

PROFILING YOUNG CONSUMERS BASED ON ATTITUDES TOWARD HEALTH, THE ENVIRONMENT AND SUSTAINABILITY OF EDIBLE INSECT-BASED FOODS

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Purpose: The aim of the study was to segment the market of young consumers, represented by members of university students in Poland, into distinct groups characterized by similar attitudes toward health, the environment, and innovative food products containing edible insects.

Design/methodology/approach: The research instrument was an online questionnaire (CAWI). To identify differences among respondents regarding the quantitative variables, the non-hierarchical k-means clustering method was applied. One-way analysis of variance (ANOVA) was used to compare the qualitative consumer characteristics across the resulting clusters.

Findings: The results indicated that the quantitative variables differentiated the study sample into two distinct, homogeneous segments ($p < 0.05$). Cluster 1 was termed “ambivalent and moderately sustainability-oriented”. This group consisted of consumers who expressed concern for food safety and environmental sustainability. Cluster 2 was labelled „sceptical and lacking a sustainability orientation”. Members of this cluster did not display environmental or health-related attitudes in their food choices and were characterised by negative attitudes towards edible insect foods and low purchase intentions for such products in the future.

Research limitations/implications: The empirical population consists of 947 university students selected through purposive non-probability sampling, so the conclusions cannot be directly generalized to the entire Polish young consumers population.

Practical implications: Understanding the distinct segments of Polish students differentiated by their attitudes towards health, the environment, and alternative sustainable foods based on edible insects, enables the precise tailoring of marketing messages and educational programmes to the needs and values of each group. Such an approach enhances the effectiveness of informational campaigns, supports the development of a positive image for sustainable food products, and contributes to fostering conscious, environmentally responsible consumer choices.

Social implications: The findings may serve as a foundation for public policies aimed at nutritional education and the promotion of sustainable eating habits among the younger generation.

Originality/value: Our study identifies distinct consumer segments based on their attitudes towards health, the environment, and sustainable food. Moreover, this study addresses a significant gap in the literature concerning the younger generation.

Keywords: consumer segmentation, Generation Z, environmental sustainability, sustainable food management, segments.

Category of the paper: Research paper.

1. Introduction

Addressing global food challenges necessitates a shift toward more sustainable consumption patterns (van Dijk et al., 2021). The increasing demand for food is driven by population growth, lifestyle changes, urbanization, and rising income levels (Clark et al., 2019; WHO, 2023). These challenges underscore the increasing importance of promoting sustainable food consumption and production (FAO and WHO, 2019). International organizations such as the FAO promote insects as an "underutilized food resource that can help address food security challenges" (FAO, 2021). Entomophagy is considered one of the most promising and environmentally sustainable sources of animal protein (van Huis, Oonincx, 2017; Kim et al., 2021).

Nichifor, Zai, and Timiras (2025) identified several key barriers that hinder the consumption of sustainable food. Among the most significant obstacles are the limited availability of sustainable products, insufficient distribution infrastructure, and unclear labeling, which collectively make it difficult for consumers to make informed choices. High prices of organic goods also represent a substantial barrier, particularly for lower-income households where price sensitivity often outweighs environmental concerns.

Poland presents a distinctive research context due to its rapidly evolving socio-economic landscape, shifting dietary culture, and increasing availability of modern food products. At the same time, the importance of sustainability is gaining traction in public policy and education. However, there remains a notable lack of broad consumer acceptance of novel protein sources, such as edible insects (Mikulec et al., 2024a, 2024b; Orkusz et al., 2020). The interplay between emerging opportunities and enduring challenges creates a compelling context for analyzing consumer segmentation, as well as for identifying both obstacles and viable strategies for the market introduction of sustainable food products.

1.1. Theoretical background

Sustainable food consumption and production lie at the heart of global strategies aimed at mitigating climate change, preserving biodiversity, and preventing the degradation of natural resources (United Nations, 2015). Similarly, a joint report by the FAO and WHO (2019) highlights that a sustainable diet should not only promote individual health but also exert minimal environmental impact, while being culturally acceptable, economically accessible, and socially equitable.

Despite increasing public awareness, the practical implementation of sustainable dietary principles continues to face substantial obstacles, including limited knowledge, strong adherence to traditional eating habits, and low acceptance of novel food products (Ford et al., 2023; Kenny et al., 2023; Nichifor et al., 2025). Studies have consistently identified a significant gap between consumers' stated intentions and their actual behaviors (Borges-Tiago et al., 2024; Gazdecki et al., 2021; Schäufele, Janssen, 2021).

Understanding consumer attitudes toward the health and environmental dimensions of food is therefore essential for developing effective educational and marketing strategies. In this context, consumer segmentation is gaining importance as a tool for identifying groups with distinct values and motivations (Kotler et al., 2021; Schäufele-Elbers, Janssen, 2023; Wedel, Kamakura, 2002). The relevance of segmentation is especially pronounced in light of rapidly shifting consumer preferences and the increasing complexity of the food market, particularly in relation to innovative products. Modern segmentation approaches incorporate a wide range of variables, including demographic, geographic, psychographic, and behavioral factors such as brand loyalty, purchase frequency, and stage of product adoption (McDonald, 2010; Schiffman, Kanuk, 2019). There is also growing interest in latent variables – such as consumer motivations, personal values, and purchase intentions – which offer deeper insights into the complexity of decision-making processes (Su et al., 2019). Contemporary segmentation strategies also increasingly account for psychological factors, including lifestyle and openness to innovation, both of which play a crucial role in shaping purchasing decisions (Gómez-Suárez, Belz, Rennhak, 2022; Rogers, 2003). As a result, segmentation is not only becoming more prominent in corporate marketing strategies but is also emerging as an essential component of effective consumer relationship management.

In recent years, a growing number of studies have employed segmentation techniques to examine the diverse attitudes of consumers toward health, environmental protection, sustainable food, and innovative products (Camanzi et al., 2024; Mancini, Antonioli, 2024; Marette, Roosen, 2023; Schäufele-Elbers, Janssen, 2023). The literature includes both traditional typological approaches and more targeted models, such as segmentation based on the LOHAS (Lifestyle of Health and Sustainability) concept. Some studies go beyond self-reported data by incorporating panel data on actual purchasing behavior, which allows for

a more nuanced analysis of the discrepancies between consumer attitudes and real-world behaviors (Schäufele-Elbers, Janssen, 2023). A particularly dynamic area of segmentation research concerns perceptions of alternative food sources, including entomophagy. Kamenidou et al. (2023) identified four consumer segments within the Greek Generation Z population: “Future potential insect consumers”, the “Rejecters”, the “Disgusted, prefer to starve”, and the “Inconsistent”. Despite generally low levels of food neophobia, members of Generation Z remain reluctant to embrace insect-based products. Valesi, Andreini and Pedeliento (2024), using the Theory of Planned Behavior (TPB) as a framework, identified three segments among Italian consumers: insect-progressives (hedonists open to new flavors), insect-avoidants (driven by health and environmental concerns), and insect-rejectors (firm opponents).

In summary, contemporary segmentation research reveals the complex structure of the sustainable consumption market. A segmented understanding of the market enables more targeted and efficient efforts to foster sustainable dietary habits across society. The rationale for conducting a pilot study in Poland stems from the need to understand the specific characteristics of Polish consumers, particularly young ones, as their attitudes will play a critical role in shaping future food trends. Young people are among the fastest adopters of change, demonstrating both high receptivity to innovation and strong environmental awareness. Therefore, examining the attitudes of Polish Generation Z toward health, the environment, and insect-based foods holds significant practical and academic value. Insights generated by this research can inform the development of educational and marketing strategies aimed at encouraging health-conscious and environmentally responsible food choices among young Poles, including greater acceptance of sustainable insect-based products.

This study offers a novel perspective on young consumers the context of health attitudes, environmental attitudes and interest in sustainable with edible insect foods. The aim of the study was to segment the market of young consumers, represented by members of university students in Poland, into distinct groups characterized by similar attitudes toward health, the environment, and innovative food products containing edible insects.

The research hypothesis proposed that students are heterogeneous in terms of their health-related attitudes, environmental concerns, and perceptions of insect-based novel foods. Potential segmentation factors include gender, field of study, place of residence, perceived material status, orientation towards pleasure, convenience and rapid meal preparation, attention to the consumption of high-nutritional-value foods, appreciation of regional culinary traditions, as well as high health consciousness and physical activity levels.

2. Methods

2.1. Data collection and sample characteristics

The segmentation of young consumers was based on data collected through a survey conducted among students enrolled in higher education institutions in Poland representing Generation Z. The study protocol was reviewed and approved by the University Ethics Committee for Scientific Research at the Krakow University of Economics (approval no. KEBN/71/0044/D24/2023). A non-probability purposive sampling method was employed to select participants (N = 947). All respondents provided informed and voluntary consent to participate in the study and confirmed their awareness of potential risks associated with participation in a Computer-Assisted Web Interview (CAWI).

The segmentation of young consumers was based on data collected through a study conducted among students enrolled in higher education institutions in Poland.

The research instrument was an online questionnaire administered via a CAWI platform, consisting of two main sections. The first section included items related to quantitative variables (see Table 1), specifically:

- Health awareness / attitudes toward organic food – HA (Kornher et al., 2019).
- Concerns for food safety – CFS (Mikulec et al., 2024b).
- Concerns for environmental sustainability – CES (Mikulec et al., 2024b).
- Food neophobia – FN (Pliner, Hobden, 1992).
- Attitudes toward sustainable food containing edible insects – ASF (Wang et al., 2013).
- Purchase intention for insect-based food – ISF (Kornher et al., 2019; Lee et al., 2010).

The second section of the questionnaire comprised a demographic and lifestyle profile, including variables such as gender, field of study, place of residence, self-assessed financial situation, and lifestyle indicators. These indicators covered pleasure orientation, convenience and speed in meal preparation, attention to the nutritional quality of food, appreciation for regional culinary traditions, self-perceived health consciousness, and level of physical activity (Platta et al., 2024a).

During the survey, the respondent expressed his or her level of approval or disapproval of all the posted items using a 5-point Likert scale, where the values means: 1 - „definitely no”, 2 - „no”, 3 - „I do not know, I have no opinion”, 4 - „yes”, 5 - „definitely yes” (Likert, 1932).

Although Likert-scale items are strictly ordinal in nature, composite scores derived from multi-item constructs were used in the clustering procedure. Following common practice in social science and consumer behavior research, aggregated scale scores are treated as approximately interval-level variables, which allows the application of distance-based clustering methods such as k-means.

Table 1 presents the characteristics of the sample in terms of gender, place of residence, and financial situation. The study included 947 participants, of whom 59.98% identified as female. The largest groups of respondents were enrolled in engineering and technical programs (41.08%) and social sciences (40.34%). The most represented backgrounds were rural areas (36.85%) and medium-sized cities with populations between 150,000 and 500,000 residents (21.96%). Regarding financial self-assessment, the majority rated their situation as good (53.01%) or very good (20.91%).

Table 1.
Sample characteristics

Variable	Category	n	%
Gender	Female	568	59.98
	Male	379	40.02
Field of Study	Engineering and Technical Sciences	389	41.08
	Social Sciences	382	40.34
	Medical and Health Sciences	74	7.81
	Natural and Physical Sciences	48	5.07
	Humanities	30	3.17
	Agricultural Sciences	24	2.53
Place of Residence	Rural area	349	36.85
	Town with population up to 50,000	167	17.63
	Town with population from 50,000 to 150,000	157	16.58
	City with population from 150,000 to 500,000	208	21.96
	City with population over 500,000	66	6.97
Financial Situation	Insufficient	27	2.85
	Adequate	215	22.70
	Good	502	53.01
	Very good	198	20.91
	Particularly high economic status	5	0.53

Source: own elaboration based on survey results.

An analysis of respondents' lifestyle characteristics (Table 2) reveals that a clear majority identified themselves as pleasure-oriented individuals (81.84% responded "strongly agree" or "rather agree") and as those who value convenience and speed in meal preparation (86.59%). Additionally, a substantial proportion reported a high level of health consciousness (65.68%) and indicated that they pay attention to the nutritional value of the food they consume (63.79%). Approximately half of the participants described themselves as physically active individuals (51.85%) and as appreciative of the culinary traditions of their region of origin.

Table 2.
Lifestyle characteristics of respondents

Statement	Response	n	%
I am a person pleasure oriented	Strongly agree	254	26.82
	Rather agree	521	55.02
	Don't know / No opinion	109	11.51
	Rather disagree	45	4.75
	Strongly disagree	18	1.90

Cont. table 2.

I am a person who values convenience and speed of meal preparation	Strongly agree	369	38.97
	Rather agree	451	47.62
	Don't know / No opinion	61	6.44
	Rather disagree	46	4.86
	Strongly disagree	20	2.11
I am a person who pays attention to the consumption of food with high nutritional value	Strongly agree	235	24.82
	Rather agree	369	38.97
	Don't know / No opinion	160	16.90
	Rather disagree	152	16.05
	Strongly disagree	31	3.27
I am a person who values the culinary traditions of the region origin	Strongly agree	170	17.95
	Rather agree	297	31.36
	Don't know / No opinion	181	19.11
	Rather disagree	215	22.70
	Strongly disagree	84	8.87
I am a person who with high health consciousness	Strongly agree	205	21.65
	Rather agree	417	44.03
	Don't know / No opinion	180	19.01
	Rather disagree	119	12.57
	Strongly disagree	26	2.75
I am a person with high physical activity	Strongly agree	180	19.01
	Rather agree	311	32.84
	Don't know / No opinion	149	15.73
	Rather disagree	239	25.24
	Strongly disagree	68	7.18

Source: own elaboration based on survey results.

2.2. Statistical approach

The collected empirical data were subjected to statistical analysis using the following methods:

- Scale reliability analysis was conducted based on Cronbach's alpha coefficients (Chan, Idris, 2017) and Average Variance Extracted (AVE). These methods were employed to assess the reliability of the quantitative variable scales used in the research instrument. A minimum Cronbach's alpha value greater than 0.7 was adopted, in accordance with Nunnally's criterion (Panayides, 2013, p. 689).
- Cluster analysis was performed using the non-hierarchical k-means clustering method. This analysis was used to identify differences among respondents with respect to attitudes toward health, the environment, and the sustainability of insect-based foods. The grouping variables were quantitative in nature. To compare consumer-related characteristics (qualitative variables) across the resulting clusters, a one-way analysis of variance (ANOVA) was applied.

A significance level of $p = 0.05$ was assumed for all statistical tests. The analyses were carried out using IBM SPSS Statistics 26 and Statistica version 13.3.

3. Results

3.1. Attitude towards health and nutrition and natural foods

3.1.1. The results of principal component analysis

As presented in Table 3, all measurement scales used in the study exhibited high internal consistency, exceeding the commonly accepted threshold for reliability (Cronbach's $\alpha > 0.7$). The values of Average Variance Extracted (AVE) were also above the recommended cutoff of 0.5 (Shrestha, 2021, pp. 5-6).

Table 3.

Measurement model: reliability and AVE

Construct	Items	Cronbach's α	AVE
Health Awareness Scale (HA)	5	0.82	0.58
Concern for Food Safety Scale (CFS)	4	0.92	0.81
Concern for Environmental Sustainability Scale (CES)	2	0.88	0.89
Food Neophobia Scale (FN)	10	0.80	0.64
Attitudes Toward Sustainable Food Containing Edible Insects Scale (ASF)	4	0.95	0.88
Purchase Intention for Insect-Based Food Scale (ISF)	4	0.91	0.80

Source: own elaboration based on survey results.

To identify internally homogeneous consumer groups based on six quantitative variables (HA, CFS, CES, FN, ASF, ISF), a non-hierarchical k-means cluster analysis was conducted. The results of the ANOVA (Table 4) indicated that these variables significantly differentiated the sample into two distinct clusters ($p < 0.05$). Cluster centers were established based on mean values for each of the six variables. The number of clusters (k) was determined based on an iterative procedure. Solutions with k ranging from 2 to 4 were evaluated and compared in terms of cluster interpretability, group separation, and practical relevance. The two-cluster solution was selected as it provided the most meaningful and clearly distinguishable consumer segments. Table 5 presents the profiles of these consumer segments. Further analysis (Table 6) revealed that variables such as place of residence, pleasure orientation, importance of convenience and speed of meal preparation, valuation of regional culinary traditions, and health consciousness significantly differentiated participants between clusters ($p < 0.05$).

3.1.2. Cluster Profiles

Cluster 1 (49.52% of the sample): "Ambivalent and Moderately Sustainability-Oriented". This group consisted of consumers who expressed moderate concern for food safety ($M = 3.96 \pm 0.79$) and environmental sustainability ($M = 3.88 \pm 0.77$). They reported neutral attitudes toward health ($M = 3.23 \pm 0.99$) and limited positive attitudes toward insect-based food alternatives ($M = 3.32 \pm 0.88$). Respondents belonging to this group exhibited a low level of food neophobia (mean score: 1.93 ± 0.80), while the majority expressed an ambivalent attitude toward the purchase of insect-based food products (Table 5). This cluster was predominantly composed of residents from rural areas (15.52%) and medium-sized cities with

populations ranging from 150,000 to 500,000 (12.57%) (Table 7). In this cluster, strongly agree attitudes in the area of lifestyle variables accounted for a small percentage of all respondents: health consciousness - 11.72%, pleasure orientation - 13.62%, valuing regional culinary traditions - 7.29%. In contrast, 20.49% valued convenience and speed of meal preparation.

Cluster 2 (50.48% of the sample): “Skeptical and Non-Sustainability-Oriented” Members of this cluster did not exhibit environmentally or health-oriented dietary concerns ($M = 2$ and $M = 3$, respectively). They displayed predominantly negative attitudes toward insect-based food ($M = 1.56 \pm 0.74$) and reported very low purchase intentions ($M = 1.24 \pm 0.53$). Their average food neophobia was higher compared to Cluster 1 ($M = 2.56 \pm 1.02$) (Table 5). This group predominantly included rural residents (21.33%). Strong attitudes towards lifestyle were represented by a small percentage of respondents belonging to this cluster: high health consciousness - 9.93%, orientation towards pleasure - 13.20%, appreciation of convenience and speed of food preparation - 18.48%, appreciation of regional culinary traditions - 10.67%.

Table 4.

Comparison of quantitative variables between consumer segments

Variable	SS (Between)	df (Between)	SS (Within)	df (Within)	F	p-value
HA	4.67	1	952.96	945	4.63	0.03
CFS	556.18	1	871.61	945	603.02	< 0.001
CES	628.56	1	745.70	945	796.55	< 0.001
FN	92.98	1	803.70	945	109.33	< 0.001
ASF	734.33	1	625.89	945	1108.74	< 0.001
ISF	720.36	1	771.11	945	882.80	< 0.001

Source: own elaboration based on survey results.

Table 5.

Mean scores of quantitative variables by cluster

Segmenting Variable	Clusters			
	1 N = 469		2 N = 478	
	X $\bar{x}$ $\pm$ SD	M	X $\bar{x}$ $\pm$ SD	M
HA	3.23 $\pm$ 0.99	3	3.09 $\pm$ 1.01	3
CFS	3.96 $\pm$ 0.79	4	2.43 $\pm$ 1.10	3
CES	3.88 $\pm$ 0.77	4	2.25 $\pm$ 0.99	2
FN	1.94 $\pm$ 0.80	2	2.56 $\pm$ 1.02	2
ASF	3.32 $\pm$ 0.88	3	1.56 $\pm$ 0.74	1
ISF	2.98 $\pm$ 1.17	3	1.24 $\pm$ 0.53	1

Source: own elaboration based on survey results.

Table 6.

Impact of qualitative variables on cluster membership

Variable	SS (Effect)	df	MS (Effect)	SS (Error)	df	MS (Error)	F	p-value
Gender	0.48	1	0.48	226.84	945	0.24	2.01	0.16
Field of Study	0.06	1	0.06	2246.59	945	2.38	0.03	0.87
Place of Residence	29.81	1	29.81	1714.14	945	1.81	16.43	< 0.001
Self-assessed financial situation	0.33	1	0.33	536.74	945	0.57	0.57	0.45

Cont. table 6.

Pleasure Orientation	3.68	1	3.68	701.32	945	0.74	4.96	0.03
Convenience and Speed of Meal Preparation	5.10	1	5.10	763.20	945	0.81	6.31	0.01
Attention to Nutritional Value	3.92	1	3.92	1168.59	945	1.24	3.17	0.08
Valuing Regional Culinary Traditions	7.38	1	7.38	1452.50	945	1.54	4.80	0.03
High Health Consciousness	8.22	1	8.22	997.36	945	1.06	7.79	0.01
High Physical Activity	0.13	1	0.13	1449.35	945	1.53	0.09	0.77

Source: own elaboration based on survey results.

Table 7.

Cluster composition based on statistically significant differentiating variables

Variable	Cluster 1	Cluster 2
Distribution of Respondents Across Clusters in Relation to the Full Sample (%)		
Place of Residence		
Village	15.52	21.33
Town ($\leq 50,000$ inhabitants)	8.98	8.66
Town (50,000-150,000 inhabitants)	8.03	8.55
City (150,000-500,000 inhabitants)	12.57	9.40
City ($> 500,000$ inhabitants)	4.44	2.53
Pleasure Orientation		
Strongly disagree	0.74	1.16
Rather disagree	1.27	3.48
Don't know / No opinion	5.70	5.81
Rather agree	28.19	26.82
Strongly agree	13.62	13.20
Valuing Convenience and Speed of Meal Preparation		
Strongly disagree	0.53	1.58
Rather disagree	2.22	2.64
Don't know / No opinion	2.64	3.80
Rather agree	23.65	23.97
Strongly agree	20.49	18.48
Valuing Regional Culinary Traditions		
Strongly disagree	5.81	3.06
Rather disagree	10.14	12.57
Don't know / No opinion	10.24	8.87
Rather agree	16.05	15.31
Strongly agree	7.29	10.67
High Health Consciousness		
Strongly disagree	0.84	1.90
Rather disagree	5.49	7.07
Don't know / No opinion	8.76	10.24
Rather agree	22.70	21.33
Strongly agree	11.72	9.93

Source: own elaboration based on survey results.

4. Discussion

Young consumers are widely recognized as a key demographic shaping future market trends, with projections suggesting they will account for approximately 30% of global purchasing power (Nadkarni, Mittal, 2022). This generational cohort is often characterized by a growing concern for both health and environmental issues, which increasingly influences their

food-related behaviors, although not always in a consistent or linear manner (Ghazali et al., 2021; Halicka et al., 2025; Ipsos, 2025). Furthermore, young consumers from Generation Z displays substantial internal diversity, shaped by cultural, social, and economic variables (Su et al., 2019). Scholarly literature highlights the importance of critically approaching generational typologies, cautioning against overgeneralization that may lead to cognitive bias and ineffective market strategies (Khan, 2022).

The present study identified two statistically distinct and internally homogeneous clusters within young consumers in Poland, differing in their attitudes toward health, the environment, and the sustainability of edible insect-based food products. Contrary to prior segmentation models, which frequently distinguish between highly engaged, moderately engaged, and disengaged or skeptical consumers, no segment demonstrating strong pro-health and pro-environmental commitment emerged in our analysis. Previous studies have yielded more differentiated segmentation structures. For instance, Gazdecki et al. (2021) identified three consumer profiles: "Doers", who actively engage in sustainable practices despite limited knowledge; "Conscious" individuals, who are well-informed yet experience an attitude–behavior gap; and "Reluctant" consumers, characterized by low engagement and low awareness. Similarly et al. (2022) proposed three clusters within the Hungarian Gen Z population: personas aligning with the LOHAS (Lifestyles of Health and Sustainability) profile, those with potential alignment, and those unaligned. Maťová et al. (2024) distinguished four pro-environmental segments among Slovak consumers: Indifferent Greens, Economical Greens, Engaged Greens, and Image-Conscious Greens. Lotko et al. (2025) identified three groups based on awareness and attitudes toward sustainable products, ranging from skeptics to informed enthusiasts. Funk, Sütterlin and Siegrist (2021), analyzing Swiss consumers, developed a six-segment typology based on environmentally oriented dietary behavior: meat- and fish-eaters, origin-focused food savers, ambiguous consumers, food waste reducing sharers, renouncement aversives, and consequent pro-environmental consumers. Several segmentation frameworks emphasize a dichotomy between progressive segments, characterized by openness to ecological innovation, and conservative or indifferent ones, oriented toward traditional food choices (Legendre, 2021; Junges et al., 2021). The progressive group tends to exhibit lower food neophobia and greater receptiveness to knowledge, whereas the conservative segment is marked by skepticism and a strong attachment to habitual consumption patterns. According to the literature, the prevailing ambivalence among Polish students regarding health and environmental concerns in the context of readiness to consume edible insects (Mikulec et al., 2024b) may increase their susceptibility to persuasion and external influence. Therefore, market segmentation and consumer profiling should be considered when designing strategies to promote the consumption of edible insects as part of a global strategy for sustainable food systems (Florença et al., 2022).

Conclusions drawn from segmenting the market of young consumers, represented by members of Polish students, into distinct groups characterised by similar attitudes towards health, the environment and innovative food products containing edible insects refer to only one part of the examined reality. From a practical perspective, the results offer actionable insights for marketers and policymakers aiming to encourage sustainable dietary changes among students. Recognizing the heterogeneity within this demographic allows for more precisely tailored marketing messages and educational interventions that align with the specific needs and values of each segment. Additionally, the results may inform public policy initiatives targeting nutrition education and the promotion of sustainable eating habits among students at Polish universities. Educational institutions, NGOs, and grassroots campaigns have a key role to play in fostering awareness of alternative food sources, including insect-based products.

The research has certain limitations. Despite the large size of the study group, the results obtained are not representative and cannot be generalised to the population of students in Poland.

5. Summary

This study identifies two distinct consumer segments based on attitudes toward health, environmental sustainability, and insect-based foods: the “ambivalent and moderately sustainability-oriented” and the “skeptical and non-sustainability-oriented”. These findings provide valuable theoretical contributions to the field of sustainable food consumption and enhance the existing body of knowledge in consumer behavior theory and sustainable marketing. Furthermore, the study fills a significant gap in the literature concerning Polish consumers (students). Our findings highlight the necessity of designing and implementing educational efforts that promote pro-health and pro-environmental attitudes while building a favorable image of sustainable food products. Based on the study, we formulated recommendations for future studies, which can be focused on analyzing the topic much more accurately.

The results suggest that communication and educational strategies promoting insect-based foods should be tailored to the characteristics of the identified consumer segments.

For Cluster 1 (“Ambivalent and Moderately Sustainability-Oriented”), communication efforts should focus on increasing familiarity with insect-based foods and reinforcing their environmental and food safety benefits. Given the relatively positive attitudes toward environmental sustainability ($M = 3.88$) and moderate acceptance of insect-based foods ($M = 3.32$), this group appears receptive to factual information emphasizing the ecological advantages of insect production, product quality, safety standards, and nutritional value.

Product promotion strategies could also highlight convenience and ease of preparation, as convenience-oriented attitudes were relatively common within this segment.

In contrast, for Cluster 2 (“Skeptical and Non-Sustainability-Oriented”), direct promotion of insect-based products may be less effective due to the very low levels of acceptance ($M = 1.56$), purchase intention ($M = 1.24$), and higher food neophobia ($M = 2.56$). For this segment, educational initiatives should first focus on reducing psychological barriers associated with novel foods, increasing trust in food safety, and improving awareness of the production process. Exposure-based communication strategies, including product tasting events, educational campaigns, and transparent information about product origin and safety, may help gradually reduce resistance toward insect-based foods.

These findings indicate that a one-size-fits-all approach is unlikely to be effective. Instead, differentiated communication strategies should be developed for consumer segments characterized by different levels of sustainability orientation, food neophobia, and willingness to purchase insect-based food products.

The research has certain limitations. Despite the large size of the study group, the results obtained are not representative and cannot be generalised to the population of students in Poland.

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