

WORKPACKAGE 6
Deliverable 6.5

CONSUMER ACCEPTANCE, PREFERENCES
AND COMMUNICATION

REPORT ON THE ROLE OF COGNITION AND EMOTIONS

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EXECUTIVE SUMMARY

The main purpose of the Task 6.3 was to assess the importance that consumers attach to different processed products and related attributes. The study was designed to identify features and claims, that can influence consumer perception of processed organic products and concepts/meanings attributed to a "careful processing", as well as findings best ways to communicate food processing.

Three products having different levels of processing (according to NOVA classification) were chosen for the study: 1) vegetable burger (as example of an ultra-processed and multi-ingredient product, 2) peas in glass jar as processed product and 3) bagged salad as minimally processed product. The study was conducted in two phases: a qualitative study and a quantitative survey that, due to Covid pandemic, was designed on-line. Consumers, 439 adults responsible of food shopping, were recruited in Italy by a market agency. The sample was balanced for gender, age groups (25-49 yrs. and 50-75 yrs.) and geographic distribution (North, Central, South Italy and Islands).

A primary aim was to evaluate the relative importance of a set of products characteristics on personal concept of organic food and intention to purchase of consumers. For this purpose, a Conjoint analysis model has been used. Synthetic positive informative messages and neutral messages were selected for 4 factors: packaging, processing, use of additives and quality. From two to three levels for each factor were considered. Instead of making a separate conjoint design for each base-products, the analysis was conducted using base-product as a factor.

For "packaging" and "processing" a positive synthetic message that informs about the environmentally friendly materials used for packaging or about processing with low impact on the environment (e.g., *'Processed with low electricity consumption to reduce the environmental impact; 'Raw materials coming from fields located nearby the company to reduce the transport environmental impact'*) had a more positive impact on organic food and intention to purchase.

A neutral informative message describing the material (e.g., *'Packaged in plastic tray and with cardboard wrapper'*) or describing instructions for disposal of the packaging (e.g., *'Packaged in glass to be disposed of according to the rules of separate collection'*) or some general steps of the processing (*'Ingredients previously processed and transported to the company for preparation of the final product'*) had a lower positive impact on the perception of organic and consumers intention to purchase.

For "additive" factor and "quality" factor, a positive message on the packaging impacted positively consumers concept of organic product than the absence of a message (e.g., *'additives approved by the European legislation on organic products'* or *'no additives except salt'; 'no damage the essential amino acid content'; 'fresh as freshly picked'*).

A secondary aim was to estimate the influence of consumers' emotional state on their views of food processing. For half of the subjects the emotional status was altered by a 2-minutes video before answering the questionnaire. It was an impressive cartoon



on environmental issues (plastic pollution, environmental pollution, climate crisis) where humans and animals live reversed roles, humans play the part of animals and animals that of humans. For the participants emotional state measure the Profile of Mood States method was used (*Heuchert & McNair, 2012*).

The vision of the video had a significant positive effect on the dimensions Depression-Dejection, Tension-Anxiety, Anger-Hostility, and no effect on Confusion-Bewilderment. However, the participants experienced a rapid recovery of their emotional state. For this reason, all analyses were conducted on the overall sample of participants, except for the five questions in section 1 of the questionnaire which were answered immediately after the video viewing (*main criteria that processing of organic products should respect; importance that information on the processing of organic food products is shown on product packaging; how the treatment should be communicated; if it were a symbol, which symbol; best terms to define suitable processing for organic products*).

Preservation of the organic product, respect for the environment, and no use of chemicals were as the most important criteria that a processing of organic products should claim on consumers point of view, both among those who had seen/had not the video. However, respect for the environment had more citations among the respondents who saw the video (70.0%) than those who did not see the video (52.8%).

A written information label on the packaging and a symbol or logo were the most frequent ways people want processing to be communicated (e.g., a hand holding a seedling or a hand indicating the human intervention). Respectful, eco-friendly, and natural were the term best associated with a careful processing for organic products.

Consumer were segmented on base of the *GREEN* scale (*Haws et al. 2014*), a scale of green consumption values, used to measure the tendency to express the value of environmental protection through one's purchases and consumption behaviors. The respondents in the cluster 'Strong GREEN' are more convinced about the importance of getting information on food processing through packaging, are more frequent consumers of organic foods (*several times a week*), are older in age and spend more time in food shopping.

In conclusion, the survey demonstrated that the product, the information on the processing and on packaging are the factors having a major influence on concept of "organic food" and consumers' purchase intention. A label or a symbol or logo are the best ways to communicate food processing. Respectful, eco-friendly, and natural were the term best associated with a careful processing for organic products.

THEORETICAL BACKGROUND

The terms "gentle" or "careful" processing are used by organic food manufacturers in their customer communication, and mostly refer to minimal technological processing. However, it is unclear what "careful processing" means to consumers and how it should be communicated.

Consumers' perception of processing technologies for organic food has been recently investigated (Hüpper & Zander 2021). Results of this study evidenced that consumers are guided by strong ecological and environmental values and a general skepticism to higher processing levels and processing technologies.

Product packaging in relation to consumer purchasing intentions have shown high importance. Consumers increasingly base their purchase decisions on words, figures, illustrations, and other labelling attributes based on information conveyed by the product packaging through the messages and claims (Biondi et al. 2020; Clement et al. 2017).

Effects of environmentally friendly labels and sustainability claims have been evaluated in the literature. Results from these studies show that consumers value environmentally friendly attributes (such as "organic" logo or "carbon trust" logo) displayed on the label (De Marchi, Caputo, Nayga, & Banterle, 2016) and that the perceived naturalness of the product induced by package and product sustainability messages explains the perception of product quality (Magnier, Schoormans, & Mugge, 2016). Cagalj et al. (2016) in a study on organic products found that the claims related to the environmental and health dimensions equally increased the willingness to pay for the product, whereas taste related claims had no effect.

However, to the best of our knowledge, there are no studies identifying which kind of processed organic products and of messages on packages comply with the concept of organic food as perceived by consumers.

Based on these considerations we designed a study to identify features and claims, that influence consumer perception of processed organic products and concepts/meanings that consumers attach to a "careful processing", and the best ways to communicate food processing.

METHODOLOGICAL APPROACH

The research began with a qualitative, elicitation study, to identify important factors and levels in the decision-making process of consumers of processed organic food products. The results of the qualitative study were used to design the main survey.



ELICITATION STUDY

A first focus group was conducted in January 2020 with the aim to define food processing technologies and products to be considered in the research and how to communicate food processing. Many technologies were introduced by a brief description and several products were shown.

A convenience sample of eight persons participated in the collective discussion (5 females and 3 males) selected from researchers and administrative staff of CREA). All the participants were frequent (more than once a week) or occasional consumers of organic products.

Results from this **focus group** highlighted a lack of consumers knowledge and interest for food processing. Other aspects appeared to be more relevant in consumers purchase decision, such as process sustainability, the use of recyclable materials for packaging, none or limited use of additives, good nutritional quality, and good sensory quality.

Subsequently, in February/March 2020, two other focus groups were conducted to determine what Italian consumers are looking for in organic processed food, what they want to know about the processing of a product and how they want it to be communicated.

In focus groups 2 and 3, seven to eight volunteers were involved (randomly selected and not being part of CREA staff), responsible for the purchase of food or that collaborate in the purchase of food, males, and females, as close as possible 50%, age 25-64 years, consumers of organic products (a mixed group who consume organic food more than once a month, or more than once a week or more often). All the focus groups took place at CREA Research Center on Food and Nutrition, Rome, Italy in a neutral environment, in February/March 2020 before the Covid pandemic. Each focus group lasted approximately 90 minutes and was literally transcribed. An interview guide was used for both focus groups.

The focus groups began with an **introduction** whose objective was to understand what consumers think and perceive of the transformations implemented on organic products:

"Do you consume organic processed products? What products do you consume? Why do you consume/do you not consume processed organic products? What do you think about the industrial processing used in organic foods?"

A technical explanation of food processing was given: *"Organic food processing includes any physical or mechanical treatment, by which raw foodstuffs are made suitable for consumption, e.g., it may include washing, cutting, techniques to extend shelf life, such as pasteurization, freezing, etc., packaging, and other treatments".*

In a **second step** of the focus group interviews, questions were asked to investigate aspects and criteria, linked to the transformation process, that consumers want to be considered in organic products. Food product images were shown, in small groups,



representing different degree of processing, or same level of processing but different matrices, mono and multi-ingredients products, animal / vegetable products.

A large sheet of paper with a circle in the center was placed on the table and participants were asked:

This circle is the domain of "organic" food. How far from the circle would you place the products in front of you?

Once the products were placed on the sheet, the moderator summed up by asking:

What aspects / factors / characteristics make the transformation process appropriate / preferable / suitable for organic products for you?

The **third step** was aimed at bringing out information consumers want to receive about organic processed foods, particularly on how the transformation process should be communicated.

"Should organic food packaging contain processing information? What kind of information?"

"How would you like information on the transformation process to be communicated on the packaging?"

"Would you be interested in other ways of communicating information on organic food products?"

"In one word, how would you define a suitable process for organic products? How should it be?"

For each of these questions the moderator stimulated the discussion bringing some examples.

Results from **focus group 2 and 3** underlined the relevance of environmental sustainability and nutritional quality in consumer purchase decision.

Ultra-processing and the high quantity of ingredients were mentioned as factors that distance a product from the concept of organic:

"Ultra-processed products are further away from the concept of organic", "Organic equals minimal handling (unprocessed and minimally processed foods)"

"The less the processing, the more a product is considered organic".

"A multi-ingredient formulation is further from the organic concept than mono-ingredient products".

"In multi-ingredient products, additives are more likely to be added".

However, not everyone agreed:

"A multi-ingredient product meets the concept of organic when all the ingredients are from organic farming".

Moreover, organic products were associated with lower nutritional quality *"Lower nutritional quality amongst processed organic products"*.

Information that peoples want to receive:

"Transformation yes, but too much confusion on the label"

"The organic label is not sufficient, it gives information on the production from organic farming, but nothing is known about the rest behind it".

"Information about additives, in order to make comparisons".

"The organic brand must give other guarantees inherent to the brand itself. Product certification up to the shelf"

"Sustainable organic packaging"

Ways peoples want to receive communications:

"Advertising campaigns"

"A sustainability scale on the package is a more immediate than a written label. I often don't read because "I'm in a hurry", "I can't see well up close", etc."

"A symbol is better" e.g., "emoticon", "planet earth", "a line whose length expresses the length of the supply chain"

"Organic leaflet", "a symbol of sustainable packaging", "a symbol of production sustainability"

Terms to communicate organic food processing:

"Careful", "respectful (raw material and environment)"

In addition, an items' elicitation online study, with a limited number of participants (61) was conducted, with open questions to get further insights on five questions:

- What criteria should the processing met to be suitable for organic products?
- What are the best ways to communicate a "careful processing"?
- If a symbol which one? What other ways?
- Other ways to communicate about processing (e.g., websites, QR code, etc.)
- What are the best terms to define "careful processing"?

Only adults (>18 years old) were eligible to participate in this study.

The sample of participants consisted of 24 males (39%) and 37 females (61%) aged between 22 to 72 years (mean age 48.9 ± 15,2 years). Frequency of use were "seldom" (31.15%), "one or twice/month" (13.11%), "at least once a week" (34.43%), every day or almost (21.31%). The results, expressed as frequency and percentage of the total responses, are shown below.

Criteria to be met in organic food products.

	n.	%
Maintaining the integrity of the organic product	11	18.0
Nutritional quality	7	11.5
No chemicals and additives	6	9.8
Respect for the environment	4	6.6
Health protection	4	6.6
Natural properties	4	6.6
Hygiene	4	6.6
Minimum processing	3	4.9
Maintain the quality of the row product	3	4.9
Sensory quality	2	3.3
Do not know or Other	13	21.3

Ways to communicate "careful" processing

Simple and clear information label	39	63.9
Image or Logo	8	13.1
Q Code	3	4.9
Chart	2	3.3
Do not know or Other	9	14.8

Symbol or logo to communicate suitable processing for organic products

Green symbol like leaf or plant	11	18.0
Farm	5	8.2
Emoticon	3	4.9
Chemical	3	4.9
Sun	2	3.3
Ladybug	2	3.3
Other	7	11.5
Do not know	28	45.9

Other ways to communicate on the processing (e.g., websites, QR code, etc.)

Q Code	30	49.2
Website	12	19.7
Info message on the label	4	6.6
Brochure	2	3.3



Do not know or other	13	21.3
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Best terms to define a “careful processing”

Respectful	7	11.5
Natural	5	8.2
Accurate	4	6.5
Attentive, Careful	3	4.9
Rigorous	3	4.9
Healthy	3	4.9
Clean	3	4.9
Eco friendly	2	3.3
Minimum	2	3.3
Other	18	29.5
Do not know	11	18.0

Outputs from focus group 2 and 3 and from the online elicitation study were used to design the quantitative survey.

QUANTITATIVE ONLINE SURVEY

Objectives

1. Investigate consumers views on the criteria to be claimed for organic processed foods and information that should be communicated on the packaging
2. Relative importance (utilities) of a set of products characteristics on consumer perception (personal concept of organic food and intention to purchase) by the Conjoint analysis model.
3. Estimate the Influence of the emotional status on consumers’ views of food processing.
4. Estimate effects of socio-demographics, of food shopping habits (time for shopping, reading the labels), and attitudes towards environmental issues.

Participants

Four hundred-thirty-nine (439) consumers of processed organic food (once every fortnight was the minimum required) were recruited by a market research agency in January 2021. Selections criteria for participation were to be responsible for food purchase or cooperating in food purchases within the family and being users of the products or not rejecting the products. There were quotas for gender (50% F, M), age (50% 25-49 yrs. and 50-75 yrs.) and geographic distribution (North, Central, South Italy and Islands).

Participants were informed that their participation was voluntary and that their individual responses would remain confidential.



The test was conducted with two separate groups of consumers; about half of whom received a link to a video with the aim of altering their emotional state through the video, and the other did not. Participants were assigned randomly to the two group. The demographics of the sample are presented in **Table 1**.

Table 1- Socio-demographic characteristics of the consumers

		VIDEO		NO VIDEO		OVERALL	
		n	%	n	%	n	%
<i>Gender</i>							
	Women	132	57.4	115	55.0	247	56.3
	Men	98	42.6	94	45.0	192	43.7
<i>Age (years)</i>							
	25-49	118	51.3	95	45.5	213	48.5
	50-75	112	48.7	114	54.5	226	51.5
<i>Residence</i>							
	North	58	25.2	58	27.8	116	26.4
	Centre	54	23.5	58	27.8	112	25.5
	South + Islands	58	25.2	59	28.2	117	26.7
	Unknown	60	26.1	34	16.3	94	21.4
<i>Education</i>							
	Primary	8	3.5	5	2.4	13	3.0
	Secondary	101	43.9	108	51.7	209	47.6
	Higher	121	52.6	96	45.9	217	49.4
<i>Consumption of organic products</i>							
	Every day or almost	55	23.9	30	14%	85	19.4
	More times a week	100	43.5	94	45%	194	44.2
	Once a week	34	14.8	40	19%	74	16.8
	More times a month, but not every week	41	17.8	45	22%	86	19.6

Questionnaire design

The questionnaire began with a short paragraph explaining the purpose of the study. The questionnaire consisted of three parts. The **first section** of the quantitative survey was drafted using the results of the online elicitation study and included 5 questions aimed at collecting opinions on the criteria that the processing should meet to be suitable for organic products, on how the processing must be communicated on the package, and which terms best define a “careful processing”.

The **second section** included a conjoint analysis task applied to identify important factors that drive intention to buy, and factors that match consumers' concept of organic food.



The **third section** was designed to investigate consumers' green consumption values defined as the tendency to express the value of environmental protection through their purchases and consumption behaviors.

The questionnaire concluded with questions on food purchasing habits and some socio-demographic characteristics. The overall time for filling the questionnaire was about 20 minutes.

Emotional state of the participants

To answer the objective 3 the samples was split into two groups of participants; half of the subjects received a link to a 2-minutes video, that was used to alter the emotional status of the participants before answering the questionnaire. The video was a cartoon of Steve Cutts (<https://www.stevecutts.com/animation.html>) on environmental issues (plastic pollution, environmental pollution, climate crisis) where humans and animals live reversed roles, humans play the part of animals and animals that of humans.

Measure of the emotional state of consumers

The participants emotional state was measured using the Profile of Mood States method (Heuchert & McNair, 2012). The consumers' Profile of Mood States (POMS) contains seven (7) scales each including several items, that identify and quantify specific aspects of individual mood and a global indicator of emotional disturbance, psychological distress, or subjective well-being (the Total Mood Disturbance score, TMD) calculated by adding the totals for the negative subscales and then subtracting the totals for the positive subscales, not including Friendliness which is scored separately.

The seven scales include Tension-Anxiety, Depression-Dejection, Anger-Hostility, Vigor-Activity, Figure-Inertia, Confusion-Bewilderment, and Friendliness, which items are rated on a five-point categorical scale (0–4, where 0 = not at all, 1 = a little, 2 = moderately, 3 = quite a bit, and 4 = extremely). In the present study and according to the video we used four dimensions of POMS, specifically Tension-Anxiety, Depression-Dejection, Anger-Hostility, Confusion-Bewilderment. A selection of items was used for each dimension to limit the length of the questionnaire (see **Table 2**).

Participants were asked "how do you feel RIGHT NOW?". The POMS data were collected prior to start the questionnaire (after the vision of the video for half of the sample) and repeated after the section of conjoint analysis task.

All the participants answered to the selected POMS items before starting Section 1 of the questionnaire and replied again at the end of Section 2 of the questionnaire to see if their emotional state was changed during the test and to compare the two groups.

Table 2. POMS dimensions and items used in the study

	English	Italian
Tension-Anxiety	Tense On-edge Uneasy Restless Nervous Anxious	Teso Con i nervi a fior di pelle A disagio Irrequieto Nervoso Ansioso
Depression-Dejection	Unhappy Sad Hopeless Discouraged Miserable Helpless Worthless	Infelice Triste Senza speranza Scoraggiato Avvilto Senza aiuto, abbandonato Sfiduciato
Anger-Hostility	Angry Grouchy Annoyed Resentful Bitter Furious	Arrabbiato Scontroso Seccato Pieno di risentimento Amareggiato Furibondo
Confusion-Bewilderment	Confused Unable to concentrate Bewildered Forgetful Uncertain	Con le idee confuse Incapace di concentrarmi Perplesso Scambussolato Indeciso su cosa fare

SECTION 1. Views of consumers on food processing communication

The first section contained questions aimed at gathering information on consumer views on the criteria to be claimed for organic processed foods and information that should be communicated on the packaging. These were:

- *What are the most important criteria for you that the processing of an organic product should respect?*
- *How important is it for you that information on the processing of an organic product is shown on the packaging?*
- *How would you like processing information to be communicated on the packaging?*
- *If it were a symbol to communicate information about the treatment, which symbol would you like?*
- *How would you define, with a single term, an adequate processing for organic products?*

SECTION 2. Design of the conjoint analysis task

A rating-based conjoint analysis task was applied to determine how organic food consumers value different product attributes. The concept of "organic food" and purchase intention were the dependent scored variables. The method allows to



estimate the structure of consumer evaluations on a set of product profiles consisting of predetermined combinations of levels of product attributes (Green & Srinivasan, 1990; Bech-Larsen & Grunert 2003).

For the **conjoint experiment** five factors were considered. A first factor was the PRODUCT. Three products were chosen having different levels of processing (according to NOVA classification) (Monteiro et al. 2019):

- Ultra-processed and multi-ingredient: *vegetable burger*
- Processed: *peas in glass jar*
- Minimally processed: *bagged salad*

Edited images of the three products were successively displayed on screen in the form of photographs (see **Appendix 1**).

Rating-based conjoint analysis was used to evaluate the influence of four independent variables on consumers' intention to purchase and on the idea of organic food that consumers have. The conjoint analysis with orthogonal design utilized SPSS Statistics 25 to ensure a reasonable number of stimuli that were evaluated by the participants. From two to three levels for each factor were considered. Instead of making a separate conjoint design for each base-products, the analysis was conducted using base-product as a factor (**Table 3; Table 4**).

Table 3. Factors and levels used in the Conjoint Design using base product as a factor.

Factor	Message	Level
Packaging	Synthetic Positive Informative message (Objective description on use of environmentally friendly materials)	Packaged with environmentally friendly materials (<i>vegetable burger</i>) Packaged with recyclable, environmentally friendly materials (<i>peas in glass jar</i>) Packaged with environmentally friendly materials (<i>bagged salad</i>)
	Neutral Informative message (Objective description of the material or its disposal)	Packaged in plastic tray and with cardboard wrapper (<i>vegetable burger</i>) Packaged in glass to be disposed of according to the rules of separate collection (<i>peas in glass jar</i>) Plastic packaging to be disposed of according to the rules of separate collection (<i>bagged salad</i>)
Processing	Synthetic positive informative message (Objective description on environmental sustainability of the processing)	Processed with low electricity consumption to reduce the environmental impact (<i>vegetable burger</i>) Row materials coming from fields located near the company to reduce the transport environmental impact (<i>peas in glass jar</i>) Row materials coming from fields located near the company to reduce the transport environmental impact (<i>bagged salad</i>)



	Neutral Informative message (Objective description referring to specific steps of the processing without referring to the environmental impact)	Ingredients previously processed and transported to the company for preparation of the final product (<i>vegetable burger</i>) Product pre-treated by blanching prior to canning, that require the use of electricity to produce the necessary heat (<i>peas in glass</i>) Product washed with plenty of water to remove impurities and reduce the microbial load (<i>bagged salad</i>)
Additives	Synthetic Positive informative message	Additives approved by the European legislation on organic products (<i>vegetable burger</i>) No additives except salt (<i>peas in glass jar</i>) Additive free (<i>bagged salad</i>)
Quality	Synthetic Positive informative message	The processing does not damage the essential amino acid content (<i>vegetable burger</i>) Freshly picked products (<i>peas in glass jar</i>) Fresh as freshly picked (<i>bagged salad</i>)



Table 4. Products Profiles (16 stimuli evaluated for “ideal concept of *organic*” ranging from 1 as “not at all” to 7 as “very much” and for “intention to purchase” by a 7-point Likert scale ranging from “definitely no” to 7 “definitely yes”).

	PRODUCT	PACKAGING	PROCESSING	ADDITIVES	QUALITY
1	VEGETABLE BURGER	No message	No message	No message	The processing does not damage the essential amino acid content
2	BAGGED SALAD	Plastic packaging to be disposed according to the rules of separate collection	Product washed with plenty of water to remove impurities and reduce the microbial load	No message	No message
3	VEGETABLE BURGER	No message	Processed with low electricity consumption to reduce the environmental impact	No message	No message
4	VEGETABLE BURGER	Packaged in plastic tray and with cardboard wrapper	No message	Additives approved by the European legislation on organic products	The processing does not damage the essential amino acid content
5	PEAS IN GLASS JAR	Packaged in glass to be disposed of according to the rules of separate collection (of your municipality)	No message	No message	Freshly picked products
6	VEGETABLE BURGER	No message	Ingredients previously processed and transported to the company for preparation of the final product	No message	The processing does not damage the essential amino acid content
7	PEAS IN GLASS JAR	Packaged with recyclable, environmentally friendly materials	Raw materials coming from fields located near the company to reduce the transport environmental impact	No message	Freshly picked products



8	VEGETABLE BURGER	Packaged with environmentally friendly materials	No message	Additives approved by the European legislation on organic products	No message
9	BAGGED SALAD	No message	No message	Additive free	Fresh as freshly picked
10	PEAS IN GLASS JAR	No message	No message	No additives except salt	No message
11	PEAS IN GLASS JAR	No message	Product pre-treated by blanching prior to canning, that require the use of electricity to produce the necessary heat	No additives except salt	No message
12	VEGETABLE BURGER	Packaged with environmentally friendly materials	Ingredients previously processed and transported to the company for preparation of the final product	Additives approved by the European legislation on organic products.	The processing does not damage the essential amino acid content
13	BAGGED SALAD	No message	Raw materials coming from fields located near the company to reduce the transport environmental impact	Additive free	Fresh as freshly picked
14	VEGETABLE BURGER	No message	No message	No message	No message
15	VEGETABLE BURGER	Packaged in plastic tray and with cardboard wrapper	Processed with low electricity consumption to reduce the environmental impact	Additives approved by the European legislation on organic products	No message
16	BAGGED SALAD	Packaged with environmentally friendly materials	No message	No message	No message



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SECTION 3. Green scale and purchasing habits

The third section of the questionnaire included the GREEN scale (Haws et al 2014). It is a scale of green consumption values, used to measure the tendency to express the value of environmental protection through one's purchases and consumption behaviors.

The **GREEN scale** is a 6-item measure that contains verbal statements that were rated on a seven-point scale ranging from 1 = "strongly disagree" to 7 = "strongly agree", with a neutral central point 4 = "neither agree nor disagree".

These are:

- *It is important to me that the products I use do not harm the environment*
- *I consider the potential environmental impact of my actions when making many of my decisions*
- *My purchase habits are affected by my concern for our environment*
- *I am concerned about wasting the resources of our planet*
- *I would describe myself as environmentally responsible*
- *I am willing to be inconvenienced in order to take actions that are more environmentally friendly.*

The questionnaire completed with questions on **purchasing habits**:

- Responsibility in food purchases
- Information on the packaging relevant to the choice of the product
- Frequency of purchase of organic products
- Involvement in food shopping (time/pleasure)
- Place of purchase of organic products

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RESULTS

Emotional state of consumers

The emotional state of consumers was compared between the two groups of people: one group that saw the video and another group that did not, measured both at the beginning of the questionnaire and at the end of Section 1.

The vision of the video affected the emotional state of the consumers increasing all the four domains from *somewhat* to *moderately* (**see T1 in Figure 1**) and then returning to baseline a few minutes later when participants responded the POMS items at the end of the conjoint analysis task.

The vision of the video had a significant positive effect on the dimensions Depression-Dejection, Tension-Anxiety, Anger-Hostility, with significant Video by Time interaction. The video had no effect on Confusion-Bewilderment (**Table 5**). The effect of time was also significant for all the dimensions. At the second evaluation, the emotional state of the sample who saw the video matched that of the sample who did not see the video.

This indicates that the participants experienced a rapid recovery of their emotional state. For this reason, all analyses were conducted on the overall sample of participants, except for the five questions in section 1 which were answered immediately after the video viewing.



Figure 1. Emotional status of consumers (who saw/did not see the video) before answering the questionnaire (T1) and at the end of section 2 (T2) of the questionnaire

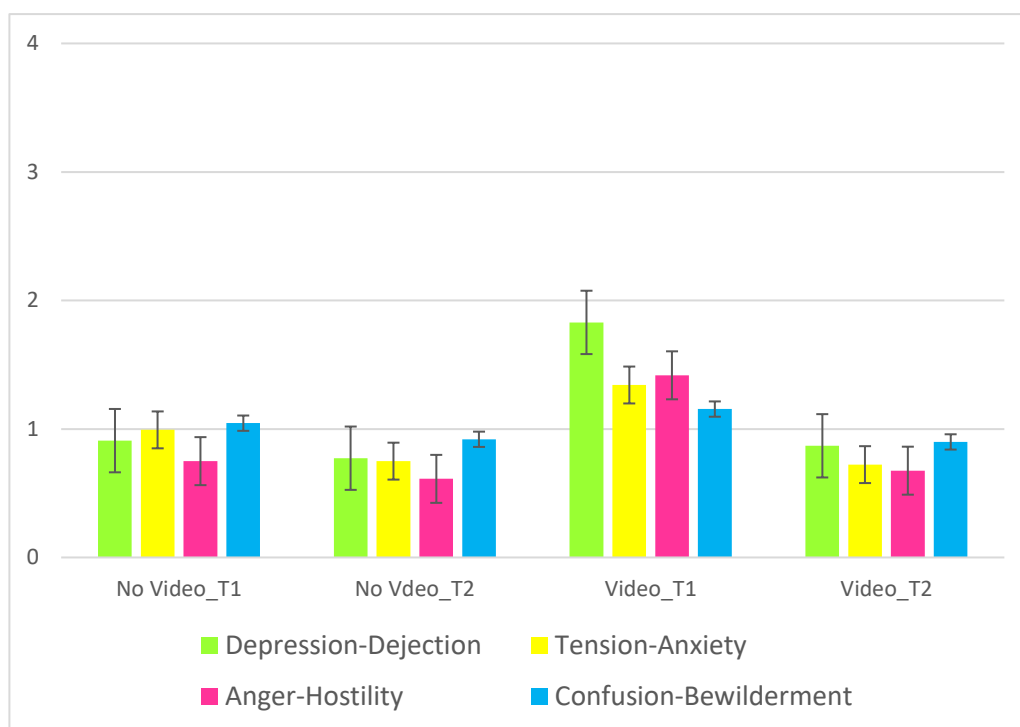


Table 5. ANOVA. Effect of the video and time on POMS items

	Depression-Dejection		Tension-Anxiety		Anger-Hostility		Confusion-Bewilderment	
	F	p	F	p	F	p	F	p
Video	60.381	< 0.0001	6.828	0.009	36.099	< 0.0001	0.517	0.472
Time	70.295	< 0.0001	49.001	< 0.0001	52.240	< 0.0001	9.408	0.002
Video*Time	39.621	< 0.0001	9.323	0.002	24.617	< 0.0001	1.100	0.295

Consumers' views on food processing communication

Table 6 reports the survey respondents' answers to questions relating to the criteria that the processing of the organic product should meet and information that should be declared on the packaging of processed organic products.

Preservation of the organic product, respect for the environment, and no use of chemicals were as the most important criteria indicated by consumers that a processing of organic products should claim, for both the subjects who have/have not seen the video. However, respect for the environment had more citations among the respondents who saw the video than those who did not see the video.

A written information label on the packaging and a symbol or logo were the most frequent ways people want treatment information to be communicated. As symbol a



hand holding a seedling or a hand indicating the intervention of man. *Respectful*, *eco-friendly*, and *natural* were the term best associated with a careful processing for organic products, in both groups (**Table 6**; **Figure 2**).

Table 6. Frequency of answers of subjects subjected to the video vision

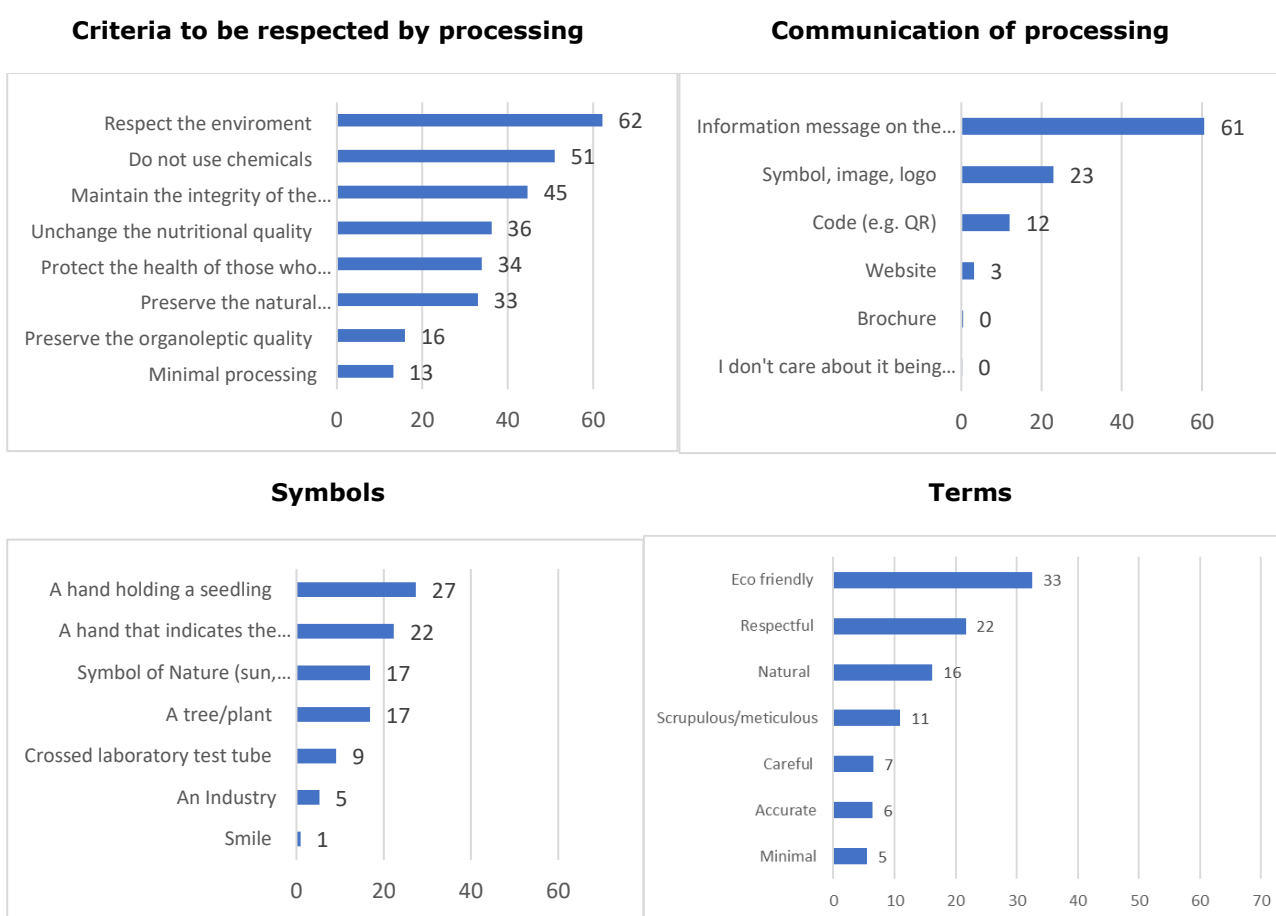
	Video (n=230)		No video (n=209)		Overall (n=439)	
	Freq	%	Freq	%	Freq	%
<i>Q1 What are the most important criteria for you that the processing of an organic product should satisfy (3 answers) *</i>						
Preserve the integrity of the organic product	96	41.7	100	47.2	196	44.6
Respect for the environment	161	70.0	112	52.8	273	62.2
Preserve the nutritional quality	81	35.2	78	36.8	159	36.2
Preserve the sensory quality	37	16.1	33	15.6	70	15.9
No chemicals	107	46.5	117	55.2	224	51.0
Minimum processing	33	14.3	25	11.8	58	13.2
Protect consumers' health	79	34.3	70	33.0	149	33.9
Maintain the natural characteristics of the product	79	34.3	66	31.1	145	33.0
Other	1	0.4	0	0.0	1	0.2
<i>Q2 How important is it for you that information on the processing of an organic product is shown on the packaging?</i>						
	Mean	(SD)	Mean	(SD)	Mean	(SD)
	6.1	(1.04)	5.9	(1.15)	6.0	(1.09)
<i>Q3 How would you like the information on the processing to be communicated on the packaging? (1 answer) **</i>						
Written information message on the packaging	130	56.5	136	65.1	266	60.6
Code (e.g., QR)	34	14.8	19	9.1	53	12.1
Symbol, image, logo	56	24.3	45	21.5	101	23.0
Website	7	3.0	7	3.3	14	3.2
Brochure	0	0.0	2	1.0	2	0.5
I do not care about it being communicated	1	0.4	0	0.0	1	0.2
Other	2	0.9	0	0.0	2	0.45
<i>Q4 If it were a symbol to communicate information on the processing, which symbol would you like? (1 answer) **</i>						
	Freq	%	Freq	%	Freq	%
An Industry	12	5.2	11	5.3	23	5.2
A tree/plant	38	16.5	36	17.2	74	16.9
Crossed laboratory test tube	19	8.3	21	10.0	40	9.1
A hand holding a seedling	57	24.8	63	30.1	120	27.3
A hand that indicates the intervention of man	56	24.3	42	20.1	98	22.3
Smile	1	0.4	3	1.4	4	0.9
Symbol of Nature (sun, rainbow, ladybug ...)	43	18.7	31	14.8	74	16.9
Other	4	1.7	2	1.0	6	1.4
<i>Q5 How would you define, with a single term, a comfortable processing for organic products? (1 answer) **</i>						
	Freq	%	Freq	%	Freq	%
Respectful	57	24.8	38	18.2	95	21.6
Careful	11	4.8	18	8.6	29	6.6



Accurate	8	3.5	20	9.6	28	6.4
Scrupulous/meticulous	26	11.3	22	10.5	48	10.9
Eco friendly	84	36.5	59	28.2	143	32.6
Minimum	10	4.3	14	6.7	24	5.5
Natural	33	14.3	38	18.2	71	16.2
Other	1	0.4	0	0.0	1	0.2

*In bold items >40%; ** in bold items >20%

Figure 2. Consumer's opinion (% responses on 439 subjects) on criteria to be met by processed organic foods and information to be communicated on the packaging



Conjoint Analysis

The objective of conjoint analysis is to determine what combination of a limited number of attributes is most influential on respondents' choice or decision making. It can be thought of as a multiple regression, in which the respondents' ratings for the product concepts are observations on the dependent variable, the product attribute

levels are observations on the independent variables and the estimated regression parameters are the part-worth utilities for the attributes.

The respondent's task was to score each product profile on two scales of interest: the adherence of the product profile to their concept of organic product, and the intention to purchase that product.

Positive utilities of the levels of each factor increase the score ("organic product" concept or "intention to buy") of a given product profile while negative ones decrease it.

Table 7 and **Table 8** represent the utilities and the average importance scores of the "organic product" concept and "intention to buy", respectively. Based on the importance scores the priority was given to the product (most important for consumers), followed by processing and packaging, whereas lower importance was given to quality and additives.

The utilities assigned to each level of the attribute evidence that within the product attribute peas in glass jar was the packaged organic product that best conveyed the idea of "organic product" by consumers. Vegetable burger, on the other hand, as an example of ultra-processed organic product, had a negative influence.

For "packaging" and "processing" the positive synthetic message had a positive impact, against a negative impact of a neutral informative message and the absence of message. A simple and honest descriptive message that informs about the *environmentally friendly materials used for packaging* or about some process steps having a low impact on the environment (e.g., *'Processed with low electricity consumption to reduce the environmental impact; Row materials coming from fields located near the company to reduce the transport environmental impact'*) had a more positive impact on the perception of organic.

A neutral informative message describing the material (e.g., *Packaged in plastic tray and with cardboard wrapper*) or describing instructions for disposal of the packaging (e.g., *'Packaged in glass to be disposed of according to the rules of separate collection'*) or some steps of the processing (*'Ingredients previously processed and transported to the company for preparation of the final product'*) had a lower positive impact on the perception of organic.

The same for "additive" factor and "quality" factor, a positive message on the packaging impacted positively consumers concept of organic product than the absence of a message (**Table 7**).

Similar results were obtained for purchase intention, with the difference that the message on packaging had a minor but positive impact, for both positive and neutral informative messages.

Correlations between the observed and estimated value of "organic product" concept (Pearson's $R=0.879$; $p<0.0001$; Kendall's $\text{Tau}=0.667$; $p<0.0001$) and between the observed and estimated value of purchase intention (Pearson's $R=0.858$; $p<0.0001$; Kendall's $\text{Tau}=0.617$; $p<0.0001$) were good.



In conclusion, the product has a complex meaning represented by more factors ('objective-subjective', 'implicit-explicit') often strongly correlated. Indeed, in our study, the type of product, with its complexity, had a great relevance in the consumer's perception of the meaning of organic. Specifically, the type of ultra-processed and multi-ingredients product had a negative impact on the perception of organic.

Table 7. Utilities and Averaged Importance Scores of the "organic product" concept (overall sample of 439 subjects)

Factors	Levels	Utility Estimates	Std. error
PACKAGING	No message	-0.125	0.131
	Positive message	0.159	0.154
	Informative message	-0.034	0.154
PROCESSING	No message	-0.158	0.131
	Positive message	0.428	0.154
	Informative message	-0.270	0.154
ADDITIVES	No message	-0.129	0.098
	Positive message	0.129	0.098
QUALITY	No message	-0.239	0.098
	Positive message	0.239	0.098
PRODUCT	Vegetable burger (Ultra-processed and multi-ingredient)	-0.317	0.131
	Peas in glass jar (Processed)	0.305	0.154
	Bagged salad (Minimally processed)	0.011	0.154
Constant		4.694	0.114

Importance Values	Score
PACKAGING	20.403
PROCESSING	23.835
ADDITIVES	12.441
QUALITY	13.861
PRODUCT	29.460

Table 8. Utilities and Averaged Importance Scores of the intention to buy (overall sample of 439 subjects)

Factors	Levels	Utility Estimates	Std. error
PACKAGING	No message	-0.109	0.135
	Positive message	0.097	0.158
	Informative message	0.012	0.158



PROCESSING	No message	-0.159	0.135
	Positive message	0.349	0.158
	Informative message	-0.190	0.158
ADDITIVES	No message	-0.090	0.101
	Positive message	0.090	0.101
QUALITY	No message	-0.234	0.101
	Positive message	0.234	0.101
PRODUCT	Vegetable burger (Ultra-processed and multi-ingredient)	-0.404	0.135
	Peas in glass jar (Processed)	0.321	0.158
	Bagged salad (Minimally processed)	0.083	0.158
Constant		4.786	0.117

Importance Values	Score
PACKAGING	18.862
PROCESSING	21.910
ADDITIVES	11.699
QUALITY	13.559
PRODUCT	33.971

Consumers' segmentation

A post hoc cluster analysis based on the pattern of individual utilities was applied to identify distinct segments of respondents, to provide further insights into differences between consumer groups and to link consumers' characteristics with their perception of organic for specific attributes of packaged organic products.

From the estimated utilities of individual attributes, we can see that cluster 3 (21.3% of the respondents), compared to the other two clusters ($p < 0.005$), showed a stronger perception of 'organic' when it was provided information related to the use of environmentally friendly materials in the packaging, or information related to processing having a positive impact on the environment. On contrast, for the same group of respondents, a stronger negative impact on the idea of organic was found when information on materials used for packaging was missing or when a generic descriptive message on processing was given (**Figure 3**).

From a socio-demographics point of view the three clusters were quite well comparable. However, Cluster 2 distinguished for fewer respondents that are primarily responsible for food purchases and a higher number of respondents that share food purchases with someone else ($X^2 = 24.4$; $p < 0.001$).

Cluster 3 was composed by a higher percentage (not statistically significant; $p > 0.05$) of female respondents (60.1%), of young people (25-49 yrs., 58.7%), and of respondents with a degree or doctoral degree (62.0%). Moreover, compared to the



other two clusters, the respondents of cluster 3 were slightly higher in strong buyers of organic products (every day or almost every day + several days a week, 65.2% vs. 62.1% for cluster 2 and 63.1% for cluster 1 (also not statistically significant; $p>0.05$). Finally, consumers in cluster 3 seems to be more inclined to spend a lot of time on food shopping because they are demanding in their choice of food products (33.7% vs. 26.4% and 18.45%, respectively, for cluster 2 and cluster 1) (not statistically significant; $p>0.05$) (**Table 9**).

Respondents from cluster 3, as those from the other two clusters declared to purchase organic food products more frequently in traditional supermarkets (79.8% in cluster 1, vs. 76.4% in cluster 2, and 76.1% in cluster 3) even though they purchased slightly more frequently in specialized organic shops (45.7% vs. 45.1% and 29.2%, in cluster 1 and cluster 2, respectively) (**Table 9**).

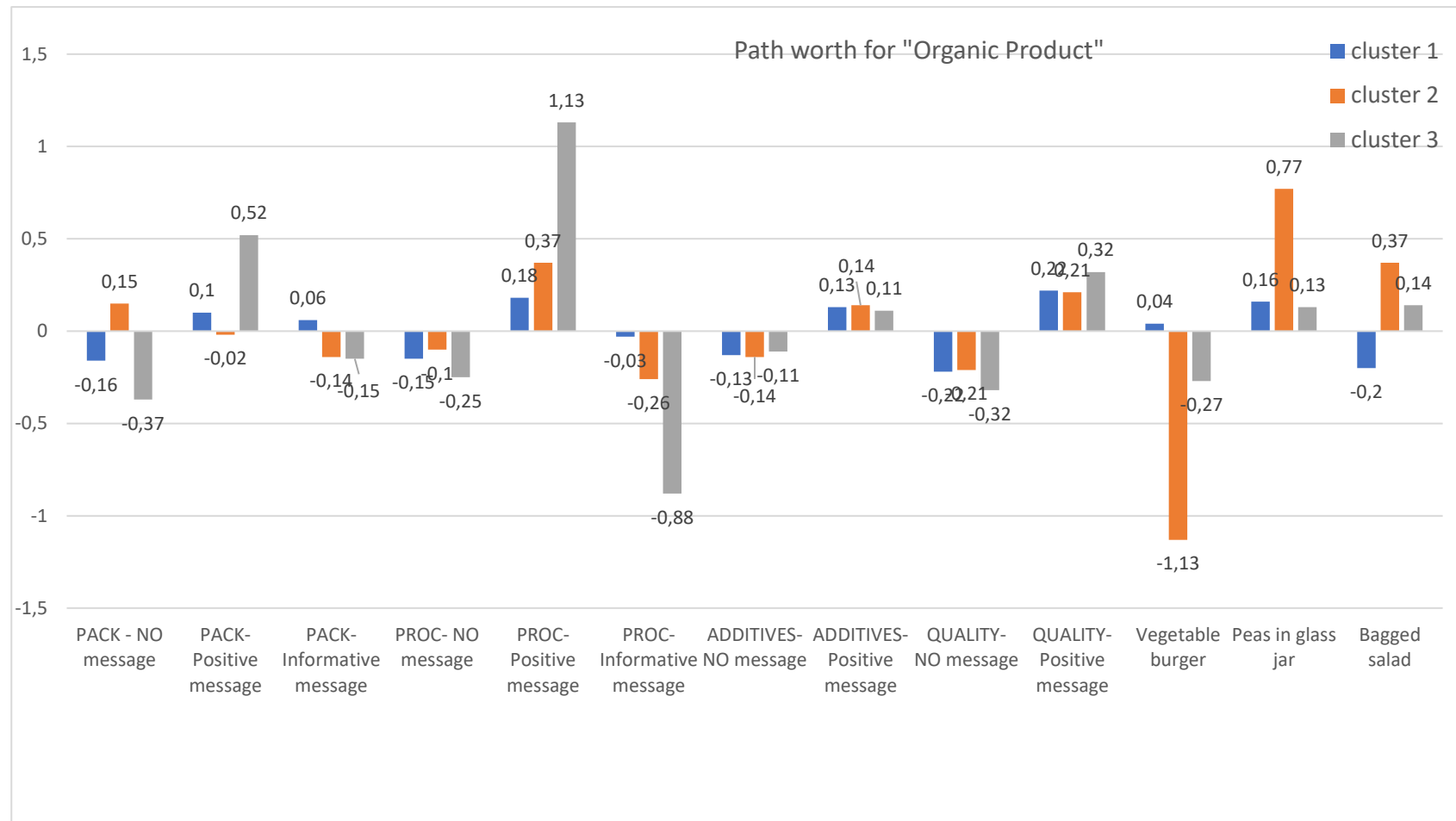
As regards the respondents' attitudes towards process information people of cluster 3 tend to prefer descriptive information less (57.6%) than respondents of cluster 1 (62.7%) and cluster 2 (59%) (statistically not significant; $p>0.05$) and most of them prefer a symbol or image as a mean of communication of the processing (26.1% vs. 21% and 24.5% for cluster and cluster 2, respectively; the difference among the clusters is not significant. As a symbol or image, the preference is more for *a hand holding a seedling* and *a hand that indicates the intervention of man*. A significant difference on symbol's preference was observed among the clusters ($\chi^2=24.76$; $p<0.05$) (**Figure 4**).

Compared to the other two clusters, cluster 3 comprises a higher percentage of respondents who stated that a suitable process to be used for organic food should be termed as "eco-sustainable process" (48.9% of respondents, vs 27% and 30%, respectively, for cluster 1 and cluster 2; $X^2=34.05$; $p<0.005$) (**Figure 4**).

Furthermore, respondents belonging to cluster 3 provided, on average, the highest GREEN Scale values (Cronbach's $\alpha=0.91$) compared to the other two clusters (mean of 6.3 vs. 5.9 and 6, for cluster 1 and 2, respectively; $p<0.005$).



Figure 3. Estimated utilities by attribute for the clusters derived from the Conjoint Path work for "organic product" concept



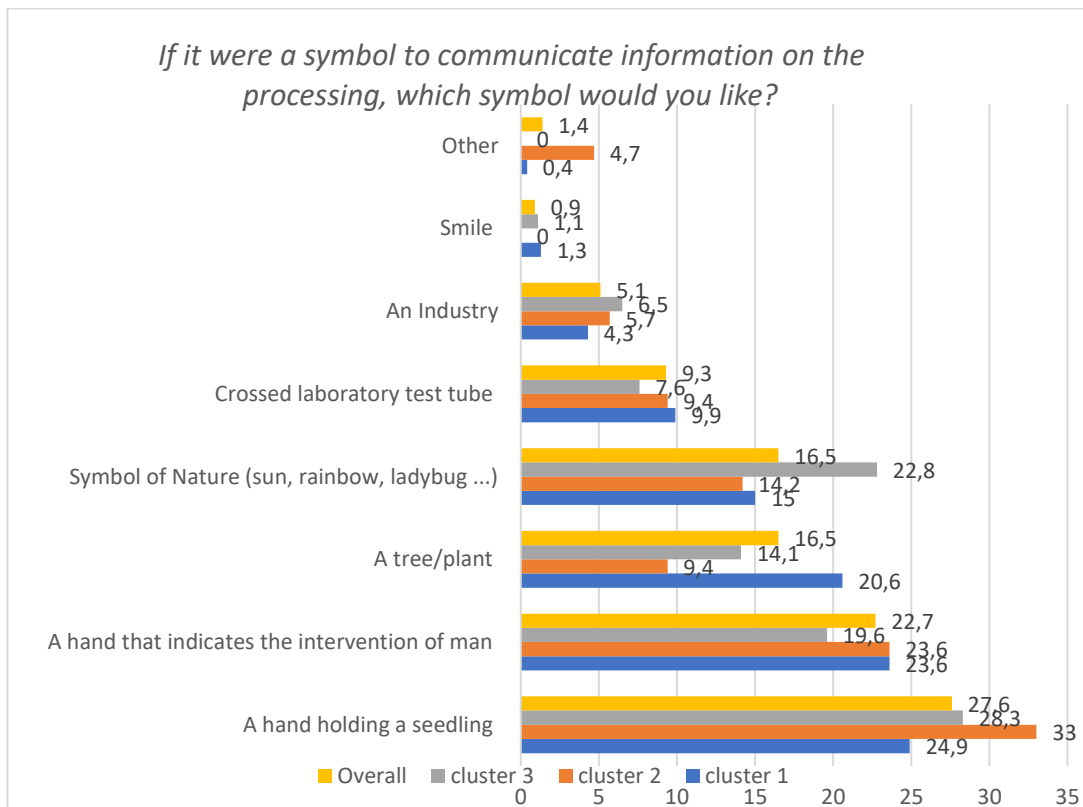
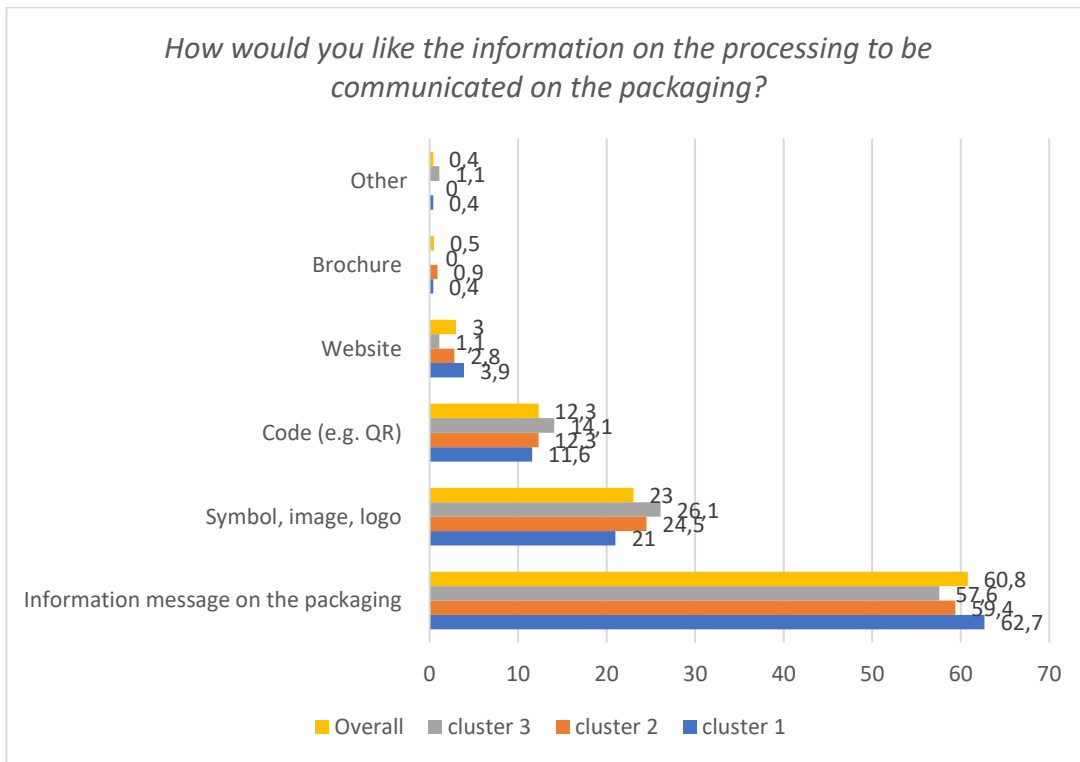
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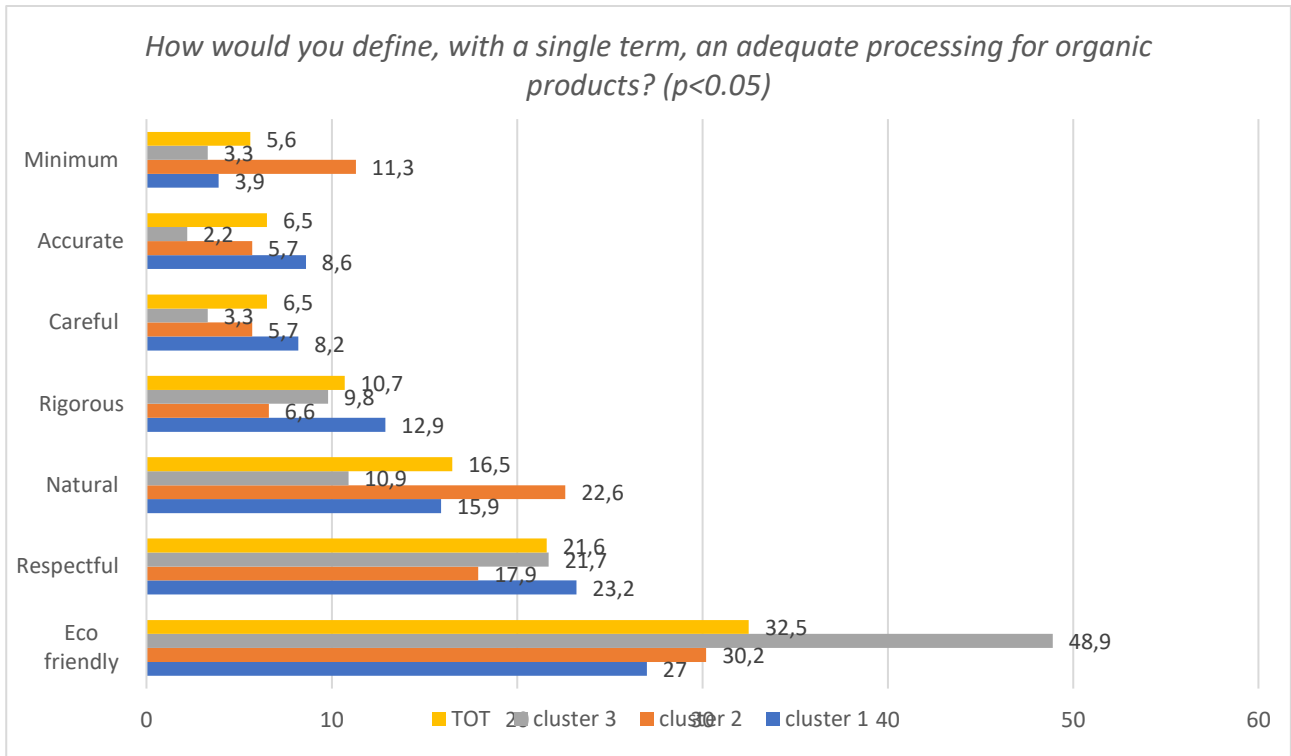
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Table 9. Characteristics of the three clusters of respondents. Data on 431 respondents

CHARACTERISTIC	CATEGORY	Cluster 1	Cluster 2	Cluster 3	
		(n=233)	(n=106)	(n=92)	
		(%)	(%)	(%)	
GENDER	F	57.9	48.1	60.1	
	M	42.1	51.9	39.1	ns
AGE	25 - 49 yrs.	45.9	45.3	58.7	
	50 - 75 yrs.	57.1	54.7	41.3	ns
GEOGRAPHIC AREA	Northern Italy	38.1	27.5	30.1	
	Central Italy	32.5	33.7	31.7	
	Southern Italy + Islands	29.4	38.7	38.1	ns
INSTRUCTION	Degree or PhDs	45.5	49.1	62.0	
	High school diploma	51.9	48.1	33.7	
	Primary school diploma	2.6	2.8	4.3	ns
FOOD PURCHASE RESPONSIBILITY	I am the main responsible for food purchases	78.5	56.6	71.7	
	I am primarily responsible, but occasionally someone else takes care of food purchases	3.0	3.8	8.7	
	I share food purchases with someone else (same extent)	18.5	39.6	19.6	$X^2=24.4$; $p<0.001$
FREQUENCY OF ORGANIC FOOD PURCHASE	Every day or almost every day	20.6	15.1	19.6	
	Several times a week	42.5	46.2	45.6	
	Once a week	18.0	19.0	14.1	
	Several times a month, but not every week	18.9	21.7	20.65	ns
ATTITUDES TOWARDS FOOD SHOPPING (1 answer)	I get bored doing the food shopping and therefore I try to solve it as soon as possible.	4.3	1.9	2.2	
	I would like to spend time shopping for food, but I am almost always in a hurry.	22.3	21.7	15.2	
	Shopping for food relaxes me and I like to spend time choosing food.	54.9	50	48.9	
	I spend a lot of time shopping because I am demanding in the choice of products.	18.4	26.4	33.7	ns
PLACE OF PURCHASE (3 answers)	Frequencies (%)				
	Solidarity buying groups	19 (8.2)	5 (4.7)	4 (4.3)	
	Fair trade points of sale	28 (12.0)	9 (8.5)	14 (15.2)	
	Websites for online food shopping	31 (13.3)	9 (8.5)	9 (9.8)	
	Traditional supermarkets	186 (79.8)	81 (76.4)	70 (76.1)	
	Shops specializing in organic products	105 (45.1)	31 (29.2)	42 (45.7)	
	Local market	53 (22.7)	35 (33.0)	15 (16.3)	
	Direct Selling Markets (Farmers / Producers Markets)	80 (34.3)	41 (38.7)	32 (4.8)	
Directly from the farmer / producer on the farm	35 (15.0)	35 (33.0)	23 (25.0)	ns	

Figure 4. Consumers' clusters and overall sample view on information be communicated on food products packaging.





Consumer segmentation based on the GREEN Scale

The GREEN values refer to consumers’ tendency to express their environmental concern through their consumption behaviors. The total sample was characterized by a general positive trend as regard the environmental protection by through their food consumption.

A Cluster analysis based on the 6-items GREEN values scale was applied to identify distinct segments of respondents to provide insights into differences between the consumer groups and to link consumers’ characteristics with their attitudes towards green consumption.

Two clusters were identified. Cluster 1 (73.3% of respondents) was characterized by subjects with greater concern regarding the environment protection through their consumption behaviour (Strong GREEN values; mean =6.4; min=5.7; max=7.0). Cluster 2 (26.7% of respondents) was made up of respondents who tended to be less convinced about protecting the environment through their consumption behaviour (Soft GREEN values; mean =5.2; min=3.8; max=5.8) (**Figure 5**).

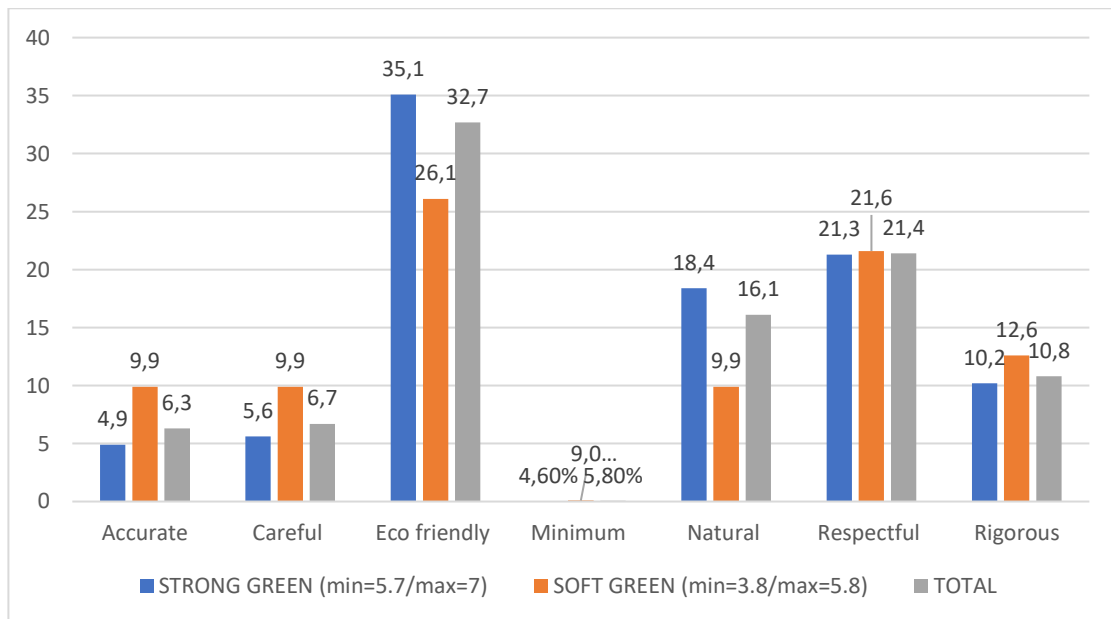
The respondents in the cluster ‘Strong GREEN’ were more convinced than respondents of the cluster ‘Soft GREEN’ that packaging information related to food processing is very important (6.1 vs. 5.7; $F=13.78$; $p < 0.001$). A suitable process to be used for organic food should be termed as “eco-sustainable process” according to most of the respondents, with a highest percentage in the Strong GREEN cluster (35.1%) and lower in the Soft GREEN cluster (26.1%) ($X^2=17.08$; $p < 0.01$) (**Figure 6**).



Figure 5. Six items GREEN scale values ($p < 0.001$) by clusters and overall sample



Figure 6. Consumers' clusters based on the GREEN Scale and overall sample view on how to term a suitable process to be used for organic products.



In cluster Strong GREEN a higher percentage of respondents (47.9%) declared to consume organic foods *several times a week* against 34.2% of cluster 'Soft GREEN' ($X^2=9.1$; $p < 0.05$) (**Table 10**).



Other differences were that the Strong GREEN cluster was older in age ($X^2=6.89$; $p<0.01$) and declared to spend more time in food shopping than Soft GREEN Cluster ($X^2=8.7$; $p<0.05$) (**Table 10**).

Table 10. Characteristics of the Two consumers segments derived by the GREEN scale responses (data on 416 subjects).

CHARACTERISTIC	CATEGORY	Strong Green	Soft Green	
		(n=305)	(n=111)	
		(%)	(%)	
GENDER	F	56.7	57.7	
	M	43.2	42.3	ns
AGE	25 - 49 yrs.	44.9	59.5	$X^2=6.89$; $p<0.01$
	50 - 75 yrs.	55.1	40.5	
GEOGRAPHIC AREA	Northern Italy	35.2	31.2	
	Central Italy	32.2	33.3	
	Southern Italy + Islands	32.6	32.5	ns
INSTRUCTION	Degree or PHDs	3.6	1.8	
	High school diploma	44.3	55.9	
	Primary school diploma	52.1	42.3	ns
FOOD PURCHASE RESPONSIBILITY	I am the main responsible for food purchases	70.8	73.9	
	I am primarily responsible, but occasionally someone else takes care of food purchases	5.6	1.8	
	I share food purchases with someone else (same extent)	23.6	24.3	ns
FREQUENCY OF ORGANIC FOOD PURCHASE	Every day or almost every day	19.0	17.1	
	Several times a week	47.9	34.2	
	Once a week	15.4	27.7	
	Several times a month, but not every week	17.7	27.9	$X^2=9.1$; $p<0.05$
ATTITUDES TOWARDS FOOD SHOPPING (1 answer)	I get bored doing the food shopping and therefore I try to solve it as soon as possible.	3.3	2.7	
	I'd like to spend time shopping for food but I'm almost always in a hurry.	17.4	25.2	
	Shopping for food relaxes me and I like to spend time choosing food.	52.1	57.7	
	I spend a lot of time shopping because I am demanding in the choice of products.	27.2	14.4	$X^2=8.7$; $p<0.05$
PLASE OF PURCHASE (3 answers)	Solidarity buying groups	76.9	23.1	
	Fair trade points of sale	14.4	14.5	
	Websites for online food shopping	10.8	13.5	
	Traditional supermarkets	77.0	81.1	
	Shops specializing in organic products	48.5	22.5	
	Local market	18.7	36.0	
	Direct Selling Markets (Farmers / Producers Markets)	35.4	36.0	
	Directly from the farmer / producer on the farm	22.6	19.8	ns

FINAL CONSIDERATIONS

Our sample was composed of organic consumers (from 'several times a month, not every week' to 'every day or almost'). However, even if the subjects are habitual organic consumers, as our sample, they cannot be considered as a homogeneous sample. They may have different reasons for buying organic food. Consumers of organic food could, in fact, give more importance to some factors rather than others, depending on their values and therefore on their main motivation that drives them to purchase organic foods.

One of the factors included in our study was the GREEN values scale to potentially distinguish the subjects. It measured the consumers' tendency to express their environmental concern through their consumption behaviors. Consumers with stronger green values were those who consumed organic products more frequently (67.9% for strong green values vs 51.3% for soft green values) and those who more frequently stated that a process suitable for use for organic food should be termed as "eco-sustainable process", confirming that the organic product meets the expectations of environment conscious consumers.

ANNEX 1. Processed products selected for the Conjoint Analysis.

Ultra-processed and multi-ingredient (vegetable burger)



35

Processed: peas in glass jar



CORE organic

Minimally processed: bagged salad

