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ASSESSING THE ACCEPTABILITY OF ORGANIC EDIBLE ROSES AMONG SUPPLY CHAIN STAKEHOLDERS: A Q METHODOLOGY STUDY

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ACRONYMS AND ABBREVIATIONS

CAGR	Compound Annual Growth Rate
EFSA	European Food Safety Authority
FAO	Food and Agriculture Organization
FDA	Food and Drug Administration
PEOU	Perceived Ease of Use
PU	Perceived Usefulness
Q-SV	Q Sort Value
TAM	Technology Acceptance Model
USD	United States Dollar
WHO	World Health Organization

CHAPTER 1 INTRODUCTION

The global food industry is undergoing a shift toward health and aesthetic conscious consumption pattern, driven primarily by evolving consumer preferences. Within this trend, edible flowers have emerged as the focus of culinary and commercial applications. However, use of edible flowers is not a recent phenomenon. Across many cultures and historical periods, they have served multiple functions, including nutrition, medicine, flavor enhancement and decoration (Benvenuti & Mazzoncin, 2021). Today, this ancient tradition is being reshaped through the combination of culinary innovation, functional studies, and sustainable food systems (Fernandes et al., 2020; Takahashi et al., 2020).

Rose (*Rosa* spp.) stands out as one of the most valuable, widely cultivated, and commercialized species, with over 200 species and 25,000 cultivars distributed worldwide (Hegde et al., 2022). The “queen of flowers” provides a broader range of benefits compared to other edible flower species: its attractive appearance enhances sensory perception, its natural aroma is associated with relaxation and improved mood, and its petals contain various nutritionally dense compounds (Wang, 2023). In nutritional and culinary fields, attention to rose is on the rise, owing to the abundance of bioactive phytochemicals including anthocyanins, flavanols, carotenoids, and phenolic compounds, which exhibit antioxidant, anti-inflammatory, anti-microbial and anti-aging activities (Kumari et al., 2021). Hegde et al. (2022) report that rose petals possess crude protein between 2.5% and 12.2% dry weight, while also containing low levels of fat and considerable amounts of minerals such as potassium, phosphorus, and calcium.

The commercial landscape of edible flowers has grown considerably in recent years, reflecting heightened consumer interest in natural, nutrient-dense plant-based products. Fortune Business Insights (2024) reports that the market is valued approximately USD 477 million in 2026, and estimated to reach USD 792 million by 2034, demonstrating a compound annual growth rate (CAGR) of 6.55%. Within the edible flower market, rose emerges as the dominant species, accounting for nearly 28% of the total edible flower sales worldwide. This strong market position is primarily associated with the extensive utilization across food, cosmetic and pharmaceutical industries. It is forecasted that, organic rose extracted products will achieve an annual growth rate of 8.15% until 2030 (Mordor Intelligence, 2025).

Several interrelated factors are contributing to this market expansion. Changing dietary habits, increasing interest in global culinary traditions, and rising consumer awareness of health-conscious food products have significantly stimulated the demand for edible flowers in general. As roses are incorporated into food and beverage applications, they are no longer regarded merely as decorative garnishes but are recognized as functional ingredients with nutritional and commercial value. Moreover, the growing preference for clean-label products has encouraged greater attention toward ingredient origin, organic production, and product traceability, thereby increasing the demand for organically cultivated roses compared with conventionally grown alternatives (Hegde et al., 2022).

Despite the strong growth potential of the edible rose sector, several important limitations continue to affect the industry across different stages of the supply chain. One of the major limitations repeatedly emphasized in the literature is the absence of standardized regulatory frameworks. Fernandes et al. (2020) and Takahashi et al. (2020) stated that international bodies including FAO, WHO, FDA and EFSA have not yet issued official classifications that differentiate between edible and non-edible flowers. Significant compliance challenges are brought on by this inconsistency in regulations, especially for small-scale companies and startups. Furthermore, edible flower market, including edible organic rose, still lacks adequate quality control and product standardization. Pieterse et al. (2022) reported that products with significant quality discrepancies may be marketed under the same categorization due to this lack. These inconsistencies have a potential to damage consumer confidence and constrain further market acceptance. Additionally, the industry faces logistical and production related limitations including fragmented supply chains, seasonal fluctuations, high perishability which constrain the scalability and long-term durability.

The review of existing literature reveals a consistent pattern: research on organic edible roses, even more broadly on organic edible flowers, has been predominantly focused on the consumer perspective. Previous studies have investigated topics such as consumer attitudes towards edible flower consumption (Chen & Wei, 2016, Rodrigues et al., 2017), and willingness-to-pay for rose attributes (Chavez et al., 2019). While these studies generate valuable insight on the consumer side of this emerging market, the supply chain perspective has been left outside the scope of academic inquiry. Studies that do engage with the production side of organic rose focus on the agronomic or phytochemical properties (Todorova et al., 2022, Butcaru et al., 2020), offering no analysis of stakeholder opinions, motivations, or divergences. Derksen and Mithöfer (2022) conducted a Q methodology study demonstrating that sustainability practices vary significantly depending on the supply chain position in floriculture; however, this insight has not been extended to organic edible rose sector. Pieterse et al. (2022) examined stakeholder views across the edible flower chain in South Africa through qualitative interviews, while Gamata and Alejandro 2021, investigated the gastronomic use of edible flowers from a restaurant operator perspective in Philippines. However, neither study addresses the organic products, the European context.

Understanding stakeholder perspectives is particularly relevant in emerging agri-food sectors characterized by fragmented supply chains, regulatory uncertainty, and evolving market structures. This is especially true for organic edible roses, where production complexity, perishability, certification requirements, and niche market positioning may significantly influence sector development. Stakeholder theory further proposes that the sustainability and competitiveness of economic systems are shaped by the collective value generated among actors throughout the value chain (Argandoña, 2011). In this context, the perception of different supply-chain stakeholders may strongly influence the future growth and market of organically cultivated edible roses.

To address this gap, the present thesis applies Q methodology (Stephenson, 1935; Brown, 1980), a research approach specifically designed to systematically explore subjectivity and identify shared patterns of opinions among participants. It is important to note that this research does not focus on consumer preferences;

instead, it investigates the perspectives of stakeholders directly involved in the organic edible rose supply chain. Particularly, Q method allows to capture shared and contrasting viewpoints, perceived challenges, and opportunities. By identifying converging and diverging perspectives among supply chain actors, this research contributes to the literature on emerging sustainable food markets and provides practical insights for producers, policymakers, and food industry practitioners involved in the organic edible rose sector.

CHAPTER 2 METHODOLOGY

This work employs Q methodology (Stephenson, 1935; Brown, 1980), a research approach that examines subjective viewpoints and uncover patterns of agreement among individuals (Mandolesi et al., 2023). As it combines qualitative and quantitative approaches, Q methodology is particularly useful for identifying common and divergent perspectives among participants (Brown, 1980; Watts & Stenner, 2012; Solfanelli et al., 2025). Q methodology has been widely applied in agri-food and sustainability studies to investigate perspectives on food innovations, agricultural systems, sustainability, and supply chain challenges (Mandolesi et al., 2015; Kougias et al., 2020; Mandolesi et al., 2022; Jahanbin et al., 2023). Its ability to capture opposing perspectives and reveal underlying thinking patterns makes Q methodology particularly relevant for the current study, which aims to compare viewpoints involved in the organic edible rose supply chain.

2.1 Concourse

The starting point of Q methodology involved constructing the concourse; that is the wide range of ideas, perspectives and opinions covering the topic under investigation (Brown, 1980). In this study, the concourse adequately reflected the diversity of perspectives belonging to organic edible rose sector, statements were collected from various complementary sources. These sources can include semi-structured interviews with stakeholders, academic and grey literature including industry reports, professional websites, blogs, and social media discussions. Contribution of these different sources allowed the concourse to capture the diversity of perspectives within the organic edible rose sector, including the viewpoints based in both scientific research and practical experience.

First, a semi-structured interviews was conducted with a group of stakeholders in order to understand current opportunities, challenges, and future expectations regarding the sector. The responses provided stakeholders' own wording, useful for the creation of "natural statements" (McKeown and Thomas, 2013). The key findings showed attention to market awareness, knowledge, certification, production challenges, and future market opportunities. Additional pre-existing statements emerged from research of academic and grey literature. Finally, around 100 subjective statements formed the concourse.

2.2 Q Sample

According to Q methodology, statement selection was conducted following a structured approach to ensure that the final Q sample correctly represented the diversity of perspectives of the original concourse (McKeown and Thomas, 2013). The statements were examined using an inductive coding approach inspired by Grounded Theory, allowing themes to naturally form (Glaser and Strauss, 1967). Later, statements

were grouped accordingly to their prevailing theme within the categories covering production, safety and regulation, market and policy, sustainability, and knowledge, and culinary and consumer related aspects of the organic edible rose supply chain.

For further refinement, each statement was assessed using the Technology Acceptance Model (TAM) (Davis, 1989). Statements were grouped according to Perceived Usefulness (PU) and Perceived Ease of Use (PEOU). PU contained statements describing the expected benefits or added value such as improved market opportunities, and consumer trust, while PEOU contained statements reflecting adaptation barriers including production difficulties, legislation, cost, implementation challenges. The application of this additional framework ensured a better understanding of the diversity of views composing the concourse.

Finally, the statements were refined by a thorough review process. Highly similar statements were merged, and difficult to understand or overly specific statements were reformed. Through the refinement process, emphasis was placed on keeping a balance between the thematic categories and PU and PEOU groups. The reduction resulted in a final and representative Q sample consisting of 38 self-referent statements (Brown, 1980). Table 2-1 presents the complete list of Q sample statements along with their thematic categories.

Table 2-1: Q Sample Statements (N=38)

N	Theme	PU/ PEOU	Statement
1	Regulation & Safety	PEOU	I believe that current regulations are not specific enough to ensure a reliable market for organic edible roses.
2	Regulation & Safety	PU	I believe that organic certification will encourage the organic edible rose market to comply with genuine production standards.
3	Regulation & Safety	PEOU	I believe that scientific knowledge on organic edible roses is still too limited to support a safe expansion of the market.
4	Regulation & Safety	PEOU	I think that novel food regulations strongly limit the development of the organic edible rose market.
5	Regulation & Safety	PU	I believe that traceability is more important than price when consumers evaluate organic edible roses.
6	Production	PEOU	I think that organic edible rose production depends too heavily on environmental conditions to be reliably scaled up.
7	Production	PEOU	I believe that the high labor intensity makes organic edible rose cultivation economically challenging.
8	Market & Policy	PEOU	I think that the organic edible rose sector is still too small and fragmented to attract major investments.
9	Market & Policy	PU	I believe that local supply chains are the most realistic way to commercialize organic edible roses due to their perishability.
10	Production	PEOU	I believe that seasonality is one of the main barriers to the expansion of the organic edible rose market.
11	Production	PU	I think that open-field production systems cannot guarantee a stable supply of organic edible roses.
12	Production	PU	I think that technological innovation is more important than traditional practical experience in the organic edible rose sector.
13	Production	PEOU	I believe that current post-harvest practices are insufficient to support the large-scale expansion of the organic edible rose market.
14	Production	PU	I think that cold chain logistics are essential for reducing losses in the distribution of organic edible roses.

N	Theme	PU/ PEOU	Statement
15	Production	PU	I think that the expansion of organic edible rose production depends primarily on technological innovation.
16	Market & Policy	PU	I think that demand for organic edible roses is driven mainly by fine dining rather than retail consumption.
17	Market & Policy	PU	I believe that organic edible roses will remain a niche product targeted at premium markets.
18	Market & Policy	PEOU	I think that supply chains are too fragmented to support efficient growth in the organic edible rose market.
19	Market & Policy	PU	I think that limited distribution channels hinder the widespread adoption of organic edible roses among consumers.
20	Market & Policy	PEOU	I believe that consumer awareness is still too low to support large-scale demand for organic edible roses.
21	Market & Policy	PU	I think that the market success of organic edible roses depends on strong coordination throughout the entire supply chain.
22	Culinary & Consumer	PU	I think that aesthetic value outweighs taste in consumers' perceptions of organic edible roses.
23	Sustainability & Knowledge	PU	I believe that the nutritional value of organic edible roses is relatively low compared to their added value.
24	Sustainability & Knowledge	PEOU	I think that aesthetic standards generate inefficiencies and waste in the production of organic edible roses.
25	Sustainability & Knowledge	PU	I think that organic edible rose cultivation can support biodiversity in agroecosystems.
26	Sustainability & Knowledge	PEOU	I think that current training programs for organic edible rose production are insufficient to support the growth of the sector.
27	Sustainability & Knowledge	PU	I believe that organic edible roses are part of emerging sustainable food innovations.
28	Market & Policy	PU	I think that clear organic certification is essential for building consumer trust in edible roses.
29	Culinary & Consumer	PU	I believe that branding and storytelling are underdeveloped in the organic edible rose sector.
30	Market & Policy	PU	I think that communicating the authenticity of organic edible roses is more important than competing on price.
31	Market & Policy	PU	I believe that direct sales to chefs are the most effective distribution channel for organic edible roses.
32	Market & Policy	PU	I think that large-scale retail chains are not suitable for organic edible rose products.
33	Market & Policy	PEOU	I believe that international competition makes it difficult for local organic edible rose producers to remain competitive.
34	Culinary & Consumer	PEOU	I believe that the lack of well-known recipes limits the diffusion of organic edible roses.
35	Market & Policy	PU	I believe that converting production from ornamental roses to organic edible roses can create new market opportunities.
36	Culinary & Consumer	PU	I believe that the nutraceutical properties of organic edible roses are an important factor influencing consumers' purchasing decisions.
37	Market & Policy	PEOU	I think that the high price of organic edible roses represents a significant barrier compared to conventionally produced edible roses.
38	Production	PEOU	I believe that producers' resistance to innovation is a barrier that limits the development of the organic edible rose sector.

2.3 P Set

According to the methodology, the group of participants – known as P set - was selected purposively to ensure the inclusion of people with adequate knowledge and experience regarding the organic edible rose sector. The objective of the P set was not to achieve statistical representativeness, but to capture a diversity of informed perspectives on the drivers, barriers, and future of the supply chain (Brown, 1980; Watts & Stenner, 2012).

A commonly cited rule of thumb in Q methodology is that the P-set should be approximately half the size of the Q sample (Kline, 1994). In line with this, the final P set consisted of 18 participants, including researchers, producers, and professionals involved in production, processing, and consultancy activities related to organic edible roses. Table 2-2 presents the participant profiles.

Table 2-2: P Set (N=18)

No.	Birth Year	Gender	Category	Experience (yrs)
1	1961	M	Researcher	10
2	1960	F	Researcher	10
3	1985	F	Researcher	1
4	1997	F	Researcher	0
5	1960	M	Researcher	1
6	1977	F	Researcher	1
7	1991	F	Researcher	0
8	1980	M	Researcher	1
9	1956	M	Researcher	3
10	1977	F	Researcher	1
11	2000	F	Researcher	1
12	1996	M	Researcher	0
13	1947	M	Producer/Transformer	11
14	1988	F	Producer	8
15	1982	M	Producer	0
16	1971	F	Researcher	1
17	1976	F	Researcher	0
18	1979	M	Researcher	0

2.4 Q Sorting

As described by Watts and Stenner (2012), Q sort is a structured ranking during which participants arrange Q sample within a predefined distribution, thereby revealing the configuration of their subjective perspective regarding the topic of investigation. For the study, the collection of Q sorts and post-sort interviews was conducted online in June 2026. More specifically, the Netlify platform was used for hosting the

data collection. A link was provided to participants via mail to access to the website containing the survey. Participants were asked to rank the 38 statements according to their level of agreement on a scale ranging from -4 (strongly disagree) to +4 (strongly agree), with 0 representing a neutral position. First, all statements were reviewed and sorted into three categories: agree, neutral, and disagree. Later, the statements were revised within each category and arranged based on the strength of participant's opinion. This approach demonstrated the accurate reflection of the relative importance of the statements and enabled participants to construct their individual Q sorts (Brown, 1980; Solfanelli et al., 2025). In order to support and strengthen the interpretation of the resulting factors, participants were also asked to provide motivations regarding the statements they put on the extreme ends of the scale (+4, +3, -3, -4). These comments provided additional insight into the reasoning behind participants' rankings and were considered during factor interpretation.

2.5 Factor Extraction

Q sorts were analysed with KADE software. All Q sorts were intercorrelated to assess the degree of similarity among each other. The resulting correlation matrix was then subjected to factor analysis to investigate participants with shared perspectives (Brown, 1980; McKeown & Thomas, 2013). Factor extraction was performed through Principal Component Analysis, initially given eight factors. Table 2-3 presents the eigenvalues and variance explained.

Table 2-3: Eigenvalues and % Variance Explained

	F1	F2	F3	F4	F5	F6	F7	F8
Eigenvalues	3.956	2.265	1.895	1.592	1.357	1.284	0.987	0.909
% Explained Variance	22%	13%	11%	9%	8%	7%	5%	5%
Cumulative % Explained Variance	22%	35%	46%	55%	63%	70%	75%	80%

The final factor solution was identified following the Kaiser-Guttman criteria (Brown, 1980). According to this criterion, factors with eigenvalues greater than 1 can be considered for retention (Brown, 1980). Although additional factors also met this criterion, a three-factor solution was ultimately selected, as it provided a satisfactory level of explained variance and a more interpretable and conceptually coherent structure (see Table 2-3). The retained factors were further refined through varimax and hand rotations to enhance interpretability. In this process, participants' motivations and contextual understanding of their viewpoints were also considered to obtain the most consistent and meaningful factor structure.

Defining Q-sorts were then identified following Brown's significance rule (Brown, 1980; Eden et al., 2005). A Q-sort is considered to load significantly on a factor when its factor loading exceeds the significance threshold, calculated as $\pm 2.58 \times 1/\sqrt{N}$, where N is the number of statements in the Q-set. Given that the present study included 38 statements, the resulting significance threshold was ± 0.42 . Q-sorts exceeding this value on a given factor were flagged as defining for that factor.

Factor loadings were calculated for each Q-sort across all extracted factors. In Q methodology, a factor loading represents the correlation between an individual Q-sort and a factor (Brown, 1980), indicating the extent to which a participant's viewpoint aligns with that shared perspective. Higher absolute loadings indicate stronger association with the factor. The full matrix of factor loadings is presented in Table 2–4, with defining Q-sorts clearly identified and marked.

Table 2-4: Factor Loadings with Defining Sorts Flagged with *

Part.	Group	Factor 1	Factor 2	Factor 3
13	F1	0.7498*	0.0587	0.1443
9	F1	0.6702*	-0.1110	0.3212
5	F1	0.6049*	0.0363	0.2718
14	F1	0.5887*	-0.2489	0.0272
16	F1	0.5853*	-0.0254	0.4228
1	F1	0.4619*	0.0133	0.3913
11	F1	0.4354*	0.0440	-0.0407
18	F2	0.3368	0.7735*	-0.0804
15	F2	-0.0882	0.6868*	-0.2447
10	F2	-0.0063	0.6502*	0.1660
2	F2	-0.0364	0.5598*	-0.0143
12	F2	0.1994	0.3579*	0.1801
8	F3	-0.0012	0.0618	0.8759*
17	F3	-0.0726	0.0273	0.7227*
6	F3	0.2077	0.1071	0.6749*
3	—	0.1030	0.5130	0.5600
4	—	0.3470	0.1993	-0.3984
7	—	0.1763	-0.0456	0.2456

CHAPTER 3 RESULTS

3.1 Factor Solution

The analysis resulted in three factors, explaining 46% of the total study variance. Out of the 18 Q sorts, 15 was loaded significantly on factors. One sort demonstrated a confounded loading, as it showed close agreement for two factors (Part. 3). Other two sorts did not load significantly to any factor (Part. 4 and 7). Factor 1 was defined by seven participants and accounted for 22% of explained variance. Factor 2 was defined by five participants and explained 13% of variance, while Factor 3 was defined by 4 participants and explained 11% of the variance. The interpretation of each factor was conducted based on highest and lowest ranked statements, distinguishing statements and the motivations given by the participants during post-sorting.

Factor score correlations between the three retained factors are presented in Table 3-1. The low correlations confirm the relative independence of the three perspectives, particularly between Factor 1 and Factor 2 ($r = 0.078$) and between Factor 2 and Factor 3 ($r = 0.020$). The moderate correlation between Factor 1 and Factor 3 ($r = 0.302$) suggests some overlap in their emphasis on supply chain structure and certification.

Table 3-1: Factor Score Correlations

	Factor 1	Factor 2	Factor 3
Factor 1	1.000	0.078	0.302
Factor 2	0.078	1.000	0.020
Factor 3	0.302	0.020	1.000

The interpretation of each factor was conducted by examining the factor arrays, considering both the statement scores (Q-sort value) and the corresponding standardized factor (Z-score). Q-sort value (or Q-SV) represent the position of each statement within a factor array, ranging from -4 (strongly disagree) to +4 (strongly agree). Z-scores represent the standardized factor scores derived from the factor analysis and indicate the relative degree of agreement or disagreement of each statement within a given factor. Statements with the highest and lowest Z-scores, together with their Q-sort value, were primarily used to characteristics the distinguishing features of each factor. In particular, distinguishing statements (i.e., those showing statistically significant differences between factor arrays, typically at $p < 0.05$ or $p < 0.01$) were used to highlight what uniquely defines each perspective. In addition, post-sort qualitative comments provided by participants were considered to further support and enrich the interpretation of each factor.

3.2 Factor 1: Trust and Traceability Perspective

Factor 1 was defined by seven participants, making it the largest perspective of the study. This viewpoint places strong emphasis on transparency, traceability, credible organic certification, and collaboration

within the supply chain. Participants belonging to this factor viewed reliable information, certification systems, and transparent production as the foundations of sector development.

The strongest agreement of this perspective is on traceability. Participants of Factor 1 believes that traceability is more important than price when consumers evaluate organic edible roses (5, +4*). This statement was accompanied by the indication that trust and food safety are the fundamentals for the success of the sector. As one participant stated, *“Trust and food safety are the key to many successful initiatives”* (P16). Stakeholders also viewed local supply chains to be the most realistic commercialization pathway (9, +4*). They highlighted the importance of collaboration between producers as one emphasized *“the need to build networks among producers”* (P13). Another participant agreed with *“Product freshness always benefits the local community. Developing and supporting a local supply chain also provides greater economic returns and environmental benefits.”* (P14). Additionally, it was agreed that converting production from ornamental roses to organic edible roses can create new market opportunities (35, +3). One participant added *“For an ornamental rose producer, producing organic edible roses is easier and can represent an additional market opportunity.”* (P5). Compared with the other factors, Factor 1 demonstrated greater importance on communicating authenticity of organic edible roses rather than competing on the price (30, +1). Even though this statement received moderate agreement, it clearly distinguishes this factor from other, as they ranked negatively. This finding further strengthens the importance of building consumer trust through transparent communication rather than price competition.

Unlike other factors, Factor 1 stakeholders did not indicate the lack of scientific knowledge as a primary barrier for market development, rejecting the idea that the current knowledge is too limited to support market expansion (3, -4*). However, one stakeholder suggested that *“Scientific literature on the topic should be further developed and disseminated.”* (P13). No specific production challenges emerged in this viewpoint. In particular, the view also disagreed that open-field production systems cannot guarantee a stable supply of organic edible roses (11, -4). Supporting this one stakeholder stated, *“Production stability is not related to whether cultivation takes place in open fields or under protected conditions.”* (P5). Similarly, stakeholders did not acknowledge large-scale retail chains to be suitable for organic edible rose production (32, 0). Even though the statement was ranked neutrally, it differed significantly from other factors. Lastly, the view supports the idea that that organic edible roses will not remain a niche product targeted at premium markets (17, -3*), demonstrating confidence in the future growth of the sector.

Overall, Factor 1 demonstrates a pragmatic perspective in which trust serves as the key component. According to this viewpoint, the successful expansion of organic edible rose market depends less on adapting to new technologies or regulations and more on making sure consumers can confidently identify, verify, and trust the product.

Table 3-2: Factor 1 — Most Agreed and Most Disagreed Statements

No.	Statement	Q-SV	Z-score
Most Agreed Statements (+4 and +3)			
5	I believe that traceability is more important than price when consumers evaluate organic edible roses.	4	2.02
9	I believe that local supply chains are the most realistic way to commercialize organic edible roses due to their perishability.	4	1.71
35	I believe that converting production from ornamental roses to organic edible roses can create new market opportunities.	3	1.66
28	I think that clear organic certification is essential for building consumer trust in edible roses.	3	1.32
2	I believe that organic certification will encourage the organic edible rose market to comply with genuine production standards.	3	1.23
Most Disagreed Statements (-4 and -3)			
33	I believe that international competition makes it difficult for local organic edible rose producers to remain competitive.	-3	-1.45
17	I believe that organic edible roses will remain a niche product targeted at premium markets.	-3	-1.17
1	I believe that current regulations are not specific enough to ensure a reliable market for organic edible roses.	-3	-1.19
3	I believe that scientific knowledge on organic edible roses is still too limited to support a safe expansion of the market.	-4	-1.55
11	I think that open-field production systems cannot guarantee a stable supply of organic edible roses.	-4	-1.80

Table 3-3: Distinguishing Statements for Factor 1 ($p < 0.05$; * indicates $p < 0.01$)

No.	Statement	F1 QSV	F1 Z	F2 QSV	F2 Z	F3 QSV	F3 Z
5	I believe that traceability is more important than price when consumers evaluate organic edible roses.	4*	2.02	-1	-0.78	-1	-0.38
9	I believe that local supply chains are the most realistic way to commercialize organic edible roses due to their perishability.	4*	1.71	0	0.11	-2	-0.67
22	I think that aesthetic value outweighs taste in consumers' perceptions of organic edible roses.	2*	0.83	-2	-1.15	0	-0.07
30	I think that communicating the authenticity of organic edible roses is more important than competing on price.	1*	0.61	-1	-0.59	-3	-1.51
32	I think that large-scale retail chains are not suitable for organic edible rose products.	0*	0.06	-2	-0.85	-4	-1.93
8	I think that the organic edible rose sector is still too small and fragmented to attract major investments.	0*	-0.21	1	0.72	-2	-1.24
16	I think that demand for organic edible roses is driven mainly by fine dining rather than retail consumption.	-2*	-0.82	4	2.14	1	0.44
17	I believe that organic edible roses will remain a niche product targeted at premium markets.	-3*	-1.17	2	0.80	0	-0.08
3	I believe that scientific knowledge on organic edible roses is still too limited to support a safe expansion of the market.	-4*	-1.55	1	0.70	-1	-0.21

3.3 Factor 2: Consumer Value Perspective

Factor 2 was defined by five participants and represents a point of view focused on consumer awareness, perceived value, and market adoption. Stakeholders associated with this perspective believes that the prospect of organic edible rose sector depends on the consumers' understanding of the product, its uses, and potential benefits.

The most agreed statements within Factor 2 emphasizes the importance of gastronomy for market growth. Participants agreed that the demand for organic edible roses is driven mainly by fine dining rather than retail consumption (16, +4*), indicating that restaurants play a big part in introducing consumers to edible roses. One stakeholder explained "*The consumption of edible roses is still limited to high-end gastronomy.*" (P10). Participants of this factor also believes direct sales to chefs is the most effective distribution channel (31, +4*). Additionally, Factor 2 emphasizes that consumer awareness is a substantial barrier for market growth. They agreed that the lack of well-known recipes limits the diffusion of organic edible roses (34, +3*) and emphasized the need for stronger branding and storytelling (29, +3*).

Unlike Factor 1, Factor 2 does not view certification to be a primary driver of market success, disagreeing that clear organic certifications are essential for consumer trust (28, -1*), and certifications can ensure production standards (2, -2*). They also rejected that international competition is a challenge (33, -4) and did not consider open-field production systems to be unable to provide stable production (11, -4)

Overall, Factor 2 views the industry from a consumer value perspective in which market growth depends on awareness, communication, and appealing consumption experiences. Stakeholders belonging to this factor believes gastronomy, branding, storytelling, and consumer awareness are the key drivers regarding the prospect of the sector. Tables 3-4 and 3-5 present the key statements for Factor 2.

Table 3-4: Factor 2 — Most Agreed and Most Disagreed Statements

No.	Statement	Q-SV	Z-score
Most Agreed Statements (+4 and +3)			
16	I think that demand for organic edible roses is driven mainly by fine dining rather than retail consumption.	4	2.14
31	I believe that direct sales to chefs are the most effective distribution channel for organic edible roses.	4	1.79
34	I believe that the lack of well-known recipes limits the diffusion of organic edible roses.	3	1.65
29	I believe that branding and storytelling are underdeveloped in the organic edible rose sector.	3	1.61
14	I think that cold chain logistics are essential for reducing losses in the distribution of organic edible roses.	3	1.29
Most Disagreed Statements (-4 and -3)			
22	I think that aesthetic value outweighs taste in consumers' perceptions of organic edible roses.	-2	-1.15
26	I think that current training programs for organic edible rose production are insufficient to support the growth of the sector.	-3	-1.16

No.	Statement	Q-SV	Z-score
24	I think that aesthetic standards generate inefficiencies and waste in the production of organic edible roses.	-3	-1.31
33	I believe that international competition makes it difficult for local organic edible rose producers to remain competitive.	-4	-1.32
11	I think that open-field production systems cannot guarantee a stable supply of organic edible roses.	-4	-1.70

Table 3-5: Distinguishing Statements for Factor 2 ($p<0.05$; * indicates $p<0.01$)

No.	Statement	F1 QSV	F1 Z	F2 QSV	F2 Z	F3 QSV	F3 Z
16	I think that demand for organic edible roses is driven mainly by fine dining rather than retail consumption.	-2	-0.82	4*	2.13	1	0.44
31	I believe that direct sales to chefs are the most effective distribution channel for organic edible roses.	-2	-1.00	4*	1.79	-3	-1.53
34	I believe that the lack of well-known recipes limits the diffusion of organic edible roses.	0	-0.20	3*	1.65	-1	-0.15
29	I believe that branding and storytelling are underdeveloped in the organic edible rose sector.	2	0.81	3*	1.61	0	0.08
7	I believe that the high labor intensity makes organic edible rose cultivation economically challenging.	-2	-0.92	2*	0.80	-2	-0.65
15	I think that the expansion of organic edible rose production depends primarily on technological innovation.	0	-0.35	2*	0.79	-1	-0.12
8	I think that the organic edible rose sector is still too small and fragmented to attract major investments.	0	-0.21	1*	0.72	-2	-1.24
3	I believe that scientific knowledge on organic edible roses is still too limited to support a safe expansion of the market.	-4	-1.55	1*	0.70	-1	-0.21
28	I think that clear organic certification is essential for building consumer trust in edible roses.	3	1.32	-1*	-0.67	4	1.85
2	I believe that organic certification will encourage the organic edible rose market to comply with genuine production standards.	3	1.23	-2*	-0.79	3	1.41
18	I think that supply chains are too fragmented to support efficient growth in the organic edible rose market.	1	0.24	-2*	-0.91	1	0.15
22	I think that aesthetic value outweighs taste in consumers' perceptions of organic edible roses.	2	0.83	-2*	-1.15	0	-0.07
26	I think that current training programs for organic edible rose production are insufficient to support the growth of the sector.	1	0.41	-3*	-1.16	0	0.02

3.4 Factor 3: Regulatory and Institutional Perspective

Factor 3 is the smallest factor as it was defined by three participants. It represents a perspective centred on the institutional conditions necessary for the sustainable growth of organic edible rose sector. The viewpoint highlights that long-term development of the sector depends on regulatory clarity, economical competition, and structural improvements across the supply chain.

The defining characteristics within this factor stated concerns regarding the need for more specific regulations regarding organic edible roses. Participants agreed that current regulations are not specific enough to ensure a reliable market (1, +4*). One stakeholder explained “*There is no specific regulation for edible*

flower sector, which could encourage greenwashing.” (P8). Another distinguishing statement of Factor 3 is the emphasis on price. Unlike other factors, participants of Factor 3 considered the high price of organic edible roses to be a significant barrier compared to conventionally produced alternatives (37, +2*). This opinion is strengthened with their strong disagreement to the statement stating that communicating authenticity is more important than competing on price (30, -3*). One participant explained, “*Price always remains a very important factor in discouraging purchases.*” (P8). Together these findings indicate that economic competitiveness of the product is one of the key factors in market expansion. Factor 3 further distinguishes by its emphasis on structural improvements. Stakeholders agreed that producer’s resistance to innovation is a barrier that limits the sector (38, +1*) and considered current post-harvest practices as insufficient to support large-scale expansion (13, +1*). This perspective associates possible market growth with technological adaptation and improvements on the supply chain.

In contrast to other perspectives, stakeholders of Factor 3 did not view local supply chains as the most realistic way to commercialize (9, -2), nor did perceive environmental conditions (6, -3*) or seasonality (10, -4*) as the primary challenges of the sector, as they suggested that these challenges could be overcome with appropriate production and commercialization strategies.

Overall, Factor 3 represents an institutional perspective, viewing regulatory clarity, improving technological practices and creating economically viable conditions as the main necessities for the prospect of the organic edible rose sector.

Table 3-6: Factor 3 — Most Agreed and Most Disagreed Statements

No.	Statement	Q-SV	Z-score
Most Agreed Statements (+4 and +3)			
1	I believe that current regulations are not specific enough to ensure a reliable market for organic edible roses.	4	1.87
28	I think that clear organic certification is essential for building consumer trust in edible roses.	4	1.85
2	I believe that organic certification will encourage the organic edible rose market to comply with genuine production standards.	3	1.41
35	I believe that converting production from ornamental roses to organic edible roses can create new market opportunities.	3	1.13
21	I think that the market success of organic edible roses depends on strong coordination throughout the entire supply chain.	3	1.12
Most Disagreed Statements (-4 and -3)			
9	I believe that local supply chains are the most realistic way to commercialize organic edible roses due to their perishability.	-2	-0.67
8	I think that the organic edible rose sector is still too small and fragmented to attract major investments.	-2	-1.24
30	I think that communicating the authenticity of organic edible roses is more important than competing on price.	-3	-1.51
6	I think that organic edible rose production depends too heavily on environmental conditions to be reliably scaled up.	-3	-1.64

No.	Statement	Q-SV	Z-score
10	I believe that seasonality is one of the main barriers to the expansion of the organic edible rose market.	-4	-1.77
32	I think that large-scale retail chains are not suitable for organic edible rose products.	-4	-1.93

Table 3-7: Distinguishing Statements for Factor 3 ($p < 0.05$; * indicates $p < 0.01$)

No.	Statement	F1 QSV	F1 Z	F2 QSV	F2 Z	F3 QSV	F3 Z
1	I believe that current regulations are not specific enough to ensure a reliable market for organic edible roses.	-3	-1.19	-1	-0.53	4*	1.87
37	I think that the high price of organic edible roses represents a significant barrier compared to conventionally produced edible roses.	-1	-0.45	0	-0.31	2*	0.97
16	I think that demand for organic edible roses is driven mainly by fine dining rather than retail consumption.	-2	-0.82	4	2.13	1*	0.44
13	I believe that current post-harvest practices are insufficient to support the large-scale expansion of the organic edible rose market.	-1	-0.70	-2	-0.81	1*	0.42
38	I believe that producers' resistance to innovation is a barrier that limits the development of the organic edible rose sector.	-2	-0.87	-3	-1.22	1*	0.42
24	I think that aesthetic standards generate inefficiencies and waste in the production of organic edible roses.	-1	-0.65	-3	-1.31	1*	0.40
11	I think that open-field production systems cannot guarantee a stable supply of organic edible roses.	-4	-1.80	-4	-1.70	0*	0.00
22	I think that aesthetic value outweighs taste in consumers' perceptions of organic edible roses.	2	0.83	-2	-1.15	0*	-0.07
3	I believe that scientific knowledge on organic edible roses is still too limited to support a safe expansion of the market.	-4	-1.55	1	0.70	-1*	-0.21
8	I think that the organic edible rose sector is still too small and fragmented to attract major investments.	0	-0.21	1	0.72	-2*	-1.24
30	I think that communicating the authenticity of organic edible roses is more important than competing on price.	1	0.61	-1	-0.59	-3*	-1.51
6	I think that organic edible rose production depends too heavily on environmental conditions to be reliably scaled up.	-1	-0.65	0	-0.49	-3*	-1.64
10	I believe that seasonality is one of the main barriers to the expansion of the organic edible rose market.	-1	-0.37	0	-0.02	-4*	-1.77
32	I think that large-scale retail chains are not suitable for organic edible rose products.	0	0.06	-2	-0.85	-4*	-1.93

3.5 Consensus Statements

Even though all three perspectives demonstrate importance on diverse aspects of the organic edible rose sector, several areas of agreement were observed amongst the viewpoints. The stakeholders share various common opinions regarding the sector as indicated by the consensus statements, even though they prefer different strategies for market growth.

The strongest consensus is that the success of the organic edible rose market depends on the coordination among supply chain. Stakeholders associated with all three factors agreed that for sector growth collaboration through all actors is crucial. Participants also shared positive views regarding the necessity of cold-chain logistics in reducing losses and recognized the contribution of organic edible rose cultivation to biodiversity. Agreement can be seen on the lack of consumer awareness to support large-scale market demand. All three viewpoints showed disagreement regarding that novel food regulations limit the organic edible rose sector. They all showed limited concern on international competition.

Despite these agreed statements, the factors differed drastically on their thoughts of the suggested pathway for sector development. The most distinguishing statements are the ones concerning traceability, certification, regulations, and commercialization ways. As explained previously, Factor 1 strongly focuses on traceability and certification mechanisms for building trust. Factor 2 prioritizes consumer awareness, gastronomy, communication, and branding, pointing to a demand-oriented market development. Lastly, Factor 3 emphasized the importance of regulatory clarity, and innovation, highlighting institutional support and modernization as necessities for substantial sector expansion.

Table 3-8: Consensus Statements (non-distinguishing across all factor pairs)

No.	Statement	F1 QSV	F1 Z	F2 QSV	F2 Z	F3 QSV	F3 Z
4	I think that novel food regulations strongly limit the development of the organic edible rose market.	-2	-1.09	-1	-0.71	-2	-0.68
14	I think that cold chain logistics are essential for reducing losses in the distribution of organic edible roses.	2	1.19	3	1.29	2	0.99
20	I believe that consumer awareness is still too low to support large-scale demand for organic edible roses.	1	0.68	2	0.84	2	1.11
21	I think that the market success of organic edible roses depends on strong coordination throughout the entire supply chain.	2	1.11	2	1.18	3	1.12

CHAPTER 4 DISCUSSION

4.1 Multiple Pathways for Organic Edible Rose Market Development

The results suggest that stakeholders share a generally positive outlook regarding the future development of the organic edible rose sector, but differ substantially in their views on how this development should be achieved. Factor 1 was more focused on trust, traceability and local supply chain; Factor 2 emphasised the consumer awareness, gastronomy, branding and value creation and communication; and, Factor 3 highlighted the importance of regulatory framework, economic competitiveness and technological improvements.

The representations of identified perspectives are in the same line with previous Q methodology research conducted on agri-food and floriculture sectors. Previous studies showed that stakeholders of these sectors often attach different priorities to sustainability, market development and innovation processes (Mandolesi et al., 2015; De Luca et al., 2018; Derksen and Mithöfer, 2022). Rather than representing conflicting positions, the factors identified in this study reflect complementary approaches to sector development.

A notable finding is that stakeholders did not disagree on the relevance of the organic edible rose sector itself. Instead, divergence emerged regarding the mechanisms through which growth can be achieved. While some participants considered transparency and traceability to be fundamental prerequisites, others focused on market creation through consumer engagement or on the establishment of appropriate institutional conditions.

Taken together, the results demonstrate that the development of the organic edible rose sector cannot be relied on the integration of these different perspectives rather than on the exclusive adoption of a single strategy.

4.2 Trust, Traceability and Organic Credibility

The Trust and Traceability Perspective focuses on the importance of transparency in supporting market development. The strongest distinguishing statement of this factor was the belief that traceability is more important than price when consumers evaluate organic edible roses. Participants also strongly supported local supply chains and recognised certification as an important mechanism for supporting consumer confidence.

The emphasis on traceability and certification reflects a challenge frequently discussed in organic food studies. Since organic foods are considered credence goods, consumers cannot directly assess the compliance with organic production standards, making certification and traceability crucial mechanisms in communicating production standards and product authenticity (Nagy et al., 2022). Emphasis on traceability is consistent with existing literature stating that traceability systems strengthen food safety trust and influence the consumer confidence in the product (Guanqi & Husnain, 2022). Similar, previous research conducted by Murphy et al. (2021), demonstrated that certification schemes are a key component in reducing uncertainty and increasing consumer trust. Participants also attached greater importance to traceability than to price competitiveness. This finding is consistent with studies suggesting that consumers of organic products often prioritise trust-related

attributes and product authenticity over purely economic considerations (Rodrigues et al., 2017; Murphy et al., 2021).

Unlike other perspectives, Factor 1 does not focus primarily on regulatory constraints or demand creation. Instead, stakeholders associated with this viewpoint consider verifiable production practices, traceability mechanisms and coordinated supply chains as fundamentals for sector development. Certification systems are also considered as necessities for verifying product authenticity and ensuring compliance with organic production standards. These findings align with the existing organic food literature, which states traceability and certification are crucial for avoiding information asymmetries and strengthening trust in product authenticity and quality (Murphy et al., 2022; Guanqi & Husnain, 2022). The emphasis of certification and traceability in Factor 1, demonstrates that stakeholders perceive transparency and verifiability as prerequisites for the sustainable growth of the sector.

In addition, the emphasis on local supply chains of Factor 1 further highlights the role of transparency in sector development. Shorter supply chains enable higher visibility, more interconnected relationships between producers and consumers, and improved opportunities for communicating production practices. Previous studies have suggested that localized food systems can foster confidence in authenticity and increase trust between consumer and producer by reducing the distance (Burgess et al., 2023).

In the context of organic edible roses, local supply chains are therefore viewed not only as a practical response to perishability but also as a mechanism for strengthening traceability and credibility. From a broader perspective, the interpretation suggests that trust should not be viewed solely as a consumer attribute but as a structural concept of the supply chain. Certification, traceability, transparency, and supply chain coordination are all regarded as complementary elements contributing to the long-term development of the sector.

4.3 Consumer Awareness, Gastronomy and Value Creation

The Consumer Value Perspective approaches the development of the organic edible rose sector from a different angle, focusing on consumer awareness, gastronomy, branding, and communication. The strongest distinguishing statements of this factor concerned the role of fine-dining, storytelling, direct engagement with chefs, and the limited availability of well-known recipes. These findings suggest that stakeholders associated with this perspective perceive limited consumer familiarity and insufficient market exposure as the main barriers to sector growth. This interpretation matches the results of previous studies which states that consumer acceptance of edible flowers is strongly influenced by familiarity, product knowledge and perceived benefits (Chen and Wei, 2016; Rodrigues et al., 2017). Consumers are more likely to adopt edible flower products when they understand the characteristics, culinary applications, and potential value (Chen and Wei, 2016). Therefore, according to Factor 2, the future of organic edible roses depends mostly on generating consumption opportunities, increasing the communication and consumer engagement with the product.

A particularly distinctive aspect of this perspective is the importance attributed to gastronomy. Fine dining establishments are seen as a major source of demand and direct engagement with chefs is viewed as an effective commercialization strategy. Consistent findings have been shared in previous studies examining the application of edible flowers within restaurants, where chefs play a key role in introducing innovative products to consumers and shaping the perception of culinary value (Gamata & Alejandro, 2021). In this context, gastronomy functions not only as a distribution channel but also as a mechanism for consumer education and product familiarisation.

The emphasis on branding, storytelling and recipe diffusion further suggests that stakeholders view market growth as a process of value communication. Recent studies have confirmed that awareness and familiarity with edible flower applications are important determinants of consumer acceptance and market expansion (Carboni et al., 2025). From this perspective, increasing demand depends not only on product availability but also on consumers understanding how organic edible roses can be used and why they provide value.

An important contribution from this perspective is the distinction between actual product benefits and the consumer understanding of those benefits. Majority of edible flower literature has documented the nutritional composition, mineral content, bioactive compounds, antioxidant activity, and potential health-promoting properties (Rodrigues et al., 2017; Kumari et al., 2021), with studies on rose specifically documenting the abundance of anthocyanins, flavanols, and phenolic acids and their associated antioxidant capacity (Hegde et al., 2022; Kumari et al., 2022). However, stakeholders associated with Factor 2 emphasise that these characteristics contribute to market development only when effectively communicated to consumers. Scientific evidence alone may therefore be insufficient to generate demand unless it is translated into accessible and meaningful information.

An important distinction is that consumer awareness and consumer trust should not be viewed as similar concepts. While Trust and Traceability Perspective focuses on certification, traceability and authenticity, the Consumer Value Perspective suggests that consumers first need to understand what the product is, how it can be used, and why it is valuable. More specifically, trust building approaches may end up limited if awareness remains low. This distinction contributes to the existing edible flower literature by suggesting that market development depends not only on assuring quality and authenticity but also on creating visibility, familiarity, and meaningful consumption experiences (Rodrigues et al., 2017; Silva et al., 2026; Gamata & Alejandro, 2021).

4.4 Regulatory Clarity, Innovation and Sector Development

The Regulatory and Institutional Perspective focuses on the importance of the structural conditions required for the development of the organic edible rose sector. The most distinctive characteristic of this viewpoint is the strong concern regarding the lack of specific regulations for organic edible roses. Participants associated with this factor considered current regulatory frameworks insufficient to ensure a reliable market, emphasising the need for clearer rules and standards capable of supporting sector development. These findings

are consistent with previous studies highlighting the fragmented regulatory landscape surrounding edible flowers (Takahashi et al., 2020). Fernandes et al. (2020) and Takahashi et al. (2020) states that regulatory status of edible flowers remains unclear in many regions, reflecting inconsistencies among jurisdictions and the lack of comprehensive regulatory frameworks. Pieterse et al. (2022) observe that the absence of standardised quality and safety frameworks can create uncertainty for stakeholders and undermine market credibility (Pieterse et al., 2022). From this perspectives, regulatory clarity is viewed not only as a legal requirement but also as a prerequisite for market expansion.

Another distinguishing characteristic of Factor 3 is the emphasis placed on price competitiveness. This view is consistent with existing organic food literature (Van Doorn & Verhoef, 2011; Smoluk-Sikorska et al., 2023) which identifies price premiums as one of the primary barriers limiting organic product adoption. Even when consumers recognise the potential benefits of organic product, their willingness to pay may not always match prevailing market prices. Therefore, sustainable development of organic edible rose sector also depends on economically competitive products that can match the willingness to pay of consumers with the market price.

The perspective also highlights the importance of innovation and technological improvement. Participants expressed concerns regarding current post-harvest practices and producers' resistance to innovation, suggesting that modernization could contribute to overcoming operational constraints within the supply chain. Existing literature similarly highlights the significance of innovation in overcoming production or mor operational barriers within the edible flower supply chains (Butcaru et al., 2020; Fernandes et al., 2020). In this context, innovation is considered a complementary mechanism with regulation in order to support sustainable sector development. As opposed to other points of view, which focus primarily on trust-building or demand creation, this view adopts a more expansion-oriented approach supported by appropriate regulations, technology and pricing.

CHAPTER 5 CONCLUSION

The present study applied Q methodology to investigate stakeholder perspectives regarding organic edible rose sector. As a Q methodology study, the aim was to identify and interpret the different viewpoints among stakeholders rather than determine how widespread these viewpoints are within the population. The analysis yielded three distinct factors representing separate views regarding the organic edible rose market. These three perspectives are not intended to be statically generalizable, but rather to capture the diversity of subjective viewpoints within the sector. However, even though the concourse was constructed from various sources, additional perspectives might arise in the case of including a broader range of stakeholders or origins.

The results revealed three complementary perspectives. The first perspective emphasised trust, traceability, certification, and local supply chains as key drivers of market development. The second focused on consumer awareness, gastronomy, branding, and product visibility, highlighting the importance of demand creation and consumer engagement. The third stressed the role of regulatory clarity, economic competitiveness, and innovation in supporting long-term sector development. Despite these differences, stakeholders shared common concerns regarding the importance of supply-chain coordination, consumer awareness, and appropriate logistical support.

The study contributes the existing literature by extending the application of Q methodology to the organic edible rose sector and by focusing specifically on supply-chain stakeholders. While previous research has largely concentrated on consumer attitudes and acceptance of edible flowers (Chen and Wei, 2016; Rodrigues et al., 2017), stakeholder perspectives have received considerably less attention. The findings demonstrate the ability of Q methodology to uncover diverse viewpoints within an emerging agri-food sector and provide insights that would be difficult to obtain through conventional quantitative approaches. This deliberate concentration is one of the main contributions of this study, as stakeholder perspectives have not been examined in depth. Understanding both common and contradictive views may help stakeholders to understand each other and address the priorities and concerns surrounding the sector.

The results also provide various practical implications. Rather than pointing towards a single development pathway, the results indicate that the future growth of the organic edible rose sector may depend on the integration of multiple strategies.

Regarding producers, the findings indicate that the significance of organic edible roses depends not solely on production quality but also on the efficient communication of the qualities, for example most consumers cannot directly differentiate production methods. Consequently, producers might benefit not only from adopting organic standards but also communication strategies that enhance transparency and understanding of consumers regarding product value.

Regarding policymakers and regulatory authorities, the findings uncover the need for clear regulatory frameworks and suggest that harmonized standards could increase market development by reducing the uncertainty for producers, traders, and consumers. Thus, regulatory initiatives intended to enhance transparency and establish clear production and commercialization guidelines could support long-term sector growth.

The results additionally demonstrate the role of gastronomical professionals in promoting sector expansion. Chefs and fine-dining restaurants are identified as key actors in increasing product visibility and consumer engagement. Restaurants could potentially be used as not only sales channels but also as educational platforms through which the consumer perceptions get shifted. Collaboration among producers, chefs, and food service operators could contribute to wider market acknowledgment and consumer adaptation.

Several limitations should be considered. Consistent with the characteristics of Q methodology the study identifies views rather than their prevalence among stakeholders (Brown, 1980; Watts and Stenner, 2012).

Secondly, the study was conducted exclusively in Italy. Although organic production is largely regulated within a common European Union framework (Bostan et al., 2019; Meinshausen et al., 2024; Mircea, 2006), the identified perspectives may reflect aspects of the Italian production, market and gastronomic context. Differences in market maturity, consumption habits, supply-chain organisation and national implementation of European regulations may influence stakeholder perceptions. Future comparative studies involving stakeholders from different countries could therefore provide additional insights into the extent to which these viewpoints are context-specific.

Additional consideration should be on participant profile. Even though participants demonstrated variety in role, researchers constituted for majority. However, it should be noted that these researchers possessed direct expertise and experience on edible flowers, making them incredibly relevant contributors to the research. Future research should seek to include a wider range of stakeholders, such as producers, processors, distributors, retailers, gastronomy experts, potentially revealing additional perspectives on sector development.

Finally, future studies could benefit from integrating both stakeholder and consumer viewpoints within the same analysis. Such an approach would allow a deeper examination of areas of convergence and divergence between supply-chain actors and consumers, providing a more comprehensive basis for supporting the development of the organic edible rose sector.

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ANNEX 1. MOTIVATIONS FOR EXTREME STATEMENTS

Table A1. Participants' Motivations for Statements Ranked at the Extreme Ends of the Q Sort (+4 and -4)

ID	Position	Statement No.	Motivation
1	+4	27	Definitely converting ornamental production to edible is a sustainable innovation.
	+4	28	I would remove 'a clear one.'
	-4	3	It doesn't seem right to me.
	-4	4	Absolutely false.
2	+4	4	A major problem for the future of organic farming.
	+4	8	Important to create supply-chain agreements.
	-4	24	It depends on how the products are processed – whole, powdered, refrigerated... aesthetics will not necessarily have an influence.
	-4	5	Traceability is not essential; quality and certification justify the price.
3	+4	28	Completely agree; I think that thanks to organic certification, consumers can be less worried about the presence of pesticide residues or other chemical treatments.
	+4	35	I think so, although for now it may be a high-value niche rather than a mass market.
	-4	5	Price remains one of the main decision-making factors.
	-4	32	The involvement of large-scale retail is inevitable if the market is to expand.
4	+4	7	Hand-picking to preserve petal quality; selection to verify quality, which I assume must be higher than that required for ornamental roses (e.g., besides aesthetic defects, phytosanitary checks should be carried out to verify the absence of fungal diseases and pests); if certified 'organic,' the use of chemical pesticides to fight fungi and pests is eliminated, so alternative solutions need to be found (e.g., bio-fertilizers); flowering lasts only a short time, so one must be quick and careful; large quantities of petals are needed, even more so when considering products such as jams or distillates.
	+4	8	First of all, I imagine that demand is in itself very low and limited to fine-dining or, in any case, niche sectors; consequently, we cannot be looking at a well-structured production sector of considerable size.
	-4	12	I believe the ideal is an integrated solution: technological innovation, scientific knowledge, and farmers' local ecological knowledge. There is scientific evidence, especially linked to agroecological practices, that through these integrated solutions farmers' goals are achieved more effectively, while also ensuring an increase in ecosystem services and an improvement in the producer's economic position.
	-4	15	Same as what I wrote above.
5	+4	2	Organic certification represents a guarantee of product quality and wholesomeness, generating consumer trust.
	+4	35	For an ornamental rose producer, it is easier to produce organic edible roses, which can represent a further market outlet.
	-4	4	Edible roses are not novel foods, since in many countries there is an established traditional use of rose petals – from various species and hybrids, including those grown for ornamental purposes – in many food preparations.
	-4	11	I don't understand why open-field systems cannot guarantee stable production while greenhouse systems can. In my opinion there is no relationship between production stability and the cultivation regime (protected or open-field).

ID	Position	Statement No.	Motivation
6	+4	19	At present this product is not available on shelves.
	+4	20	Many consumers are not really aware that roses can be eaten. There is a limitation closely tied to culinary tradition, which to date has not made roses and other edible flowers well known in gastronomic applications.
	-4	23	No, I recall reading that roses are rich in antioxidants and phenols that play an important role in human health.
	-4	32	I rather believe that large retail chains do not sell edible roses because there is currently not a market large enough to encourage large-scale retail to take an interest in the product.
7	+4	25	They have no negative impact on the environment.
	+4	27	Innovations must focus on low environmental impact.
	-4	33	Local production is positioned within short supply chains.
	-4	4	There are still no clear regulations.
8	+4	1	There is no specific regulation for the edible-flower sector (favoring greenwashing).
	+4	28	Organic could reassure consumers about cultivation and processing methods, reducing skepticism and information asymmetry.
	-4	30	Price remains a very important factor discouraging purchases.
	-4	32	Products based on organic edible roses could be marketed without problems if the supply chain could be structured.
9	+4	25	It is one of the main advantages of introducing organic systems. The conventional-to-organic conversion in floriculture is essential to reduce the very high use of synthetic chemical products in conventional production.
	+4	27	It is an inherently innovative product, still almost absent from the market, that could succeed precisely because it is organic.
	-4	11	With a bit more difficulty, a certain production stability can be achieved using tunnels or cold greenhouses.
	-4	7	Greater labor intensity is typical of all systems based on agroecology and is a social advantage recognized by consumers.
10	+4	36	I think that, besides taste and visual appearance, these are not enough to reach a wide audience; nutritional composition is a fundamental factor in consumers' purchasing decisions.
	+4	16	Because the consumption of edible roses is still limited to fine dining and takes more time to be understood and adopted by consumers.
	-4	5	Because price remains one of the main decision-making factors for most consumers.
	-4	19	Because demand is still very niche and depends more on product knowledge than on distribution channels.
11	+4	10	Roses cannot be harvested all year round since their production is limited.
	+4	22	For decades roses have been appreciated mainly for their aesthetic appeal rather than their flavor.
	-4	34	Today consumers can easily access recipes through the Internet and social media. In my opinion, factors such as limited availability, the seasonality of production, and consumers' limited knowledge of the product have a greater influence on the spread of edible roses.
	-4	38	The development of the organic edible rose sector seems to be limited more by market demand, production constraints, and consumer knowledge than by producers' resistance to innovation.
12	+4	16	I find the use of edible flowers more suited to decorating special dishes, where aesthetic value matters more than in everyday use.

ID	Position	Statement No.	Motivation
	+4	22	I believe that the use of flowers in cooking is more for decorative purposes than for nutritional or taste reasons.
	-4	36	I believe that the use of flowers in cooking is more for decorative purposes than for nutritional or taste reasons.
	-4	6	There are agronomic techniques to become independent of environmental conditions, such as greenhouse or soilless cultivation. I don't think environmental conditions are too great a limitation in this case, as they might be for other crops.
	-4		
13	+4	5	Short and certified supply chain.
	+4	9	Need to build networks with producers.
	-4	3	Deepen and disseminate the scientific literature on the topic.
	-4	1	Disorganized and at times contradictory regulations: lack of streamlined, specific procedures.
14	+4	9	The freshness of the product always benefits the local community. Much greater economic margin and environmental benefit in developing and supporting a local supply chain.
	+4	32	It is not a product suited to large-scale retail.
	-4	12	Horticultural knowledge is the key to being able to cultivate and address any problem.
	-4	38	Competence must be developed before innovation.
15	+4	16	Fully agree.
	+4	7	Exactly – I imagine the labor cost is extremely high.
	-4	26	I am not aware of any information/training programs.
	-4	28	I do not believe that organic is the key to the diffusion and development of edible roses.
16	+4	35	Roses have been used in cooking in the past, and currently in some regions younger generations are very open to new and old flavors; I believe they could become new consumers, especially if the offer is accompanied by a marketing strategy. The population is also increasingly attentive to health and to reducing pesticide residues both on the plate and in the environment.
	+4	5	Trust and food safety are the key to many successes.
	-4	6	Many products are seasonal, and this is not a particular obstacle.
	-4	8	Large investments often go where potential is seen, not necessarily where it is already realized.
17	+4	1	It becomes necessary to expand control regulations in order to certify the product.
	+4	15	The use of new technologies for processing the product will be necessary.
	-4	8	Investments can be attracted regardless.
	-4	10	Greenhouses can be used for cultivation.
18	+4	29	Because I think awareness needs to be created before trying to sell a product. At the moment I don't think there is much awareness among consumers.
	+4	34	Same as above: there is no awareness of how to use this ingredient or of the potential it can have from a culinary point of view.
	-4	4	I don't think it's a problem; in the end it's a plant-based product like many others. Even assuming it needs authorization, I don't see why it should be denied.

ID	Position	Statement No.	Motivation
	-4	11	Open-field systems are more vulnerable, but it is always a matter of technique and investment: if you invest in research and infrastructure, anything can be done. In fact, I don't see why open-field cultivation protected with anti-hail nets shouldn't work!