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Quality Perception of Short Food Supply Chains Products: From the Producer's to the Consumer's Point of View

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Abstract

Short food supply chains (SFSCs) are a still developing phenomenon in the world of food production and distribution. They involve a direct connection between local farmers and consumers, with minimal intermediaries involved. SFSCs have gained significant interest in recent years due to their potential to promote sustainable agriculture and support local communities. As a result, many governments, organisations, and individuals have been exploring ways to develop and promote these chains as a viable alternative to conventional food supply chains. However, it is still unclear how SFSCs products are perceived differently by producers and consumers: what makes SFSCs products more desirable? Starting from a European project (SmartChain), answers from twenty questionnaires from SFSCs actors across Europe were analysed to understand the strengths and weaknesses of SFSCs products according to the producers. From their answers, 18 quality criteria referred to SFSCs products were obtained and then proposed to consumers through a second questionnaire. The second questionnaire aimed to better understand whether the producers' points of view matched the consumers' points of view. From the analysis of the results, it was possible to understand what criteria were considered quality attributes by producers and consumers. Organic production and the presence of both trained and vulnerable personnel were not particularly relevant to the quality perception of SFSCs products. The storage method, the assortment range, and the processing of the products were not evaluated as quality criteria. The consumers who were interviewed perceived the quality of a food product coming from an SFSC linked to the characteristics of the social context of the product. They associated products sold in SFSCs with non-processed food. Overall, such a survey can be considered a useful tool to deepen our knowledge about short food supply chains and offers several ideas for further studies and analysis.

Keywords: Consumers' survey; Consumers' perception; Food quality criteria; Local product; Food chains

1 Introduction

Quality is increasingly referred to as a key concept within the agri-food sector and has become a central issue for such fresh commodities as vegetables (Morris, 2000). Therefore, it is essential to explain what quality means when applied to a quality food product or a food supply chain. Although the term "quality" is used quite widely, it is not possible to provide a single and universal definition of what it actually is, since different definitions can be assumed under

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different situations (Ojasalo, 2006). Short supply chains seem to reflect the demand for quality by post-modern consumers who increasingly look not only for strict food quality and traceability, but also for tradition and transparency, which, it has emerged, are apparently guaranteed more by short chains, in spite of global industrial production (Panico et al., 2014; Pozo et al., 2018; Scozzafava et al., 2018; Verneau et al., 2014). In this context, the concept of quality is related to a series of tangible and intangible characteristics that are associated with products and services: it is not just a matter of a better taste or healthier food, but also of improved experience in purchasing and consumption (Golini et al., 2013). As a result, the evaluation of quality has become increasingly complex and heterogeneous, and therefore context specific examinations of its mediation effects are needed (Kirwan, 2006).

According to Florkowski et al. (2014), shelf life is an important element of quality for product procurement managers and retailers; according to government regulations, quality is linked to risks for the public; in retail stores, quality is determined by the aesthetic and sensory characteristics of the food, which may influence customers' decisions; for the final customers, quality is achieved if their expectations are satisfied. The definition is changed according to the context and, consequently, to the parameters used to check whether the quality condition has been fulfilled or not. Other authors (Ophuis & Van Trijp, 1995) have described quality as a "multifaceted concept" for which consumers use both quality attributes and quality cues to form their assessment of perceived quality. Consumers' perception of quality is influenced by the intrinsic attributes of a product (e.g., appearance, colour, shape, size, structure) as well as by extrinsic indicators (e.g., price, brand, nutritional information, production information, country of origin) and cues provided by the seller of the product (Espejel et al., 2007; Moser et al., 2011). Regarding the economic aspect, Carpio and Isengildina-Massa (2009) found that the willingness of consumers to pay was 27% higher among those who attributed higher quality to local products than to products from outside South Carolina, where the research was conducted.

Quality attributes may be abstract and/or based on experience (e.g., taste, freshness, convenience) or on the perceived benefits (e.g., healthfulness, naturalness, animal, and/or environmental friendliness). Perceived benefit quality attributes are also called credence quality attributes (Grunert, 2005). Credence products are those whose information on relevant attributes is difficult to establish, even after the food has been consumed (Grunert, 2005; Moser et al., 2011). Credence attributes play a significant role in the preference formation of consumers (Lee & Hwang, 2016). Consequently, new certifications are being introduced into the food system in an attempt to establish market standards (Squatrito et al., 2020). However, the distinction between search and credence attributes is of crucial importance and may differ among different actors of the supply chain. For example, what may be a credence attribute for certain consumers (i.e., pesticide residues) may be a search attribute for a retailer for whom testing the products is possible and advisable (Noelke & Caswell, 2000).

In recent years, the development of "alternative food chains" has gained great interest (Marsden et al., 2000). Changes in consumers' habits is one of the factors that drive this phenomenon (Thomé et al., 2021). Also of growing concern for consumers are health issues (Watts et al., 2005), concerns about ecology, health, and animal welfare (Renting et al., 2003), the origin (Marsden et al., 2000) and the perception of quality (Murdoch et al., 2000). In this context, sustainability and regionality have become two key concepts, and have led to the development of shorter supply chains. Longer food chains, compared to short food supply chains (SFSCs), are organised in a complex and rational way (Marsden et al., 2000) and involve several stages and intermediaries (Thomé et al., 2021). A great deal of importance has been given to the relationship and interaction between farmers and consumers, as well as to the role of this relationship in building the value of products (Thomé et al., 2021).

In recent times, SFSCs and local markets, where farmers sell their products directly to consumers or with a minimal number of intermediaries, have flourished in all EU countries, in both rural and urban areas (Chiffoleau & Dourian, 2020). These chains and markets represent an alternative to

longer food chains, where small farmers or cooperatives often have little bargaining power, and the consumer cannot trace the food to a known producer or local area (Le Velly et al., 2021; Sebok et al., 2022). A short chain food system is of considerable interest, since it responds to several needs and opportunities, for both farmers and consumers (Csordás et al., 2022; Evola et al., 2022). Unlike other supply chains, farmers and final consumers can have a direct connection and create a relationship (Marsden et al., 2000). The need of a reconnection between consumer and agriculture is one of the aspects in the rise of SFSCs (Renting et al., 2003). The development of different types of SFCSs (e.g., direct sales by individuals and/or collective direct sales, partnerships such as Community Supported Agriculture) is one of the Common Agricultural Policy approaches adopted to improve competitiveness in Europe. SFCSs may act as a driver of change and/or as a model to increase transparency, trust, equity, and growth throughout agri-food chains.

The work presented here is a substudy of the SmartChain project (https://cordis.europa.eu/project/id/773785), which was used as a starting point. The 3-year project was funded by the European Commission and was aimed at fostering and accelerating the shift towards collaborative SFSCs and at introducing new robust business models and innovative practical solutions, with the aim of enhancing the competitiveness and sustainability of the European agri-food system. During the project, the participants in the 20 case studies filled in a questionnaire about their business, in which they described the strengths and the weaknesses of their supply chain. The intention of the project was to evaluate these SFSCs in terms of innovation potential, consumer perspectives towards short food supply chains, and overall sustainability (environmental, economic, and social). SFSCs are a developing phenomenon that is gaining more attention among consumers. Several authors identify one of the drivers of success of an SFSC as consumer proximity: this factor influences the quality of the product, which is perceived fresher and with an added value, and the interaction between the actors, which increases the transparency and traceability (Jarzebowski et al., 2020; Sellitto et al., 2018). However, despite their strengths, the development of SFSCs sometimes encounters obstacles, mostly due to the difficulties related to increasing the attractiveness to consumers and identifying the quality elements (Cox et al., 2007; Sebok et al., 2022).

It is important to understand the significance of diversifying the products of SFSCs from other food supply chains, not just for the producers, but also for the consumers. Since consumers are the ones who make purchasing decisions, it is crucial to identify the key factors that influence their buying choices. To achieve this, the present study aimed to determine what makes a SFSCs product of high quality and whether both producers and consumers agree on the importance of these quality attributes. Thus, we decided to investigate if those strengths that producers considered as quality elements are considered the same by the consumers. To achieve the aim, the work was conducted following these two major steps:

1 Analysis of the Producers' Questionnaires The results of producers' questionnaires obtained from the Smartchain project were analysed to identify quality criteria related to the concept of SFSCs from the producers' point of view. Following the analysis of the producers' questionnaires, eighteen criteria were identified.

2 Consumers' questionnaires These quality criteria were then proposed through a questionnaire to the consumers.

The results obtained from the analysis of the responses obtained from the consumers and the producers was helpful to understand whether the proposed criteria were considered as quality elements by both groups.

2 Materials and methods

2.1 Analysis of the Producers' Questionnaires

The study material obtained from the SmartChain Project consisted of 20 open-ended questionnaires, which were filled in by the

case study representatives (farmers/producers/ consultants/operators/managers) involved in the SmartChain project. The case study list with a short description can be found in the Supplementary material (Table S1: List of Smartchain project case studies).

The questionnaires aimed to pinpoint the technological and non-technological innovations applied by the case studies in their food chains. One of the questions included in the questionnaire asked about what strengths of the chain were perceived. The question was formulated as follows: "Which are the strength points of your product(s) related to quality?" Producers have been given the possibility to freely write down their answers and to indicate which quality elements of their chains they considered as strengths.

Since the questionnaires were of an open-ended type, it was not possible to collect unique and quantifiable data. Therefore, a reading and contextualising process was used for the answers. Since the selection of the criteria followed the principle of "strength", to enrich the range of information available on the cases studies, the authors consulted the websites of the stakeholders who were involved in the study and additional information about the food chains, not already included in the questionnaires, was considered as study material.

Quality is linked to a range of material and immaterial features associated with products and services: it's not only about having a better taste or healthier food, but also about improving the buying and consuming experience (Golini et al., 2013). The evolution of the quality perception experience was reflected in the questionnaire analysis process. The tangible and intangible characteristics, as defined by Golini et al. (2013), were associated with the two categories identified to fully represent the different meanings linked to the word "quality" and to group the criteria detected in the questionnaires: product/process quality and sociological quality. The first category refers to the intrinsic characteristics of the product (sensory and nutritional characteristics) and the production process (e.g., agricultural techniques, specific raw materials, the use of preservation methods), hence the criteria that allow the consumer to characterise the appearance and composition of a product. Criteria related to product/process quality were obtained directly from the answers of the producers.

With respect to the second category, Convention Theory (CT) was used to frame those quality elements indicated by the producers as strengths which can be referred to the concept of sociological quality (Cheyns & Ponte, 2018; Thiéblemont-Dollet, 2006). In CT, conventions are defined as a broad group of mutual expectations, and its use covers a wide range of themes, including the food sector; hence, CT has been used as a scientific tool to identify sociological quality criteria. It was here used to provide a new way of approaching quality, in consideration of the understanding of how the exchange of agri-food products takes place and with what social and power dynamics. CT can provide guidelines to examine alternative food networks, such as SFSCs, and the increasing interest concerning quality in food production and consumption (Ponte, 2016). CT assesses how producers and consumers coordinate their mutual expectations to circumvent the standards of conventionally produced food and to create new production-consumption spaces. According to this logic, quality criteria incorporate not only the physical properties of the product (intrinsic qualities - product/process qualities) but also the conditions under which it is produced, distributed, and retailed (extrinsic qualities - sociological qualities) (Nygård & Storstad, 1998). Appling the CT to the agri-food context has led to new categories of conventions. In relation to this, of particular interest is the analysis of Kirwan (2006) on how producers and consumers coordinate their mutual expectations on quality at farmers' markets. Based on Kirwan's study, three conventions were investigated and used as input to identify the sociological quality criteria expressed in the producers' questionnaires: civic convention, domestic convention, and regard convention. Considering all these elements, the perception of sociological quality depends on the concepts of trust, tradition, and locality; all these become connection tools between consumers and producers. From the answers to these questions, the identification of the quality elements considered

by the producers was developed. Two categories of quality elements were identified to group the criteria that emerged from the questionnaires: product/process quality and sociological quality.

2.2 Consumers' questionnaires

After having been identified from the producer's point of view, the criteria were validated from the consumers' perspective. The aim was to compare producers' and consumers' opinion and investigate if they both consider the same aspects as quality criteria in SFSCs.
The criteria submitted to the consumers were the following: *Local product, Seasonal product, Organic product, Geographical Indication (GI) product, Enriched product, Homemade product, Additives Free product, Preservation technologies, Wide Offer, Interaction between consumers and producers, Trained staff, Transparency, Presence of Vulnerable Individuals in the staff, Food traditions, Disadvantaged areas, Animal welfare, Food waste and Environmental sustainability.* These criteria were proposed in two different questionnaires, one concerning product/process quality and one concerning sociological quality. The questionnaire presented to the consumers can be found in the Supplementary material (Table S2: Consumers' Questionnaires). Each question corresponded to one criterion that emerged from the analysis of the producers' questionnaires. Consumers were asked if they considered such criterion as a quality element in a SFSC context. Both questionnaires were composed of 9 multiple-choice questions and three answers were possible for each question: "Yes", "No", "I don't know/I don't care". The "Yes" answer was interpreted as "I think that the issued criterion is related to "quality", and the consumer's perception was thus in agreement with that of the producer. "No" was interpreted as "I do not think that the issued criterion is related to "quality", and the customer's idea therefore was not in agreement with that of the producer. "Indifferent" was interpreted as a lack of interest in the mentioned criterion. To help consumers during completion of the questionnaires, they were given the option of choosing whether to fill in just one questionnaire or both.
The test period was from the middle of February 2021 to the middle of March 2021. A shop based in Turin (Italy) was chosen to contact consumers known for purchasing from SFSCs. The shop belonged to a franchise, based on an online platform, whose aim is to distribute products from SFSCs and to allow direct sales between local producers and consumer communities by creating temporary markets (the zero-mile concept). The questionnaires were presented to the consumers at the end of the buying process. Additionally, the online platform of the shop was used to distribute the questionnaires. The answers were analysed by means of a statistical method to validate the relevance of the obtained data and identify any pattern of behaviour and conditions of dependence among the different criteria.

2.3 Statistical analysis

Correspondence Analysis (CA) was chosen to explore the relationships between the qualitative variables (the criteria, which were considered fixed) (Hirschfeld, 1935). The purpose of this analysis was to maximise the information in reduced dimensions. This analysis was used to ascertain whether there were any associations or patterns within the data by comparing the results from the consumers' questionnaires with the producers' responses. The criteria were considered as variables, and it was possible to visualise in a single graphic, how the panel of interviewed consumers perceived the overall criteria (variables). After the analysis of the dataset, CA was then used to obtain a global view of the data and a useful interpretation. The results were studied to define their statistical significance, as well as to establish the dependence between the criteria and possible answers. Pearson's Chi-square test was used to assess the level of dependence. The results of the Chi-square test were expressed as the P-value. RStudio software (Boston, USA) was used for the CA-Biplot and the statistical significance analysis.

Table 1: Consumer responses to the three possible answers on the questionnaire ("Yes, No, Indifferent")

Criterion	Number of "Yes" answers	Number of "No" answers	Number of "I don't care/ Indifferent" answers
Local Product	50	15	14
Seasonal Product	76	1	2
Organic Product	32	27	20
Geographical Indication Product	57	8	14
Enriched Product	16	50	13
Homemade Product	72	2	5
Additive-Free Product	66	7	6
Preservation Technologies	11	49	19
Wide Offer	37	35	17
Interaction between consumers and producers	52	11	7
Trained Staff	46	11	13
Transparency	65	2	3
Presence of Vulnerable Individuals in the Staff	44	12	14
Food Traditions	59	6	5
Disadvantaged Areas	55	5	10
Animal Welfare	64	0	6
Food Waste	63	1	6
Environmental Sustainability	60	2	8

3 Results and Discussion

3.1 Criteria derived from the Producers' Questionnaires

From the outputs, the following criteria referring to product/process quality were selected as strengths for the SFSCs by the producers: *Local Product, Seasonal Product, Organic Product, Geographical Indication Product* (Protected Designation of Origin, PDO, Protected Geographical Indication, PGI), *Enriched Product, Additive Free Product, Homemade Product, Preservation Technologies, and Wide Offer.* The following sociological criteria were selected as strengths for the SFSCs by the producers: *Interaction between consumers and producers, Trained Staff, Transparency, Presence of Vulnerable Individuals in the Staff, Food Traditions, Disadvantaged Areas, Animal Welfare, Food Waste, and Environmental Sustainability.*

3.2 Analysis of Consumers' Questionnaires

A total of 79 product/process quality questionnaires and 70 sociological quality questionnaires were filled in. Women were the prevalent gender category: 48/79 (about 61%) of the respondents who took part in the survey were women. The majority of participants were 26-54 years old with 40/79 (about 51%) of them in this age range. All the consumers who took part in the survey were used to purchasing SFSCs products. Table 1 shows the 18 criteria that were administered to the consumers to find out whether the variables represented elements of quality of a food product provided by SFSCs, and to understand whether the consumers agreed with the producers' point of view. The frequencies were also present in the dataset (Table 1), so it was possible to discriminate the number of times the possible answers were selected by all the consumers: for "Yes", "No", "I don't care/Indifferent". The dataset was then used as the starting point for the graphic visualisation.

3.3 Statistical analysis results

The CA graph (Figure 1) allowed the consumers' response to each criterion to be visually described, by considering the position of the latter according to the three possible answers: "Yes, No, Indifferent". The closer a criterion was to the "Yes" answer, the more it was associated with the concept of quality in the eyes of the consumers, and, consequently, the more the producers' and consumers' perspectives matched. The CA graph represents 100% of the information contained in the dataset: there were 18 criteria (blue circles) and 3 possible answers (red triangles). The 18 criteria were located according to the total of the given answers. The distance between each single blue point and red triangle, that is the distance between a criterion and a possible answer, represents the degree of connection between the producers' and consumers' opinions. Furthermore, the distance between two criteria represents the degree of similarity between them: the closer two criteria are, the more they were considered evenly relevant for the consumers.
The Chi-square test showed that the correspondence between the producers' and consumers' perceptions was highly significant ($\chi^2 = 464.52$, $P < 0.001$, $df = 34$).
It was possible to identify three clusters of criteria. First, the criteria located around the "Yes" answer, which indicate shared producers' and consumers' perceptions of quality (Cluster 1). Second, the criteria close to the "Indifferent" answer, which indicate a not so relevant evaluation for the consumers, but which does not affect the perception of quality (Cluster 2). Third, the criteria close to the "No" answer, which indicate an element of quality that was not considered in the SFSCs context; thus, the producers' opinions did not match the consumers' opinion (Cluster 3).
The Cluster 1 criteria, which the producers and the consumers both considered as elements of quality, were: *Local Product, Seasonal Product, GI Product, Homemade Product, Additive-Free Product, Interaction between consumer and producer, Transparency, Food Traditions, Disadvantages Areas, Animal Welfare, Food Waste, Environmental Sustainability. Local Product and GI Product* criteria were generally perceived as an element of quality, but the consumers showed a greater tendency towards the "Indifferent" answer than the others emerged. Probably, the consumers were less affected by them during the purchasing process.

Local Product

The results of our study showed that more than half of the consumers (63%) reported that a local product can be considered as quality element, corresponding to the producers' view. Although this percentage is relevant, the number of consumers who agreed with this opinion was not very high. Stanco et al. (2019) asserted that only a small portion of consumers was willing to pay a premium price for local products. Moreover, a higher price may be due to the importance consumers place on the "local" attribute. Kawecka and Gebarowski (2015) stressed the concept of local produce and provided an exhaustive list of reasons why "local" was considered important in the eyes of consumers: a local product sustains regional rural development and it is seen as a product characterized by unique features, both at sensorial and social level, guaranteed by the short distance.

GI Product

Protected Designation of Origin (PDO) and Protected Geographical Indication (PGI) certifications refer to the origin of a product and its connection to agri-climatic conditions and production practices (Di Vita et al., 2014; Resano et al., 2012). The intention of PDO and PGI certifications focuses on protecting and promoting typical food products against all the practices that may mislead consumers about their attributes which are strictly related to their specific area of production (Allaire et al., 2011). The results (72.2% "Yes") confirmed the corresponding view of producers and consumers, which consider these certifications as an adding value element when from a SFSC. However, the criterion received a great number of "Indifferent" answers, which could be explained with the minor importance of labels in SFSCs, due to the direct contact with the producer which can confirm itself the relationship with the territory (for Prospective Technological Studies (Joint Research Centre) et al., 2013).

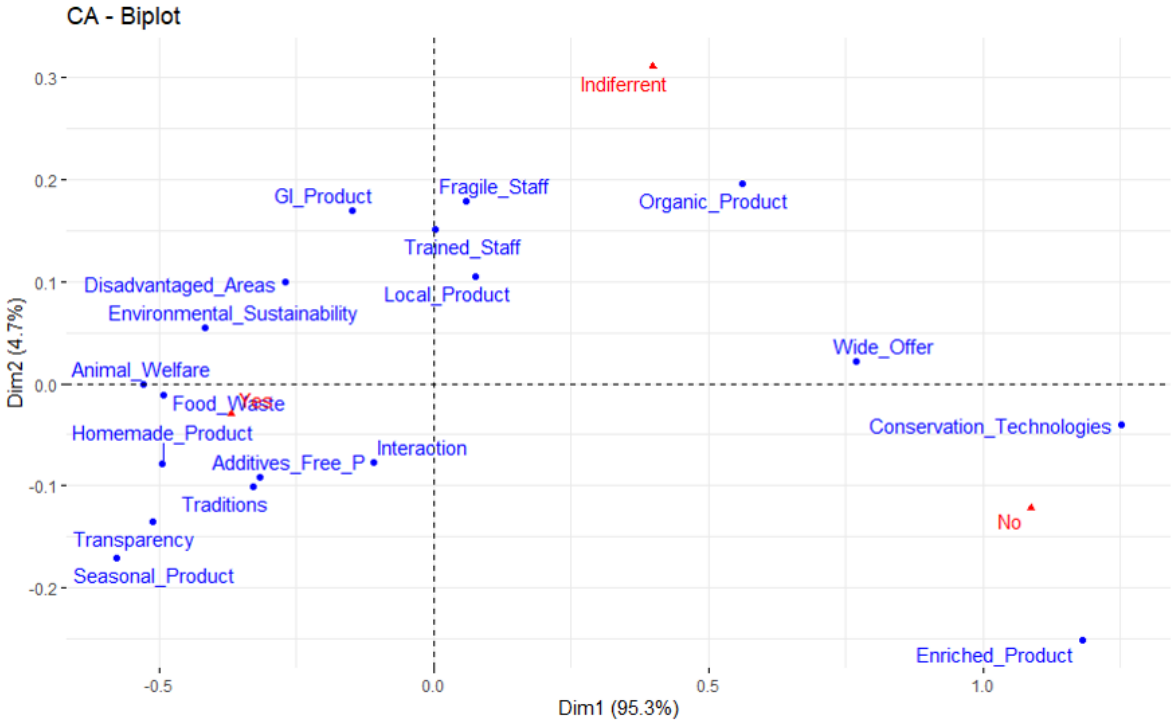

Figure 1: CA graph of the distribution of the consumers' responses in relation to the producers' opinions. The 18 criteria are represented with blue circles and the 3 possible answers in red triangles.

Seasonal product

In the present study, 91.1% of the consumers agreed that a seasonal product can be considered as a quality element. This result was in line with our expectations, since the concept of seasonality is associated with the concept of benefits for the consumer in the SFSC context (Galli & Brunori, 2013). According to Stanco et al. (2019), seasonality is one of the reasons why consumers decide to engage in SFSCs. What becomes more relevant, regarding the criterion, is the limited availability of products, which in fact depends on seasonality. Golini et al. (2013), in a study involving 19 SFSCs, indicated that in 1 case out of 19, the customers of SFSCs accepted that they might not find a great variety or large volumes when buying directly from farmers, depending on the time of the year. Nevertheless, the same study, referring to a different short chain, declared that seasonality is a constraint, because customers are not pleased when there is a poor variety of products (Golini et al., 2013). The same situation arose in one of Smartchain survey case studies, where producers reported that people easily get tired of always buying the same kinds of food, because the seasonality of the products reduces the variety of the supply. It can thus be inferred that consumers are aware of the value of a seasonal product, but do not seem to be aware of the limits that arise due to seasonality.

Homemade Product

The results revealed that 91.1% of the consumers considered that homemade products are an indication of quality. Little support is available in the literature on this specific aspect when it comes to considering the consumers of SFSC. Nevertheless, Watts et al. (2005) (cited in Fibri and Frøst, 2019) mentioned that homemade products are a key feature in short food

chains. The need for the producer to emphasise homemade products as a point of quality strength is due to the fact that a consumer associates them with the concepts of tradition, freshness, and more nutritious components. Teaching the relevance of the criterion to consumers could be a useful way of attracting more consumers and improving the visibility of the specific producers involved in an SFSC.

Additive Free Product

This criterion involves technologies/processes that need specific training to be planned and realized. Producers presented products without additives (and similar) as a point of strength. The results of consumers perception were in line with the expectations: 83.5% of the interviewees agreed with the criterion, that is, they considered the absence of additives a factor of quality, as it has been confirmed by other SFSC surveys (Galli & Brunori, 2013; Kawecka & Gebarowski, 2015).

Interaction between consumers and producers

The *Interaction between producers and consumers* is one of the key points of SFSCs (Murdoch et al., 2000; Thomé et al., 2021), and our results confirmed this: 74.3% of the consumers considered the interaction with producers an element of quality. When consumers buy directly from producers, the label becomes less important, because the consumers can evaluate the product based on their direct interaction with the producer (for Prospective Technological Studies (Joint Research Centre) et al., 2013). The results of this criterion are strictly connected to the tendency to "Indifferent" answers obtained for Local Product and GI Product. This direct relationship between farmers and consumers enables the farmers to convey the attributes and characteristics of food products as well as their connection with the production area (Marsden et al., 2000), a feature that is synonymous with quality for consumers (Lyon et al., 2009). Hinrichs (2003) highlighted that disintermediation fosters the creation of networks and direct relationships between producers and customers. Consumers defined the possibility of having direct contact with producers as a benefit (Cheyns & Ponte, 2018), and they referred to the positive relationships stipulated between a producer and a consumer, which improve the awareness of local and quality food and increase the proportion of added value captured by the producer (for Prospective Technological Studies (Joint Research Centre) et al., 2013). Furthermore, the importance of the relation between the involved parts is strongly connected with the following criterion.

Transparency

The *Transparency* criterion was one of the most endorsed aspects of the whole survey: 92.9% of the consumers provided a positive response. The existing scientific literature about this topic confirmed these results. The role of transparency in SFSCs has already been emphasised (Kawecka & Gebarowski, 2015). Transparency refers to the easy identification of all the participants in the chain; furthermore, it indicates the possibility of exchanging real-time information along the supply chain (Kirwan, 2006). for Prospective Technological Studies (Joint Research Centre) et al. (2013) reported that producers mentioned the importance of the concept of transparency to enhance the sales of farm produce. From the consumers' point of view, information transparency allows them to obtain a better and more conscious experience of the product (Marsden et al., 2000; Renting et al., 2003). Transparency within SFSCs contributes to creating a trust relationship for consumers. Another important point is the direct communication between producers and consumers, which has implications on the transparency of the food product: the consumers are encouraged to be involved in the quality control and the producers are stimulated to increase their accountability towards the consumers (Galli & Brunori, 2013). Again, it is possible to see how the criteria are related, since the relationship between the consumers and the producers encourages transparency.

Food Traditions

In this study, 84.3% of the consumers said that food traditions were important when developing

a food product. An aspect which could have partially influenced the results is the contextualisation of the study, as it was conducted in Italy, a country with a long-standing food tradition. Nevertheless, SFSCs are not only an Italian phenomenon, and our results may therefore also be interesting for the economics and for research communities outside Italy. Golini et al. (2013) recognised that traditional methods are a critical resource for SFSCs, and that one of their purposes is to preserve the traditional landscape. At the same time, preserving traditional foods and production methods helps to promote a particular food culture and to preserve biodiversity.

Disadvantaged Areas

Disadvantaged Areas was one of the first criteria that was proposed with an economic meaning. Overall, 78.6% of the consumers voted "yes". From the consumer's point of view, supporting less favoured areas is a good reason to pay a higher price. This choice is due to the willingness of consumers and producers to understand the extent to which the perception of an added value can be translated into economic support. For instance, for producers, the high quality of the environment they guarantee, due to the low intensity of production methods, can be a force on the market. Producers can promote their "environmentally friendly" production and attract those tourists who desire to visit the area because of its high environmental quality (Gilg & Battershill, 2000). As already shown, this criterion is linked to others: producers located in remote rural areas can directly access the market and create relationships with the consumers (Sini & Sini, 2010) in areas dedicated to the direct selling of farming produce. Given that consumers are now more educated, aware, informed, attentive, and selective, they seek, as part of the new trends in food consumption, quality, and tradition, as well as characteristics of a product that comes from an area that is limited in size (Lanfranchi et al., 2019). Therefore, when consumers look for food products from rural areas, they are intrinsically searching for direct interactions with the producer, for new experiences, and for unique products.

Animal Welfare, Food Waste, and Environmental Sustainability are important aspects of the agricultural and food production sectors, not only in SFSCs context. However, since the producers of Smartchain project indicated these topics as quality aspects of their food supply chains, they were proposed to the consumers. We investigated the willingness to spend more for products made with respect for animal welfare, that take into account the reduction of food waste and that follow good environmental practices.

Animal Welfare

Animal Welfare was the second-highest criterion approved by the consumers, with 91.4% of positive responses. As confirmed by the literature, animal welfare is very important for consumers (Carlsson et al., 2007; Font-i-Furnols & Guerrero, 2014) and turned out to be the most important ethical attribute for them (Zander & Hamm, 2010). Consequently, the criterion was proposed in an economic key, to obtain more information about whether ethical values are relevant enough to encourage consumers to pay a higher price. In another study on whether consumers are willing to pay a premium price for ethical food (Torquati et al., 2019), it was found that consumers place great importance on animal welfare when they face the choice of products of animal origin. Animal welfare has been recognised to be a very important attribute in the context of proper rearing techniques (Torquati et al., 2019). Moreover, when animals are involved, customers might also want to be informed about their quality of life (Golini et al., 2013).

Food Waste

In many agricultural productions, waste can trigger serious sustainability problems, due to the high quantities produced in a limited period and to the relatively high organic matter content, which can be lost (Panouillé et al., 2007; Santana-Méridas et al., 2012). A total of 90% of the consumers would spend more on a product made by farmers willing to reduce waste production. According to the research conducted by Coderoni and Perito (2020), consumers felt that food produced by a company that is committed to reducing food waste is healthy and thus more

likely to be associated with a positive purchasing intent. In the research, 68% of the respondents believed that such a supply chain can provide environmental benefits and 69% declared they were interested in buying from it, if this helped to preserve the environment (Coderoni & Perito, 2020).

Environmental Sustainability

In this study, 85.7% of the consumers declared they were willing to pay more for environmentally friendly agricultural practices. This result reflected the expectations that emerged in other similar investigations. To support the issue of sustainability, consumers and other market actors need to recognise a higher quality for environmentally and/or socially sustainable products (Thomé et al., 2021). The study conducted by Lanfranchi et al. (2019) pointed out that the knowledge of sustainable production methods significantly influenced the decision of consumers to accept a premium price. Therefore, the results suggested that a more careful and informed consumer is ready to pay more for products obtained according to the principles of environmental sustainability. In the consumers' opinion, purchasing food at SFSCs was synonymous with the environmental benefits: products sold in local food chains are generally produced in an environmentally sustainable way, using fewer inputs, such as pesticides, synthetic fertilizers, animal feeds, water, and energy; they require less packaging than in supermarkets and less energy for storage, as they are fresher. Less transport also means energy savings and a reduced environmental impact, as indicated by the European Parliament in the "Short food supply chains and local food systems in the EU" (for Prospective Technological Studies (Joint Research Centre) et al., 2013). Among the responses of consumers regarding the benefits of shopping at SFSCs, that is directly from the manufacturers, such environmental aspects also appeared to be associated with a shorter transport of products. Some advantages related to enhancing the consumers' confidence in the origin and quality of food are also associated with reducing the impact on the environment (Gilg & Battershill, 2000).
The Cluster 2 included three criteria which were located around the "Indifferent" answer: *Organic Product, Trained Staff and Presence of Vulnerable Individuals in the Staff*, therefore the producers' and the consumers' points of view on these criteria were only shared in part. These criteria only involved the producer and were not the consumer's concern, which could explain the "Indifferent" reactions.

Organic Product

The results pertaining to organic products were distributed without any clear position: there were 40.5% "Yes", 34.2% "No" and 25.3% "Indifferent" responses. A possible explanation of this result variability was the interviewees' distribution: it has been indicated that people under 18 and over 64, who represented half of the target of our investigation, are less likely to buy organic products than other age groups (Agovino et al., 2017). The result can be also explained by the positive effect of the trustworthy relationship occurring between consumers and producers, which reduced the importance for the consumer and the necessity of labels or certifications, such as the organic certification in case of products from SFSCs sold directly (Aouinait et al., 2022).

Trained Staff

According to our findings, 65.7% of the customers considered the presence of trained staff a quality element. This criterion was somewhat critical because training staff has always been considered relevant, albeit only for the businesses, and this is understandable since it is a firm's duty to ensure the training of its staff to provide quality food. As suggested by Casolani et al. (2019), in order to implement SFSCs, it is very important to organise training to complete the operators' competence and to allow them to acquire new skills that can be used in a different context (in the present research, this was intended as different phases of the food chain). Half of the case studies pinpointed staff skills as a quality point along the chain. The decision to question the consumers about this criterion arose from a communication issue, that was, "Can knowing that the operators who produce food items are professionally trained affect the consumers' purchasing choices?" A useful input

is that, when promoting an SFSC, it might be advantageous to mention the presence of trained staff to increase the good image of the chain.

Presence of Vulnerable Individuals in the Staff

Our results showed that 62.9% of the consumers considered the social aspect of farming as an added value. This criterion only emerged in one SmartChain case study (Case study 16). Torquati et al. (2019) showed that consumers were willing to pay a three times higher amount than the estimated amount of social work: in the study, social farming referred to people with autism spectrum disorders who were involved in farming work. However, not everybody perceives with the same sensitivity the involvement of vulnerable staff, which can lead to different mindsets when purchasing goods (Srnka, 2004). Several studies have demonstrated that, considering the interest of consumers, the lack of specific information about the involvement of vulnerable personnel in the chain ise one of the factors that prevents ethical consumption from growing (Carbone et al., 2009; Irving et al., 2022). It is possible to hypothesise that social farms that usually sell their products through short market chains have a competitive advantage, because they can establish a direct relationship with consumers, therefore reducing the asymmetry of information that usually characterises longer market chains (Sini & Sini, 2010). The good perception of social farming by consumers is not strictly linked to the consumers' will to pay a premium price (Torquati et al., 2019).

Preservation Technologies, Enriched Product and Wide Offer were the three criteria in Cluster 3, where the "No" answer prevailed, probably due to the consumers' limited knowledge of the subject and the lack of association with both the SFSCs and quality concepts.

Preservation Technologies

Consumers were asked to express their opinion about food preservation methods. Overall, 62% of the consumers declared that preserved foods were not associate with high quality concept when applied in SFSCs. The aim of preservation technologies is to preserve the nutritional, organoleptic, and safe conditions of a product. The great mistrust in these methods that emerged may be due to a lack of knowledge about the subject and to a feeling of incompatibility between preserved foods and SFSCs. Thus, the SFSC concept itself might need to be evaluated (or re-evaluated). According to the principle of short distance and reduced number of intermediaries, a product should not need preservation methods. However, due to the seasonality of products, not all raw materials are consistently available, and a preservation method could help solve this issue, thereby preserving the short distance principle. A perfect example, among the 20 "SmartChains" case studies, is Case study 15, which only markets truffles and sells them off-season using a freeze-dried method. The producers in SFSCs listed the preservation technologies as a strength, however, consumers seem to rely more on the respect of seasonality than preserving the food for longer time. As a large body of literature on the criterion related to preservation technologies was not available, additional evidence is needed to integrate the concept with SFSCs.

Enriched Product

The *Enriched Product* criterion concerned food that had undergone a production process to improve its nutritional characteristics, to enrich the composition or modify it, and to make it more suitable for consumers suffering from intolerances/allergies. The criterion arose from certain SmartChain case studies that had invested in research projects to enhance these categories of products (e.g., Case study 9). The data were almost identical to the previous criterion: in fact, 63.3% of the consumers did not consider enriched products to be of higher quality than non-enriched ones, in contrast with the producers' view. Again, considering the consumers' views, food technologies do not appear to be compatible with SFSCs. At the same time, the consumers showed an increasing interest in "natural food" (e.g., local products, organic foods, etc.), even on globalised markets (Vidigal et al., 2015); the trend shows that consumers were less inclined to accept new food technologies, although new tech-

nologies emerged in response to market needs and a more rigorous consumer demand (Cox et al., 2007). Furthermore, according to Vega-Zamora et al. (2019), consumers are generally not able to decide whether new foods produced by new technologies are associated with potential risks, because they have very little knowledge about such new technologies.

Wide Offer

This criterion was chosen to refer to the situation of several case studies in Smartchain project among the producers (e.g., Case study 18; Case study 19) that decided to expand the range of products because of consumers' requests. This decision was probably not linked to the availability or seasonality of a product, but rather to drawing the consumers' attention to niche products and distinguishing them from mass production (Kawecka & Gebarowski, 2015). About half of the consumers (44.3%) answered that they did not consider this criterion a key quality element. The negative response from the consumers represented a different view concerning the producers and other studies in which the consumers prefer a wide range of products (Aouinait et al., 2022; Sebok et al., 2022). However, such an outcome is not consistent with the perception of the SmartChain producers, as some of them explained that the production mix was driven by consumer demand. Therefore, the producers thought about satisfying the expectations of consumers. A study conducted by Galli and Brunori (2013) reported that a broad assortment of products was a key point for the development of SFSCs: from the marketing point of view, a large assortment was a huge step forward for the image and economy of a firm, since it satisfied the needs of new consumers. Another study conducted on consumers of products from SFSCs (Aouinait et al., 2022) confirmed the findings of Galli and Brunori (2013): consumers when buying in local food shops search for variety, accessibility and availability. It can be asserted that the relevance of the criterion changes according to the consumer and his/her willingness to open up to new food possibilities.

4 Conclusions

The present work was aimed at providing a new approach that involved comparing producers' and consumers' perceptions about quality aspects of SFSC products. The twenty case studies are examples of SFSCs across Europe. However, the twenty food chains were not completely comparable with each other as far as the dimensions and organisations are concerned. On the one hand, the analysis allowed a model for each type of SFSC to be obtained and almost every kind of entity that was relevant to the context to be included. On the other hand, the quality criteria that emerged during the analysis were not shared by all the case studies: some of them corresponded to most of the involved SFSCs, while others could only be applied to some of the SFSCs. Nevertheless, all the criteria were included in the consumers' questionnaire, and, as a consequence, a generalisation process was applied. Hence, the survey was not prepared to define whether the quality criteria, as detected from the producers' questionnaires, were statistically sound, and they were instead considered as "items" and, as such, the aim of our work was to validate such criteria through a quantifiable data method.

Among the product/process criteria, seasonality, homemade production, and the absence of additives were considered as quality characteristics. Nevertheless, sociological quality criteria revealed to be the most important for consumers: *Food Waste and Animal Welfare* were the two criteria that obtained the highest number of positive responses, followed by the criteria that represent a benefit to society, such as *Interaction and Environmental sustainability*. It was found that organic production, together with the criteria linked to the composition and skills of the staff, made the consumers indifferent to these characteristics, although "Yes" was the most voted answer. The criteria linked to the processing of the products, such as preservation methods and enrichment with nutritional components, were not considered as positive elements in a SFSC by the consumers, probably due to a lack of knowledge about the subject, while they were more important for the producers.

In short, when purchasing at SFSCs, consumers

seemed to mainly consider the sociological characteristics of the products that represent a benefit for society. When it comes to the properties of a product, its genuineness was seen as a major criterion. The composition of the staff was not a main concern, and, unlike "homemade production", a process considered as "industrial" was not perceived as a quality criterion. The results of the present study lead to some reflections: where exactly are the borders between a short food supply chain and a "long" food supply chain? Is it the production process that defines the chain? When it is necessary to refer to an additional intermediary to safeguard the integrity of food, does the concept of a short chain cease to exist, even though the phase is necessary? Our work provided some input to help answer these questions: consumers did not associate preservation methods with the concept of short supply chain, and it could be interesting to further investigate why this is so.
The present work can be considered as an attempt to enhance knowledge about SFSCs in the framework of scientific literature, as it offers different inputs and outputs that could be dealt with in more depth to provide more information about the phenomenon.

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