	0.40703	0.63829	−0.23751	0.40287
NGO7	0.3869	−0.027	0.48482	−0.05735	0.31166
ACA6	0.21474	0.18892	0.75525	0.14568	−0.0963
ACA2	0.24986	0.13926	−0.11251	0.51816	0.31646
CON3	0.08732	0.04585	0.07284	0.54975	0.4341
RTC1	0.01415	−0.11657	0.29267	0.56398	−0.11718
NGO1	−0.04768	−0.13005	−0.18831	0.50946	−0.18698
CON8	0.17607	0.42959	0.10002	−0.21631	0.52587
RTC3	0.2367	0.2333	0.21664	0.0109	0.50871
CON9	−0.25216	0.15763	0.31475	−0.10243	0.66112
CUI2	0.09236	0.18533	−0.13495	−0.00273	0.72505
CON2	0.30425	0.06458	0.21925	0.14412	0.46108
ACA1	0.26257	0.1591	0.54096	−0.03305	−0.45464
CUI1	0.46225	0.55017	0.28907	−0.2975	0.21226
CON5	0.01804	0.48373	0.62709	0.04405	0.15945

delivering a good product is what counts for these respondents. Finally, their neutral stance toward food format, as in other discourses, shows that form or convenience is not their concern. This discourse is firmly centred on technology, taste, and product functionality, while remaining sceptical of broader differentiation strategies that do not directly enhance product performance.

There are 3 experts that are not significantly associated with the five strategies (Table 5). Their loading patterns suggest confounding, as they display high loadings on two components, resulting in a lack of clear association (ACA1, CUI1, CON5).

In analysing patterns of agreement and disagreement among experts, certain topics emerged as areas of broad consensus, while others highlighted significant divergences in perspective. The strongest consensus among experts centred on the view that the food format of AP products is not a decisive factor in determining their marketability (S9). Experts also widely agreed that companies in the AP sector face limited challenges in differentiating their products and enhancing their presence in the market (S12). Additionally, there was agreement that texture influences marketability (S4). Taste (S3) is a statement consistently rated positively across all five components - albeit to a lesser extent in Discourse 4 - suggesting it is broadly acknowledged and a crucial driver of marketability. By contrast, other themes highlighted areas of contention, strengthening the perception of no unique view on marketability of AP products. The statement suggesting that subsidies could play a key role in enhancing marketability generated the highest level of disagreement among stakeholders, with Discourse 1 rating it highly positively and Discourse 4 negatively (S23). There was also a lack of consensus regarding whether environmental concerns influence the marketability of AP products (S1). Finally, opinions varied on the extent to which innovation in food technology and product development makes these products more attractive to consumers (S10).

5. Discussion

5.1. Key determinants shaping marketability

Building on existing evidence of determinants of marketability, this study provides input for further reflection on the marketability of AP products and possible action paths to support the growth of the sector. By applying Q-methodology, the study highlights the diversity of stakeholders' perspectives on the marketability of AP products.

The present findings are consistent with previous studies on a few key points. First, the study confirms that features such as taste and texture are crucial determinants for the marketability of AP products [33,35]. Consequently, stakeholders perceive (Discourse 2 and 5) that food innovation serves as a key enabler in the development of novel, tasty, and nutritious products, thereby enhancing marketability through consumer acceptability. This perspective is strongly backed by previous literature, which discuss food innovation as an enabler for market growth [42,52]. Nonetheless, Discourse 3 highlights that food innovation brings some risk as it may lead to perceptions of excessive processing or lack of naturalness of AP products. This could also reflect a degree of food neophobia toward technological innovation [83]. This concern aligns with the stakeholders' prevailing negative perception of AP foods as ultra-processed, confirming findings from previous studies [21,41]. The classification of AP products as ultra-processed has emerged as a significant barrier to their marketability, particularly deterring health-conscious consumers. This perception persists despite existing research suggests that not all of them are necessarily associated with adverse health outcomes [33,41].

The present study also presents various contradictory results. First, the current study shows divergent stakeholders' views regarding the relevance and effectiveness of subsidy policies in the AP sector. Most discourses align with previous research supporting the relevance of targeted subsidies [65,67] and advocating for a level playing field with the conventional meat industry [42,67]. Discourse 4, however, presents a contrasting position. It challenges the notion that subsidies are a key driver of marketability, suggesting instead that other factors may be more influential. Second, previous studies have discussed environmental values only as enabler of marketability of AP products by creating a positive image among consumers, investors, and retailers [35,55]. This view is confirmed by Discourse 3, which values the sustainable promises of AP products as a competitive advantage for their marketing. However, other discourses, especially Discourse 4, deemed that the sustainable narrative of the AP products is not significant in shaping marketability. Third, stakeholders do not place price among the most influential barriers to AP consumption. Previous studies have identified price as a major barrier to marketability [36,67]. However, the present findings suggest that stakeholders believe negative impact of high prices is potentially mitigable through more pressing interventions, such as improving taste. A group of stakeholders also discusses structural challenges, including limited consumer knowledge and uncertainty about future demand. Fourth, while some reaffirm previous findings that limited consumer awareness hinders the marketability of AP products [13,55], others are less concerned about future demand uncertainty. Finally, Discourse 5 aligns with prior literature stressing the negative effect of novel food regulation on AP sector, especially on innovation and thus marketability [52,63]. However, Discourse 4 diverges from this by not identifying it as a major barrier. These diverging points show how marketability is a multi-faced topic and how stakeholders picture different development paths for the sector. Moreover, stakeholders have different opinions on the impact of companies' dimension over market success. While a group of stakeholders (Discourse 4) is in line with previous literature which has discussed the competitive advantage of big companies in marketing AP products [50,51], another group (Discourse 2) perceive it as a minor determinant.

A comparison with the existing literature reveals several findings that depart from prior evidence. Regarding product features, previous

research supports the lower satiability of AP products as barrier to marketability [43,44], the current research dismiss this as a key barrier to marketability. In addition, the current findings diverge from previous research on the allergenicity of AP products [47]. Unlike earlier studies [47], stakeholders do not view the allergenicity of certain AP ingredients as a barrier to market growth. Additionally, they do not express concerns around the industry's ability to diversify AP products assortment, instead acknowledging an existing varied range of products available to consumers. This perception appears to contrast with previous studies, which highlight that the majority of AP products are PB meat analogues, suggesting a relatively narrow market focus [30,84].

It is worth highlighting that a group of determinants, in particular ethical concerns, nutritional profile, product format, challenges in scaling up production, and marketing, are not included in the Discourses. These findings indicate that, although previous literature has identified these themes as relevant, stakeholders do not perceive them as either highly relevant or entirely irrelevant to marketability. This difference may result from perspectives of different actors or different methodological approaches used to investigate these factors, which may result in different prioritization. In the present study, their neutral stance suggests that interventions targeting these areas may be deprioritized, as their current impact on marketability appears limited.

5.2. Macro-approaches for scaling marketability for companies

This study proposes three overarching approaches to enhance the marketability of AP products, shaped by product-level, structural and institutional factors. These approaches align with the narratives shaping the protein transition identified by previous studies [85,86] integrating marketability with broader sector growth discussions. Each approach suggests a different strategy for companies to enhance marketability of AP products.

First, the "product approach", found in Discourses 2 and 5, emphasizes product-related concerns. It prioritizes taste implementation and investments in technological advancement and R&D to improve products to meet consumer acceptance, thus enhancing marketability. This approach reflects a technocentric narrative around AP, where industry and research play a vital role in driving the sector development through resource-efficient and highly performing products [85]. This approach suggests companies should increase investments in R&D. Providing support for start-ups, university programs focused on AP, and increased research funding are few actions that would benefit the marketability of AP products. Improving the sensory qualities of the product would particularly appeal to a larger number of flexitarian consumers, for whom taste remains a key barrier to adopting AP products [87]. Marketing strategy could use packaging claims emphasizing the innovative side of these products in addition to the taste, including sensorial and emotional messages such as "innovative recipe" or "new taste".

Second, Discourse 3 supports a "value-driven approach". While taste remains a primary consideration, sustainability is recognized as a key driver of consumer behaviour. To enhance the marketability of AP products, businesses should strengthen their positioning as environmentally value-driven companies through targeted marketing strategies. This value-oriented approach aligns with the promissory narrative of AP, which stresses the promises of the protein transition being better for the planet [86,88]. It resonates with highly educated consumers, particularly within the vegan and vegetarian segment, for whom values play a central role in shaping food purchasing decisions. This approach supports the use of sustainability-centred communication, such as environmental claims and certifications. Such marketing strategies are already adopted by AP companies [52] and represent an effective avenue for enhancing marketability.

Third, the "structural approach" is shared by Discourse 1 and 4, both of which emphasize that the marketability of AP products is hindered by systemic barriers that slow their adoption. This approach relates with the understanding of the protein transition through the consumer and

socio-technological narratives, focused on *meso* (consumers) and macro (policy) food system dynamics. Discourse 4 highlights the need for companies to enhance market readiness through consumer education and greater clarity around AP products. In parallel, Discourse 1 calls for stronger policy engagement to establish a more equitable regulatory and economic environment for the AP sector. Communication strategies for AP companies should incorporate consumer educational initiatives designed to enhance product literacy, foster trust in these products, and mitigate prevailing consumer scepticism. Educational activities should be directed especially to flexitarians and health-conscious consumers, given their willingness to explore new foods. Furthermore, deeper collaboration with culinary influencers and chefs represents a channel for enhancing product appeal, thus increasing marketability [89]. Nonetheless, AP companies should also collaborate to increase their lobbying power to be able to influence policymaking to address structural frictions to marketability.

Together, these approaches suggest that there is no unique path to improving AP marketability as there is no unique narrative on protein transition. Companies could adopt different marketing strategies based on their internal resources and objectives. Simultaneously, strategic alliances with stakeholders are essential to leverage cross-sector expertise and resources. Collaborations with stakeholders including NGOs facilitate innovation in product development and the mitigation of structural barriers, including consumer knowledge and political support. Finally, the study underscores the importance of engaging policymakers to implement interventions, such as subsidies and labelling regulations, which could strengthen the sector by enhancing marketability.

5.3. Limitations and directions for future research

While this study is an insightful analysis on stakeholders' perspectives on the marketability of AP products, certain limitations must be acknowledged. First, the reliance on personal perspectives is a distinguishing feature of this methodology. In fact, the study does not aim to reach statistical generalizability but provides in-depth analysis of the perspectives emerged. Second, despite efforts to ensure diverse recruitment, the relatively small sample size of 35 interviews may introduce potential biases. To mitigate this, purposive sampling was employed to seek diverse perspectives. Third, key food system stakeholders and experts have been involved in the study, but perspectives from representatives of consumers and retailers have been left out. Future studies may extend the research to include them to compare how discourses differ across value chain positions. Finally, the present paper aims to engage stakeholders from the European Union, providing an aggregated view of the AP sector. Further studies may also consider replicating a similar study in other geographical areas, to be able to identify extra-European paths of AP marketability. Such comparisons would allow the identification of geographically specific barriers and enablers, as well as policy and cultural differences influencing market development. Future research could build on these findings by designing a study involving directly consumers. A Q-set based on the five discourses could explore how these narratives are endorsed, contested, or reinterpreted across different consumer segments, enabling a comparison between expert and consumer perspectives on AP marketability. This would highlight potential alignment or divergence across value chain actors.

6. Conclusion

This study advances the literature on alternative proteins and their role in food sustainability transition. It contributes to the stakeholder theory by confirming the stakeholders' pivotal role in market formation and commercialization of innovative food products. The integration of diverse stakeholder insights collectively contributes to a more comprehensive, multi-strategy approach for advancing the marketability of AP products.

This study's novel contribution lies in identifying multiple stakeholder perspectives on marketability, extending the analysis beyond consumer studies. The findings confirm that a mix of factors shapes marketability, including product attributes, structural and institutional factors. Overall, stakeholder and consumer perspectives show broad alignment. However, the discourses diverge on a subset of factors, including subsidies, environmental values, innovation, and novel food regulations. This divergence highlights the complexity of AP product marketability and suggests that multiple pathways and commercialization strategies may be implemented to support marketability. The study suggests various communication strategies that companies could adopt, including product-oriented, value-driven, and structural approaches. Enhancing the marketability of AP products will therefore require co-ordinated efforts across product development, policy frameworks, and food system actors to address both systemic barriers and evolving consumer expectations. Future research and action should continue to integrate these diverse perspectives to support a more cohesive and effective transition toward sustainable protein alternatives.

CRedit authorship contribution statement

Erica Conversano: Formal analysis, Investigation, Methodology, Writing – original draft, Writing – review & editing. **Antonella Samoggia:** Conceptualization, Data curation, Funding acquisition, Methodology, Supervision, Writing – original draft, Writing – review & editing. **Chiara Benussi:** Writing – original draft, Writing – review & editing.

Declaration of competing interest

The authors declare that there are no conflicts of interest regarding the publication of this paper.

Data availability

The data that has been used is confidential.

References

- [1] J. Mylan, J. Andrews, D. Maye, The big business of sustainable food production and consumption: exploring the transition to alternative proteins, *Proc. Natl. Acad. Sci. USA* 120 (2023) 1–9, <https://doi.org/10.1073/pnas.2207782120>.
- [2] C.C. de Moraes, P. Borin Claro, V. Picanço Rodrigues, Why can't the alternative become mainstream? Unpacking the barriers and enablers of sustainable protein innovation in Brazil, *Sustain. Prod. Consum.* 35 (2023) 313–324, <https://doi.org/10.1016/j.spc.2022.11.008>.
- [3] F. Medeiros, R.S. Aleman, L. Gabríny, S.W. You, R.T. Hoskin, M. Moncada, Current status and economic prospects of alternative protein sources for the food industry, *Appl. Sci.* 14 (2024) 3733, <https://doi.org/10.3390/app14093733>.
- [4] H. Westhoek, J.P. Lesschen, T. Rood, S. Wagner, A. De Marco, D. Murphy-Bokern, et al., Food choices, health and environment: effects of cutting Europe's meat and dairy intake, *Glob. Environ. Change* 26 (2014) 196–205, <https://doi.org/10.1016/j.gloenvcha.2014.02.004>.
- [5] C. Hartmann, M. Siegrist, Our daily meat: justification, moral evaluation and willingness to substitute, *Food Qual. Prefer.* 80 (2020) 103799, <https://doi.org/10.1016/j.foodqual.2019.103799>.
- [6] M. Estell, J. Hughes, S. Grafenauer, Plant protein and Plant-based meat alternatives: consumer and nutrition professional attitudes and perceptions, *Sustainability* 13 (2021) 1478, <https://doi.org/10.3390/su13031478>.
- [7] A. Green, C. Blattmann, C. Chen, A. Mathys, The role of alternative proteins and future foods in sustainable and contextually-adapted flexitarian diets, *Trends. Food Sci. Technol.* 124 (2022) 250–258, <https://doi.org/10.1016/j.tifs.2022.03.026>.
- [8] P.G. Brooker, G.A. Hendrie, K. Anastasiou, R. Woodhouse, T. Pham, M.L. Colgrave, Marketing strategies used for alternative protein products sold in Australian supermarkets in 2014, 2017, and 2021, *Front. Nutr.* 9 (2022) 1087194, <https://doi.org/10.3389/fnut.2022.1087194>.
- [9] C. Béné, M. Lundy, Political economy of protein transition: battles of power, framings and narratives around a false wicked problem, *Front. Sustain.* 4 (2023), <https://doi.org/10.3389/frsus.2023.1098011>.
- [10] M. Qaim, R. Barrangou, P.C. Ronald, Sustainability of animal-sourced foods and plant-based alternatives, *Proc. Natl. Acad. Sci. USA* 121 (2024) 1–8, <https://doi.org/10.1073/pnas.2400495121>.

- [11] E. Beacom, J. Bogue, L. Repar, Market-oriented development of plant-based food and beverage products: a usage segmentation approach, *J. Food Prod. Mark.* 27 (2021) 204–222.
- [12] D. Sucapane, C. Roux, K. Sobol, Exploring how product descriptors and packaging colors impact consumers' perceptions of plant-based meat alternative products, *Appetite* 167 (2021) 105590, <https://doi.org/10.1016/j.appet.2021.105590>.
- [13] M. Amato, R. Rivero, R. Palmieri, F. Verneau, L.B.F. Stakeholder, Beliefs about alternative proteins: a systematic review, *Nutrients* 15 (2023) 837, <https://doi.org/10.3390/nu15040837>.
- [14] R.K. Mitchell, Toward a theory of stakeholder identification and salience: defining the principle of who and what really counts, *Acad. Manag. Rev.* 22 (1997) 853.
- [15] A. Engez, L. Aarikka-Stenroos, Stakeholder contributions to commercialization and market creation of a radical innovation: bridging the micro- and macro levels, *JBIM* 38 (2023) 31–44, <https://doi.org/10.1108/JBIM-03-2022-0136>.
- [16] Y. Vecchio, J. Di Pasquale, T. Del Giudice, G. Pauselli, M. Masi, F. Adinolfi, Precision farming: what do Italian farmers really think? An application of the Q methodology, *Agric. Syst.* 201 (2022) 103466, <https://doi.org/10.1016/j.agsys.2022.103466>.
- [17] Watts S., Stenner P. Sage Research Methods - Doing Q Methodological Research: Theory, Method and Interpretation. SAGE Publications Ltd; 2012. doi:10.4135/9781446251911.
- [18] R.E. Freeman, The politics of stakeholder theory: some future directions, *Bus. Ethics Q.* 4 (1994) 409–421, <https://doi.org/10.2307/3857340>.
- [19] M. Degieter, M. Dutra De Barcellos, X. Gellynck, S. Goyal, D. Ott, H. De Steur, Risks, resilience and sustainability of plant-based protein chains in Europe: a stakeholder analysis, *Brit. Food J.* 128 (2026) 1149–1163, <https://doi.org/10.1108/BFJ-10-2024-1000>.
- [20] R. Manners, I. Blanco-Gutiérrez, C. Varela-Ortega, A.M. Tarquis, Transitioning European protein-rich food consumption and production towards more sustainable patterns—strategies and policy suggestions, *Sustainability* 12 (2020) 1962, <https://doi.org/10.3390/su12051962>.
- [21] R.L. Morais-da-Silva, G.G. Reis, H. Sanctorum, C.F.M. Molento, The social impacts of a transition from conventional to cultivated and plant-based meats: evidence from Brazil, *Food Policy* 111 (2022) 102337, <https://doi.org/10.1016/j.foodpol.2022.102337>.
- [22] T. Arppe, M. Niva, P. Jallinoja, The emergence of the Finnish edible insect arena: the dynamics of an 'active obstacle', *Geoforum* 108 (2020) 227–236, <https://doi.org/10.1016/j.geoforum.2019.11.005>.
- [23] A. Lamy, S. Costa, L. Sirieix, O. Mugel, M. Michaud, Tell me what you cook and I'll tell you who you are. A study of the influence of the representations and identities of aspiring chefs on their intentions to reduce meat in favour of plant-based dishes, *Ecol. Econ.* 235 (2025) 108642, <https://doi.org/10.1016/j.ecolecon.2025.108642>.
- [24] Y.J.E. Michielsen, H.M. Van Der Horst, R. Van De Nobelen, Beef or Beet Wellington? Chefs, meat reduction, and hindering and supportive forms of craftsmanship, *Food Cult. Soc.* 28 (2025) 60–83, <https://doi.org/10.1080/15528014.2024.2322792>.
- [25] K.O. Ouko, A.W. Mukhebi, K.O. Obiero, F.A. Opondo, C.A. Ngo'ng'a, D.O. Ongor, Stakeholders' perspectives on the use of black soldier fly larvae as an alternative sustainable feed ingredient in aquaculture, Kenya, *AfJARE* 17 (2022) 64–79, [https://doi.org/10.53936/afjare.2022.17\(1\).4](https://doi.org/10.53936/afjare.2022.17(1).4).
- [26] M. Degieter, X. Gellynck, S. Goyal, M. Mattelin, J. De Wulf, D. Ott, et al., A mixed-methods approach to examine farmers' willingness to adopt protein crops, *Outlook. Agric.* 52 (2023) 446–456, <https://doi.org/10.1177/00307270231205924>.
- [27] R. Craft, H. Pitt, More than meat? Livestock farmers' views on opportunities to produce for plant-based diets, *Agric. Hum. Values* 41 (2024) 975–988, <https://doi.org/10.1007/s10460-023-10533-4>.
- [28] D.C. Bentia, Accountability beyond measurement. The role of meetings in shaping governance instruments and governance outcomes in food systems through the lens of the Donau Soja organisation, *J. Rural. Stud.* 88 (2021) 50–59, <https://doi.org/10.1016/j.jrurstud.2021.09.026>.
- [29] C.V.C. Casnici, G.G. Reis, D. Schulzmann, M. Papanastassiou, J. Clegg, The role of NGOs in the transition towards more sustainable and innovative agri-food GVCs, in: R. Van Tulder, B. Grøgaard, R. Lunnan (Eds.), *Progress in International Business Research*, Emerald Publishing Limited, 2024, pp. 373–392, <https://doi.org/10.1108/S1745-886220240000018023>.
- [30] L. Rini, J.J. Schouteten, I. Faber, K.-B. Bechtold, F.J.A. Perez-Cueto, X. Gellynck, et al., Identifying the key success factors of plant-based food brands in Europe, *Sustainability* 15 (2022) 306, <https://doi.org/10.3390/su15010306>.
- [31] C. Apostolidis, F. McLeay, Should we stop meat eating like this? Reducing meat consumption through substitution, *Food Policy* 65 (2016) 74–89, <https://doi.org/10.1016/j.foodpol.2016.11.002>.
- [32] X. Liu, D. Wu, Y. Shao, Y. Wu, New food sources and production systems: a comparison of international regulations and China's advancements in novel foods with synthetic biology, *Food Sci. Hum. Wellness* 13 (2024) 2519–2542, <https://doi.org/10.26599/FSHW.2022.9250253>.
- [33] M. Messina, V. Messina, Nova fails to appreciate the value of plant-based meat and dairy alternatives in the diet, *J. Food Sci.* 90 (2025) e70039, <https://doi.org/10.1111/1750-3841.70039>.
- [34] J. Nguyen, C. Ferraro, S. Sands, S. Luxton, Alternative protein consumption: a systematic review and future research directions, *Int. J. Consum. Stud.* 46 (2022) 1691–1717, <https://doi.org/10.1111/ijcs.12797>.
- [35] A. Samad, S.-H. Kim, C.-J. Kim, E.-Y. Lee, S. Kumari, M.J. Hossain, et al., From farms to labs: the new trend of sustainable meat alternatives, *Food Sci. Anim. Resour.* 45 (2025) 13–30, <https://doi.org/10.5851/kosfa.2024.e105>.
- [36] M. Springmann, A multicriteria analysis of meat and milk alternatives from nutritional, health, environmental, and cost perspectives, *Proc. Natl. Acad. Sci. USA* 121 (2024) e2319010121, <https://doi.org/10.1073/pnas.2319010121>.
- [37] S. Cutroneo, D. Angelino, T. Tedeschi, N. Pellegrini, D. Martini, S.I.N.U. Young Working Group, Nutritional quality of meat analogues: results from the food labelling of Italian Products (FLIP) Project, *Front. Nutr.* 9 (2022) 852831, <https://doi.org/10.3389/fnut.2022.852831>.
- [38] G. Dong, L.M. Hinds, A.B. Soro, Z. Hu, D.-W. Sun, B.K. Tiwari, Non-thermal processing technologies for allergen control in alternative protein sources for food industry applications, *Food Eng. Rev.* 16 (2024) 595–617, <https://doi.org/10.1007/s12393-024-09378-2>.
- [39] J. Graça, A. Oliveira, M.M. Calheiros, Meat, beyond the plate. Data-driven hypotheses for understanding consumer willingness to adopt a more plant-based diet, *Appetite* 90 (2015) 80–90, <https://doi.org/10.1016/j.appet.2015.02.037>.
- [40] IPES-Food. The politics of protein: examining claims about livestock, fish, 'alternative proteins' and sustainability. 2022. Available online: https://www.ipes-food.org/_img/upload/files/PoliticsOfProtein.pdf.
- [41] G. Andreani, G. Sogari, A. Marti, F. Foldi, H. Dagevos, D. Martini, Plant-based meat alternatives: technological, nutritional, environmental, market, and social challenges and opportunities, *Nutrients* 15 (2023) 452, <https://doi.org/10.3390/nu15020452>.
- [42] I. Blanco-Gutiérrez, C. Varela-Ortega, R. Manners, Evaluating animal-based foods and plant-based alternatives using multi-criteria and SWOT analyses, *IJERPH* 17 (2020) 7969, <https://doi.org/10.3390/ijerph17217969>.
- [43] J. de Boer, H. Aiking, Pursuing a low meat diet to improve both health and sustainability: how can we use the frames that shape our meals? *Ecol. Econ.* 142 (2017) 238–248, <https://doi.org/10.1016/j.ecolecon.2017.06.037>.
- [44] L. Malek, W.J. Umberger, How flexible are flexitarian? Examining diversity in dietary patterns, motivations and future intentions, *Clean. Responsible Consum.* 3 (2021) 100038, <https://doi.org/10.1016/j.clrc.2021.100038>.
- [45] C. Alae-Carew, R. Green, C. Stewart, B. Cook, A.D. Dangour, P.F.D. Scheelbeek, The role of plant-based alternative foods in sustainable and healthy food systems: consumption trends in the UK, *Sci. Total Environ.* 807 (2022) 151041, <https://doi.org/10.1016/j.scitotenv.2021.151041>.
- [46] H.J. Lee, H.I. Yong, M. Kim, Y.-S. Choi, J. Cheorun, Status of meat alternatives and their potential role in the future meat market — a review, *Asian-Australas. J. Anim. Sci.* 33 (2020) 1533–1543, <https://doi.org/10.5713/ajas.20.0419>.
- [47] B. Rajpurohit, Y. Li, Overview on pulse proteins for future foods: ingredient development and novel applications, *J. Future Foods* 3 (2023) 340–356, <https://doi.org/10.1016/j.jfutfo.2023.03.005>.
- [48] A. Lonkila, M. Kaljonen, Promises of meat and milk alternatives: an integrative literature review on emergent research themes, *Agric. Hum. Values* 38 (2021) 625–639, <https://doi.org/10.1007/s10460-020-10184-9>.
- [49] A. Mannem, A. Heintz Tangari, M.J. Baran, I've got the power: encouraging pro-environmental behavior through messaging, *J. Bus. Res.* 168 (2023) 114228, <https://doi.org/10.1016/j.jbusres.2023.114228>.
- [50] G. Reis, E.G. Villar, T. Rynänen, P.R.V.D. Goliath, The challenges for plant-based meat companies competing with animal-based meat producers, *J. Clean. Prod.* 423 (2023) 138705, <https://doi.org/10.1016/j.jclepro.2023.138705>.
- [51] Y. Tian, Q. Kamran, Creating value for sustainability by transforming the food well-being paradigm—Alternative new food product development, *J. Creat. Val.* 9 (2023) 291–308, <https://doi.org/10.1177/23949643231184167>.
- [52] E. Lurie-Luke, Alternative protein sources: science powered startups to fuel food innovation, *Nat. Commun.* 15 (2024) 4425, <https://doi.org/10.1038/s41467-024-47091-0>.
- [53] B.M. Bulah, M. Tziva, C. Bidmon, M.P. Hekkert, Incumbent entry modes and entry timing in sustainable niches: the plant-based protein transition in the United States, Netherlands, and United Kingdom, *Environ. Innov. Soc. Transit.* 48 (2023) 100735, <https://doi.org/10.1016/j.eist.2023.100735>.
- [54] Good Food Institute, State of the Industry Report: Plant-based meat, seafood, eggs, and dairy. 2024. Available online: <https://gfi.org/wp-content/uploads/2024/05/2023-State-of-the-industry-report-Plant-based.pdf>.
- [55] L. Johansson, I. Jonasson, W. Reim, Sustainable expansion: capabilities for "new food source", *Co. Future Foods* 8 (2023) 100259, <https://doi.org/10.1016/j.fufo.2023.100259>.
- [56] F.B. Hu, B.O. Otis, G. McCarthy, Can plant-based meat alternatives Be part of a healthy and sustainable diet? *JAMA, J. Am. Med. Assoc.* 322 (2019) 1547, <https://doi.org/10.1001/jama.2019.13187>.
- [57] R. Katz-Rosene, A. Heffernan, A. Arora, Protein pluralism and food systems transition: a review of sustainable protein meta-narratives, *World Dev.* 161 (2023) 106121, <https://doi.org/10.1016/j.worlddev.2022.106121>.
- [58] V. Zulfia, N.F. Andini, Hamiyati, The purchase intention of environmentally friendly milk bottles: role of product knowledge and environmental concern, *JCS* 8 (2023) 379–394, <https://doi.org/10.29244/jcs.8.3.379-394>.
- [59] C.A. Gómez-Luciano, L.K. de Aguiar, F. Vriesekoop, B. Urbano, Consumers' willingness to purchase three alternatives to meat proteins in the United Kingdom, Spain, Brazil and the Dominican Republic, *Food Qual. Prefer.* 78 (2019) 103732, <https://doi.org/10.1016/j.foodqual.2019.103732>.
- [60] M.A. Toribio-Mateas, A. Bester, N. Klimenko, Impact of plant-based meat alternatives on the gut microbiota of consumers: a real-world study, *Foods* 10 (2021) 2040, <https://doi.org/10.3390/foods10092040>.
- [61] H. Zaleskiewicz, M. Siwa, A. Banik, Z. Szczuka, E. Kulis, F. Grossi, et al., Psychosocial determinants of alternative protein choices: a meta-review, *Health N. HavHealth. Psychol. Rev.* 19 (2025) 97–122, <https://doi.org/10.1080/17437199.2024.2412630>.

- [62] F. Verneau, F. La Barbera, S. Kolle, M. Amato, T. Del Giudice, K. Grunert, The effect of communication and implicit associations on consuming insects: an experiment in Denmark and Italy, *Appetite* 106 (2016) 30–36, <https://doi.org/10.1016/j.appet.2016.02.006>.
- [63] T. Reinhardt, A. Monaco, How innovation-friendly is the EU novel food regulation? The case of cellular agriculture, *Future Foods* 11 (2025) 100574, <https://doi.org/10.1016/j.fufo.2025.100574>.
- [64] G. Spatola, A. Giusti, S. Mancini, L. Tinacci, R. Nuvoloni, F. Fratini, et al., Assessment of the information to consumers on insects-based products (Novel Food) sold by e-commerce in the light of the EU legislation: when labelling compliance becomes a matter of accuracy, *Food Control* 162 (2024) 110440, <https://doi.org/10.1016/j.foodcont.2024.110440>.
- [65] O. Duluins, A. Riera, M. Schuster, P.V. Baret, G. Van Den Broeck, Economic implications of a protein transition: evidence from Walloon beef and Dairy farms, *Front. Sustain. Food Syst.* 6 (2022) 803872, <https://doi.org/10.3389/fsufs.2022.803872>.
- [66] L. Hundscheid, M. Wurzing, A. Gühnemann, A.H. Melcher, T. Stern, Rethinking meat consumption - how institutional shifts affect the sustainable protein transition, *Sustain. Prod. Consum.* 31 (2022) 301–312, <https://doi.org/10.1016/j.spc.2022.02.016>.
- [67] P. Newton, W. Eichhorst, M. Hegwood, R.L. Morais-da-Silva, M.S. Heidemann, A. Hoffmann, et al., Price above all else: an analysis of expert opinion on the priority actions to scale up production and consumption of plant-based meat in Brazil, *Front. Sustain. Food Syst.* 8 (2024) 1303448, <https://doi.org/10.3389/fsufs.2024.1303448>.
- [68] C. Varela-Ortega, I. Blanco-Gutiérrez, R. Manners, A. Detzel, Life cycle assessment of animal-based foods and plant-based protein-rich alternatives: a socio-economic perspective, *J. Sci. Food Agric.* 102 (2022) 5111–5120, <https://doi.org/10.1002/jsfa.11655>.
- [69] S.R. Brown, A primer on Q methodology, *Operant Subj.* 16 (1993) 91–138.
- [70] van Exel J., de Graaf G. Q methodology - A sneak preview 2005. Available online: <https://qmethod.org/portfolio/van-exel-and-de-graaf-a-q-methodology-sneak-preview/>.
- [71] G.G. Reis, B.D.F. Martins Da Silva, A.L. Hartmann, T.E. Venus, Promises and uncertainties in the cultivated proteins market: perspectives from Germany and Brazil, *Food Policy* 131 (2025) 1–18, <https://doi.org/10.1016/j.foodpol.2025.102820>, 102820.
- [72] V.I. Kraak, B. Swinburn, M. Lawrence, P. Harrison, A Q methodology study of stakeholders' views about accountability for promoting healthy food environments in England through the responsibility deal food network, *Food Policy* 49 (2014) 207–218, <https://doi.org/10.1016/j.foodpol.2014.07.006>.
- [73] B. McKeown, D.B. Thomas, Sage Research Methods - Q Methodology, SAGE Publications, Thousand Oaks, 2013, ISBN 9781483384412, <https://doi.org/10.4135/9781483384412>.
- [74] W. Stephenson, Q-methodology, *interbehavioral psychology, and quantum theory - ProQuest, Psychol. Rec.* 32 (1982) 235–248.
- [75] S. Lutfallah, L. Buchanan, Quantifying subjective data using online Q-methodology software, *Ment. Lex.* 14 (2019) 415–423, <https://doi.org/10.1075/ml.20002.lut>.
- [76] J. Schmidt, T.H.A. Bijmolt, Accurately measuring willingness to pay for consumer goods: a meta-analysis of the hypothetical bias, *J. Acad. Mark. Sci.* 48 (2020) 499–518, <https://doi.org/10.1007/s11747-019-00666-6>.
- [77] A. Fonseca Flores, J. Rocha Trindade, C. Freitas Silveira Netto, V. Brei, Redefining market potential: definitions, dimensions, and index, in: *Proceedings of the European Marketing Academy*, 2025.
- [78] S.R. Brown, Q methodology and Qualitative research, *Qual. Health Res.* 6 (4) (1996), <https://doi.org/10.1177/104973239600600408>.
- [79] T.A. Steelman, L.A. Maguire, Understanding participant perspectives: q-methodology in national forest management, *J. Policy Anal. Manag.* 18 (1999) 361–388, [https://doi.org/10.1002/\(SICI\)1520-6688\(199922\)18. :3%3C361::AID-PAM3%3E3.0.CO;2-K](https://doi.org/10.1002/(SICI)1520-6688(199922)18. :3%3C361::AID-PAM3%3E3.0.CO;2-K).
- [80] N. Akhtar-Danesh, Impact of factor rotation on Q-methodology analysis, *PLoS. One* 18 (2023) e0290728, <https://doi.org/10.1371/journal.pone.0290728>.
- [81] Y. Yang, A brief introduction to Q methodology, *Int J. Adult. Vocat. Educ. Technol.* 7 (2016) 42–53, <https://doi.org/10.4018/IJAVET.2016040104>.
- [82] C.M. Dieteren, N.J.S. Patty, R.-D. VT, J. Van Exel, Methodological choices in applications of Q methodology: a systematic literature review, *Soc. Sci. Humanit. Open.* 7 (2023) 100404, <https://doi.org/10.1016/j.ssaho.2023.100404>.
- [83] S. Tunca, M. Budhathoki, K. Brunsø, European consumers' intention to buy sustainable aquaculture products: an exploratory study, *Sustain. Prod. Consum.* 50 (2024) 20–34, <https://doi.org/10.1016/j.spc.2024.07.021>.
- [84] FAO, Plant-based Food products, Precision Fermentation and 3D Food Printing, FAO, 2024, <https://doi.org/10.4060/cd2430en>.
- [85] O. Duluins, P.V. Baret, A systematic review of the definitions, narratives and paths forwards for a protein transition in high-income countries, *Nat. Food* 5 (2024) 28–36, <https://doi.org/10.1038/s43016-023-00906-7>.
- [86] A.E. Sexton, T. Garnett, J. Lorimer, Framing the future of food: the contested promises of alternative proteins, *Environ. Plan. E: Nat. Space* 2 (2019) 47–72, <https://doi.org/10.1177/2514848619827009>.
- [87] M. Pointke, M. Ohlau, A. Risius, E. Pawelzik, Plant-based only: investigating consumers' Sensory perception, motivation, and knowledge of different Plant-based alternative products on the market, *Foods* 11 (2022) 2339, <https://doi.org/10.3390/foods11152339>.
- [88] A. Schwarz, P. Fischer, R. Weinrich, Unlocking the value and transitional purpose of plant-based meat alternative companies in the German market, *Sustain. Futures* 7 (2024) 100183, <https://doi.org/10.1016/j.sfr.2024.100183>.
- [89] Z. Wang, M. Nguyen, J. Park, Y. Yuan, From perceived healthiness to acceptance: how influencer type shapes consumer acceptance of insect-based foods, *Food Qual. Prefer.* 135 (2026) 105719, <https://doi.org/10.1016/j.foodqual.2025.105719>.