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# Know the Farmer That Feeds You: A Cross-Country Analysis of Spatial-Relational Proximities and the Attractiveness of Community Supported Agriculture

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**Citation:** Gugerell, C.; Sato, T.; Hvitsand, C.; Toriyama, D.; Suzuki, N.; Penker, M. Know the Farmer That Feeds You: A Cross-Country Analysis of Spatial-Relational Proximities and the Attractiveness of Community Supported Agriculture. *Agriculture* **2021**, *11*, 1006. <https://doi.org/10.3390/agriculture11101006>

Academic Editors: José Luis Vicente-Vicente, Cristina Quintas-Soriano and María D. López-Rodríguez

Received: 16 August 2021  
Accepted: 7 October 2021  
Published: 14 October 2021

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**Abstract:** While food production and consumption processes worldwide are characterized by geographical and social distance, alternative food networks aim to reconnect producers and consumers. Our study proposes a framework to distinguish multiple dimensions of proximity in the context of Community Supported Agriculture (a type of alternative food network) and to quantitatively evaluate them. In a principal component analysis, we aggregated various detailed proximity items from a multinational survey using principal component analysis and examined their relationship with the attractiveness of Community Supported Agriculture in a multiple regression analysis. Our findings highlight the importance of relational proximity and thus of increasing trust, collaboration, and the sharing of values and knowledge within and across organizations in the food system. Rather than focusing on spatial proximity, increasing relational proximity might support alternative food networks, such as Community Supported Agriculture.

**Keywords:** community supported agriculture; alternative food networks; spatial proximity; relational proximity; cross-national case study

## 1. Introduction

The current agricultural and food industry is based on labor division and connects companies in different regions, countries, and sometimes also continents [1]. As a result, production and consumption processes often take place at a great geographical and social distance [2]. Alternative food networks (AFNs) aim to overcome this distance by anchoring food in its socio-ecological context and thus promote direct producer-consumer relationships [3,4]. AFNs therefore pose an alternative to the mainstream, industrial food system [3,5]. Community Supported Agriculture (CSA) is a food production and distribution model in which farming responsibilities, risks, and rewards are shared between farmers and consumers [6]. They have mainly been established in or close to urban areas, where people are more spatially separated and alienated from food production than people in rural areas [7,8].

Previous research on AFNs has pointed especially to the importance of spatial dynamics and the essential role of place in building alternative food systems [9,10], as well as the socio-cultural embeddedness of food in local relations of food provision [3,11]. Therefore, scholars highlighted the positive effects of local contexts on social ties and innovation processes [3]. However, food system actors are interconnected due to various spatial-relational configurations [12]. Close producer-consumer relations may also be performed

“at a distance” [13–15]. To provide an attractive alternative to conventional food provision, AFNs aim to rebuild production and consumption processes [5].

In this context, we find it purposeful to utilize the term “proximity” and Boschma’s [16] differentiation between relational (i.e., social, cognitive, institutional, and organizational) proximity and spatial (i.e., geographical) proximity dimensions [16,17]. Using the proximity concept could be one way to expand our knowledge of what makes AFNs, such as CSAs, attractive, and to better understand what constitutes attractive relationships between CSA members (i.e., consumers and producers) and between CSA members and society in general [16,18].

While CSA literature [19,20] highlights implications of geographical proximity, to our knowledge, only one study related Boschma’s [16] broader perspective on proximity dimensions to CSAs [21]. However, in an ever-evolving body of knowledge, critical questions on various spatial–relational configurations associated with AFNs are being debated [15,22–25]. With respect to CSAs, this includes motivations to join the CSA scheme [26–30], challenges CSAs face in retaining members [31–34], the institutionalization of CSA principles [35] and up-scaling processes [36,37], as well as the extent to which CSAs succeed in creating an alternative to conventional practices in the market [3]. Furthermore, the appeal of CSAs has been investigated in previous studies [38–41]. Interrelating the latter to the different dimensions of spatial and relational proximity configurations promises new insights for better understanding the role of spatial–relational proximity for the attractiveness of CSA and other AFNs. Thus, we also hope to gain some insights into what factors should be used to promote AFNs—a knowledge gap that has been attributed to their recentness [25].

More generally, we want to contribute to relational rural sociology. In theory, human-to-human relations and relations between humans and their bio-physical context (farm, land, infrastructure) are well debated (for an overview, see [42]). However, the relational perspective still poses various methodological challenges, such as shifting the analytical attention from nodes, objects, and subjects to their relations [42]. Taking the example of CSA, we want to demonstrate that proximity theory can help to operationalize geographical, social, cognitive, institutional, and organizational relations of CSA members with their social and bio-physical contexts using a quantitative multi-variate analysis and thus complement Actor–Network Theory, providing graphical or visceral methods that help to empirically analyze human-to-human, human–technology, or human–nature relations [42].

Our literature analysis revealed that there are hardly any studies quantitatively differentiating between spatial–relational proximity dimensions and their role in AFN attractiveness. Taking the example of CSA, an AFN implemented in different parts of the world, this study examines the interrelation of spatial–relational proximity with CSA’s attractiveness. CSA attractiveness has been investigated in several studies, but, to our knowledge, not yet regarding different proximity dimensions. More generally, the measurement of organizational attraction dates back to early research, such as Vroom [43], who measured the attractiveness of different organizations to potential job seekers using a single item. A few years later, Singh [44] applied information integration theory to organization choice using a single item that assessed the likelihood of accepting a job with the company. We assume that organizational attractiveness can also help to understand the membership in non-profit organizations, such as CSAs. Recent studies have analyzed member satisfaction within CSAs [38–41]. In the literature, CSA attractiveness and satisfaction have been measured with single items, so there is no multi-item attractiveness scale yet.

The empirical analysis is based on data from several countries. We selected Austria, Japan, and Norway for this cross-national case study, as their national CSA movements have developed differently. However, the organization of CSA movements in these countries is similar (see Section 3 for further justification of study sites).

By interviewing CSA members in different (peri-)urban contexts, we aim to understand better the relevance of proximity dimensions for the attractiveness of the CSA model. We distinguish between spatial and relational proximity among CSA members (CSA-

internal proximity) as well as between CSA members and CSA-external actors, structures, and resources (CSA-external proximity). The central research question of our study is: How are spatial and relational proximity within and outside CSAs related to the attractiveness of CSAs in (peri-)urban contexts? Based on proximity and the CSA literature (see Section 2), we hypothesize that there is a positive correlation between all dimensions of social proximity and attractiveness, except for institutional and organizational proximity to external actors (as members may seek to distance themselves from dominant food organizations and deviate from prevailing rules and standards).

This paper is structured as follows. First, we briefly review proximity literature and present assumptions about proximity and CSAs (Section 2). We then describe our research design and data collection process in Section 3. In Section 4, we create proximity variables using principal components analysis. In a multiple linear regression, we analyze the interrelation between these proximity variables and CSA attractiveness. Section 5 discusses the results and the limitations of the study. Finally, in Section 6, we conclude the paper by highlighting its empirical and methodological contributions.

## 2. Theoretical Background on Proximity and Operationalization for CSA

Theoretical definitions of proximity dimensions have been proposed by scholars [16,45,46] aiming to understand the coordination of economic activities. Boschma [16] differentiated between five dimensions of proximity: geographical proximity (i.e., spatial proximity), as well as social, institutional, cognitive, and organizational proximity. The latter four can be subsumed under the umbrella of relational proximity (i.e., non-spatial proximity), because they conceptually overlap (i.e., they are intangible dimensions based on affinity and similarity) and often coexist in practice [47]. The five proximity dimensions were later adapted to the field of sustainability innovation [48]. The sustainability of AFNs, such as CSAs, has been addressed in previous studies [49–51]. The CSA concept represents an alternative, sustainability-oriented model of food provision that addresses social justice, community, and environmental sustainability. Thus, we conceptualize CSA as a social innovation [52,53]. While previous scholars have examined proximity dimensions with a focus on innovation [16], this paper analyzes the exploratory value of proximity dimensions for CSA attractiveness. Since proximity dimensions have not previously been operationalized for analyzing CSA attractiveness, we ground our assumptions on a broader base in the literature on proximity and CSA.

Scholars associate geographical proximity with physical distance between actors [16,48] and local availability of natural resources [48]. Cognitive proximity is understood as a base of knowledge, competence, and expectation shared between actors. Knowledge and expectations that lead to the emergence of innovations need to be shared to create a mutual understanding between actors [16,48]. Social proximity is defined by trust-building activities between actors. Mutual trust based on friendship, kinship, and mutual experience is a prerequisite for collaborations before knowledge or resources are deployed between actors [16,48]. Institutional proximity refers to the similarity of contextual rules, norms, and values, e.g., the similarities of actors to external institutions, such as prevailing rules and regulations within a system (i.e., the rules and regulations by which actors play) [16,48,54]. Finally, organizational proximity refers to the extent to which relationships are shared among actors in a formal, organizational arrangement, including the degree of autonomy and control under which actors can experiment and share knowledge [16,48]. The different proximity dimensions may support, complement, or replace each other [55,56]. Thus, the occurrence of relational proximity could replace the need for geographical proximity as a precondition for experimentation and learning. Furthermore, social proximity complemented by cognitive proximity can support the transmission of “value-laden information” between actors without the need to enforce external standards [22]. However, previous studies point to the positive effects of proximity while neglecting the potential impediments that arise from it [48]. Thus, geographic proximity might constrain organizations in accessing land and resources and in competing with other

local actors. While institutional proximity of alternative (e.g., social) innovations to prevailing food system structures could promote effective cross-level learning and coordination, being too rule-bound could hinder experimentation [48]. The greater the trust relationships within or between actors, the less organizational control is required by or between actors. However, tendencies toward excessive trust between actors can also be detrimental to their collaboration [48].

Due to their complementary, substitutive, and supporting nature, the analytically clearly delineated proximity dimensions can be quite messy in real-life and therefore difficult to measure empirically. Therefore, we opted for an explorative approach (see Section 3.1). Based on previous definitions by scholars [16,48,54] and interpretations of proximity dimensions in the context of CSAs [21], we operationalized social, cognitive, institutional, organizational, and geographical proximity:

- Operationalization of geographical proximity: The spatial distance among CSA members (i.e., their access to the CSA farm) (CSA-internal) and the local availability of resources and structures for the CSA farm (e.g., farmland, urban area, infrastructure) (CSA-external) [16,21,48].
- Operationalization of cognitive proximity: The degree to which CSA members empathize with CSA ideas and thus share knowledge, competence, and expectations with respect to CSAs (CSA-internal), and, as CSA-external actors, the degree of interest in and understanding of the CSA model (CSA-external) [16,21,48].
- Operationalization of social proximity: The degree of connections among CSA members (i.e., their trust in each other) (CSA-internal) and societal acceptance (i.e., attitudes) between CSA members and CSA-external actors (CSA-external) [16,21,48].
- Operationalization of institutional proximity: The extent to which CSA rules, norms, and values are shared among CSA members (CSA-internal), and the similarities of the CSA institutions to external, prevailing food system institutions (i.e., production and market mechanisms of dominant food system actors) (CSA-external) [16,21,48,54].
- Operationalization of organizational proximity: The degree to which the CSA members are connected to other CSA members (CSA-internal) and CSA-external actors (CSA-external) in a formal, organizational arrangement [16,21,48].

Figure 1 illustrates the operationalization of spatial and relational proximity dimensions in the context of CSAs. The figure differentiates between CSA-internal proximity (i.e., arrows illustrating proximity among CSA members) and CSA-external proximity (i.e., arrows illustrating proximity between CSA members and CSA-external actors, structures, and resources).

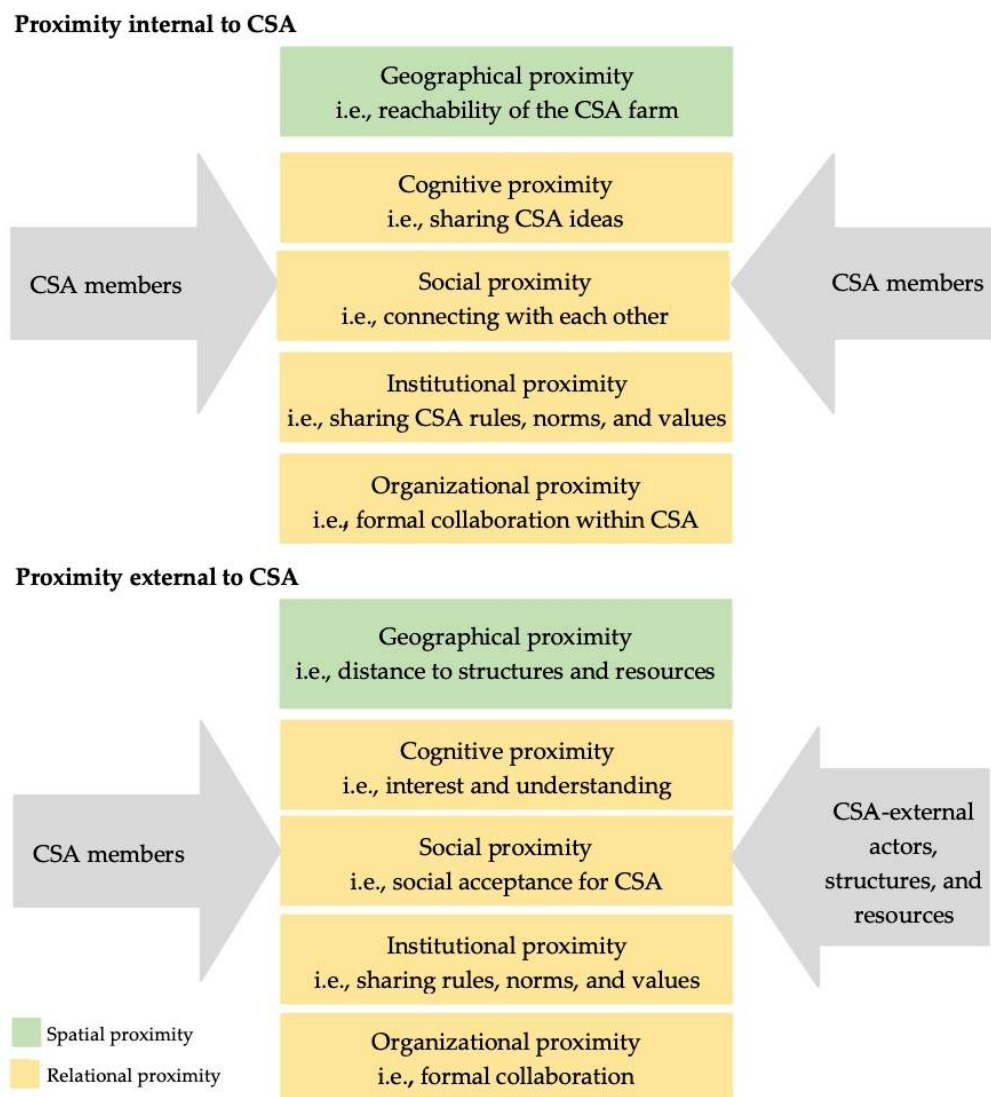
Operationalizing the proximity dimensions for the CSA context and a literature review on CSAs in Austria, Japan, Norway, and beyond helped to make assumptions about how the different proximity dimensions might affect CSAs and their attractiveness in these countries. This review also helped to tailor the statements and questions for the cross-national contexts (see Section 3.1).

- Geographical proximity: In general, CSAs seem to face a trade-off between the locational advantages of rural and urban areas. While CSAs target affordable access to biophysically suitable farmland that is predominantly located in rural areas, a CSA which has a location in or near a city with mainly urban CSA consumers represents a locational advantage (e.g., access to public transportation, infrastructure, networking opportunities) [21]. Thus, by being close to rural and urban areas, a CSA could stimulate a mutual understanding (i.e., cognitive proximity) between people in rural and urban areas (see next point) [30].
- Cognitive proximity: CSA members in Austria share knowledge, competence, and expectations of CSA ideas (e.g., pricing based on self-assessment) with each other, and therefore predominantly connect with individuals already connected to the CSA community (i.e., members of other CSA initiatives) [21]. CSA members' empathy for CSA ideas promotes their endorsement of the CSA [57]. However, Austrian CSA members raised the concern that CSA ideas might be too difficult to under-

stand for actors outside the CSA [21]. With the expansion of mainstream organic food marketing channels in Japan, the interest in CSAs among CSA-external actors is decreasing [58,59]. Thus, in terms of cognitive proximity, Japanese teikei might lack the ability to adapt to the expectations of today's consumers [21]. In contrast, the growing demand for locally and organically produced food and a trend toward urban gardening in Norway might explain the growing interest of Norwegians in CSA and the rapid growth of CSAs in Norway [30,60–62].

- **Social proximity:** Personal contact with food system actors can increase trust or distrust in the system [63]. CSAs aim to create social proximity among their members by connecting them through network relationships, organizing meetings and events, and participatory decision making [21,30,57,60]. CSA members in Austria highlighted that trust-building activities among CSA members and with society are important for the CSA. Though they have built strong connections with other local CSA actors, relations with other (dominant) food system actors are rare, as stated by CSA members [21]. In Japan, building trusting relationships with actors outside their (teikei) community might be even more challenging due to a more collectivist pattern [64]. While trust within established and stable relationships (such as the teikei community) might be higher than in individualistic societies (i.e., Norway and Austria), it has been observed that Japanese tend to distrust actors outside these relationships [65].
- **Institutional proximity:** Several studies indicate that Austrian, Japanese, and Norwegian CSA members try to avoid institutionalizing the CSA but rather aim to disrupt conventional food provision practices, rules, norms, and values [21,35,59,66]. They aim to contrast the mainstream and seek an alternative form of food provision [67,68], characterized by typical CSA features (e.g., small-scale operation, short value chains, transparent food provision, social and ecological sustainability) [18,25,60]. Austrian and Norwegian CSAs emerged in response to the conventionalization of the organic food market (i.e., a process in which the organic food market increasingly takes on the characteristics/institutions of mainstream industrial agriculture), and thus CSA members tend to criticize the dominant structures of the food system [21,60,69,70]. In contrast, CSAs emerged in Japan before the Japanese organic food market became conventional, in response to the negative effects of chemically intensive and mechanized agriculture. However, the expansion and institutionalization (i.e., the introduction of a certification system and other government policies to adapt to the dominant structures of the conventional food system) of the organic market since the 1980s, as well as the introduction of a certification system for organic food, were largely responsible for the decline of CSAs in Japan [59].
- **Organizational proximity:** Due to the shared organizational arrangement, organizational proximity among members of the original teikei type (i.e., OF–OC teikei scheme) and European CSA organizations is high. However, formal collaboration between CSAs and other (dominant) food system actors seems to be less relevant for Austrian and Japanese CSA members [21,59]. In contrast, Norwegian CSAs receive financial and technical support as well as advisory services. The association Organic Norway, the Agricultural Extension Service, the Norwegian Agriculture Agency, and several county governors have been particularly supportive of CSAs, promoting them, and playing an important role in the development of CSAs in Norway [60,71,72]. Although closer links to non-CSA actors, such as government and public institutions, could generate additional resources for CSAs, they may also lead to a loss of independence [73].





**Figure 1.** Operationalized spatial–relational proximity dimensions for the CSA (Community Supported Agriculture) context.

Finally, demographic factors could also be related to the attractiveness of a CSA. They might partly explain the development of CSAs in Japan, Austria, and Norway. To maintain the essence of CSA, CSA members are strongly encouraged to actively participate in various activities [58], regardless of their age and gender [5,74]. However, while young people might be less interested in joining a CSA, the physical support expected by CSAs (e.g., work in the fields) can be particularly challenging for older people [58,59]. Furthermore, it can be difficult to work full time and participate in a CSA [58]. Most CSA members are women [57,58]. In Japan, housewives have historically been the driving force behind CSAs, but as more women pursue a career, membership is declining [58].

### 3. Data and Methodology

This paper analytically differentiates between various proximity dimensions in the context of CSA and examines how these dimensions relate to CSA attractiveness. This section explains the research design used, including site selection, the design of the quantitative analysis, the creation of proximity variables, and their interrelation with CSA attractiveness.

### 3.1. Site Selection

We applied the proximity framework in three very different national contexts. Drawing on a literature review, Internet research, and informal talks with CSA coordinators, we selected six CSAs in Austria, Japan, and Norway because they share organizational similarities, even though CSA development paths differ in these countries.

CSA has its origins in various countries. One of them is Japan, where the CSA movement, also known as *teikei*, originated in 1971 [75]. In Japan, there are different types of *teikei* schemes, ranging from associations with 20–30 households and a single farm to hundreds or thousands of households and multiple farmers [75]. Most of today's *teikei* systems trade agricultural products to individual consumers who are not organized (e.g., farmers delivering vegetable boxes to consumers). Hence, they require little or no consumer participation (e.g., for agricultural and delivery labor) [75–77]. The original form of *teikei*, consisting of a group of organized farmers and consumers (OF–OC *teikei* scheme), experienced rapid growth until the 1980s (there were about 238 *teikeis* in 1990) [58,77]. Since then, it has gradually lost popularity, especially among younger families [58], and in 2019, there were only about ten active OF–OC *teikei* schemes [78]. This study focuses only on the OF–OC *teikei* scheme, as its formal arrangement is similar to the CSA schemes in Austria and Norway.

Austria experienced an increase in CSAs in the first years after the introduction of CSA in 2011. However, CSA in Austria developed late and slowly compared to other countries in Europe and beyond [6,67,79]. In 2020, there were approximately 30 CSA organizations in Austria [66]. The development of CSAs in Austria has been stagnating in recent years [21].

In contrast, the popularity of CSAs in Norway, a non-EU country, has grown rapidly since their initial introduction in 2006 [60]. It is expected that their popularity will continue to grow [62]. In Norway, the number of registered CSAs reached 92 in 2020 [72].

Because CSA arrangements vary across initiatives [6], we selected six similar CSA cases (two per country) for our study. The six selected CSAs have a similar formal structure (i.e., organizational proximity), in that product prices are collectively negotiated and there is an emphasis on the year-round commitment of members.

### 3.2. Setting up the Quantitative Analysis

For data collection, we designed a cross-national survey on proximity related to CSA attractiveness in Austria, Japan, and Norway. We collected data from CSA members, including farm owners/managers via online and in-person questionnaires. Based on the literature presented in Section 2, the proximity dimensions were operationalized for the CSA questionnaire. The common questionnaire first introduced the objectives of the cross-national study. The first questions addressed CSA-internal relational proximity among CSA members. Furthermore, the questionnaire included questions on CSA-internal geographical proximity (i.e., CSA members' accessibility to the CSA farm) and the geographical proximity of the CSA farm to external structures and resources (i.e., suitable farmland, urban areas, services, network structures, and other community activities). In order to gather information on CSA-external relational proximity, respondents were asked about broader societal contexts of the CSA, such as attitudes, interest, and the level of support by CSA-external actors. The questionnaire included other parts for different research objectives not presented here (see Supplementary Materials). In cases where respondents did not hold information, they could skip questions about CSA collaboration with other food system actors and questions about the policy context that influences the CSA. For these two topics, we relied on the answers of respondents who indicated that they were in a leading position within a CSA ( $n = 14$ ) (as demonstrated by the number and types of activities as well as the working hours for the CSA stated in the questionnaires) to avoid guessing and to ensure the validity of the answers. The questionnaires concluded with demographic questions about the respondent. We translated the questionnaires into German, Japanese, and Norwegian and distributed them to members of six CSAs (two CSAs per country, each in a different city) (Table 1).

**Table 1.** Selected CSAs and number of respondents in Austria, Japan and Norway.

Country	(Peri-)urban Areas	CSA Members	Surveys ( <i>n</i> = 209)	Organizational Similarities
Austria	Vienna	About 300	51	Collective price negotiation;
	Graz	About 100	27	
Norway	Sandefjord	About 140	39	Year-round commitment of members;
	Porsgrunn	About 120	49	
Japan	Tokyo	About 40	25	Participative decision-making processes
	Tsukuba	About 40	18	

Regarding the total number of CSA members, CSA coordinators indicated a lack of data, as the number is constantly changing. In addition, one or more family member/s often split one harvest share (i.e., the amount of produce dedicated to one CSA member), but the exact number is missing. So, we cannot assess the representativeness of the sample. However, this should not be an issue as we do not aim to provide representative insights into the CSA model, but to analyze the relationships between proximity and attractiveness. Data collection resulted in a total of 209 questionnaires (after excluding 19 surveys with too many missing values and/or outliers) that were analyzed using principal component analysis, and 208 questionnaires that were included in the regression modeling (only respondents whose gender was indicated). IBM SPSS Statistics 24 software (IBM, Armonk, NY, USA) supported both principal component analysis and regression modeling. Table 2 illustrates the demographic characteristics of CSA members who responded to our survey.

**Table 2.** Demographic characteristics of respondents.

Variable	Category	Austria (in %)	Japan (in %)	Norway (in %)
Country		37.3	20.6	42.1
Gender	Female	65.4	74.4	81.4
	Male	34.6	25.6	17.4
	Diverse	0.0	0.0	1.2
Age	>24 years	6.5	0.0	0.0
	25–44 years	50.6	25.6	19.8
	45–64 years	33.8	37.2	45.3
	>65 years	9.1	37.2	34.9
Work condition	Working full-time	25.3	9.3	37.6
	Working part-time	24.0	14.0	9.4
	Being self-employed	14.7	20.9	15.3
	Being not employed (studying, retirement, parental leave, unemployment)	28.0	41.9	36.5
	Other	8.0	14.0	1.2

### 3.3. Creating Proximity Variables

To create the variables for our model, we measured the spatial–relational proximity items on six-point scales with equally distanced intervals (interval scale of 1 (not significant/disagree/not given/not attractive) to 6 (very significant, completely agree/absolutely given/very attractive). Proximity variables measured with more than a single item on graphically equally distanced 6-point scales were treated as continuous data. Thus, we measured proximity variables with more than a single item and ensured graphically equal distances between response patterns in the survey design [80]. Similar to Rossi and Woods [41] and Galt [38], who measured satisfaction with CSA on a single-item scale, we measured CSA attractiveness on a six-point scale based on the question: “To what extent is CSA attractive to you?”



The operationalization of spatial and relational proximity dimensions for the CSA context provided the basis for developing the proximity statements. Table 3 presents all operationalized proximity items in our survey. We asked about the importance of the proximity items to CSA participation (i.e., CSA-internal relational proximity), for the extent to which proximity items were present by participant (i.e., CSA-internal and -external geographical proximity), and for participants' agreement with proximity items (i.e., relational proximity to CSA-external actors). We used an explorative principal component analysis to weight, reduce, and linearly combine the operationalized proximity items (i.e., items describing the overlapping, complementary, and partially substitutive proximity dimensions in the context of CSA presented above). Principal component analysis allowed us to create a small number of synthetic variables (i.e., principal components reflecting different proximity dimensions) from a large number of operationalized proximity items and to test whether the structure of the principal components could be related to latent proximity dimensions similar to those described in the literature [16,21,48]. The resulting variables (i.e., principal components) then served as explanatory variables for the multiple linear regression [81].

The survey also captured perceptions about proximity among CSA members. These proximities refer to linkages within the same CSA to assess social, cognitive, institutional, and geographical proximity among CSA members. For internal linkages, we asked CSA members about the significance of several items for their participation in a CSA: connection with the local CSA community and farmer (i.e., social proximity); empathy with the CSA idea of risk sharing and ensuring a secure income for local farmers (i.e., cognitive proximity); independence from the regular food market and its prices, thus supporting a new food market; and traceability and transparency of food production (i.e., institutional proximity). In addition, we asked CSA members about the accessibility of the CSA farm from their homes by car, bike, or on foot, as well as by public transportation (i.e., geographical proximity).

We also operationalized the proximity of CSA members to actors, structures, and resources outside of CSAs. Thus, the survey included questions on perceptions of the social, cognitive, institutional, and organizational proximity of CSA members to CSA-external actors, as well as the geographical proximity of CSA members to the urban areas, infrastructure, and agricultural land. Hence, we asked CSA members to assess how they perceive CSA-external actors' attitudes toward the CSA (i.e., social proximity), how understandable the CSA model is to CSA-external actors, and how they perceive the public interest in the CSA (i.e., cognitive proximity). Because members characterized the CSA preferably by institutional distance from the dominant structures of the food system [21,57], we also asked about external institutional linkages. Thus, we asked CSA members about their agreement with CSA's institutional orientation on independence from dominant product and market mechanisms of the food system to avoid institutional proximity to the latter. Furthermore, we asked members in a leading position within the CSA about the degree and type of support they received from CSA-external actors (i.e., organizational proximity). Finally, CSA members were asked about the availability of infrastructure and social activities near their CSA farm, access to suitable land for agricultural production, and the proximity of their CSA farm to an urban area (i.e., geographical proximity).

### *3.4. Interrelating Proximity to CSA Attractiveness*

To analyze the interrelation between proximity variables and CSA attractiveness, we applied both a binary logistic model (which divides the responses on CSA attractiveness into two groups: "very attractive" and "less attractive") and a multiple linear regression (which measures CSA attractiveness on a 6-point interval scale based on equal distances between response patterns in the survey). The two analyses showed basically the same outcome, indicating the robustness of the results. Although an ordered logit model might be more appropriate in terms of model assumptions, linear regression also has some advantages. Therefore, we chose to present the linear regression results here because they

can be interpreted more intuitively. In addition, as users of the results, CSA members are more familiar with linear regression results. Finally, the simpler model is equally well suited for presenting the results.

**Table 3.** Operationalized items of spatial–relational proximity dimensions.

CSA-Internal Proximity	Operationalized Proximity Items as Presented in the Questionnaire	Mean	Standard Deviation
Social proximity among CSA members	Significance of connecting with the CSA community	4.53	1.360
	Significance of direct connection with the CSA farmer	4.83	1.227
Cognitive proximity among CSA members	Significance of empathy for CSA ideas of risk sharing and ensuring a secure income for local farmers	5.23	1.145
Institutional proximity among CSA members	Significance of traceability of food and transparency of production	5.48	0.818
	Significance of becoming more independent from the regular agricultural market and its prices	4.95	1.298
	Significance to support the development of a new and more sustainable agricultural market	5.63	0.758
Geographical proximity among CSA members	Extent of connection to CSA farm via road network for driving	5.48	0.871
	Extent of connection to CSA farm via road network for biking/walking	4.93	1.308
	Extent of connection of public transport system to the CSA farm	3.90	1.659
CSA-external proximity	Operationalized proximity item in survey	Mean	Standard deviation
Social proximity between members and CSA-external actors	Agreement that attitudes of the CSA are in general positive	4.26	1.300
Cognitive proximity between CSA-external actors and CSA members	Agreement that local interest in CSA is increasing in recent years	4.25	1.552
	Agreement that CSA model is easy to understand for CSA-external actors	3.28	1.557
	Agreement that media often reports about CSAs *	2.03	1.202
Organizational proximity between CSA-external actors and CSA members	Agreement to support/impediment by CSA-external actors (e.g., by governmental organizations, agricultural associations, food businesses, farmers, other CSAs, NGOs, private actors) **		
	Agreement that the CSA should cooperate with dominant actors and organizations of the food system and encourage them to become more sustainable *	3.34	1.797
Institutional proximity between CSA-external actors and CSA members	Agreement that the CSA should stay independent and small-scale, to be an alternative to the production and market mechanisms of the dominant actors of the food system *	4.57	1.846
	Agreement that the CSA should not adapt to the production and market mechanisms of the dominant actors of the food system, to grow faster and gain power *	5.10 recoded	1.207
Geographical proximity between CSA farm and urban area, infrastructure, and agricultural land	Extent of suitability of land and climate for agricultural production	5.33	0.829
	Extent of proximity of the CSA farm to the city *	4.58	1.340
	Extent of services nearby the CSA farm	3.16	1.646
	Extent of other community activities nearby the CSA farm	3.28	1.575
	Extent of networking opportunities nearby the CSA farm	3.19	1.446

\* Items have been excluded before conducting the principal component analysis, as all correlations to other items were  $\leq 0.3$  (two-tailed Pearson correlation) \*\* Items have been excluded before conducting the principal component analysis, as only members in a leading position within the CSA responded. Results are not presented in the table but are qualitatively described in Section 4.2.

Multiple linear regression shows the correlation between CSA attractiveness (i.e., the dependent variable) and the latent proximity dimensions identified in the principal component analysis (i.e., the explanatory variables) (see Section 4.1). Furthermore, we added dummy-coded categorical variables to the regression to examine the extent to which demographic variables might explain CSA attractiveness. We selected country, age, gender, and work situation based on the demographic variables highlighted in the CSA literature (see Section 2). We also collected data on the geographical distance (measured as the linear distance in kilometers based on zip codes) of the location of CSA members and the CSA farm and distance in minutes needed to access the farm. Since these variables did not show correlations with the attractiveness variable, we did not include them in the regression. Before running the multiple linear regression, we checked the data for linearity, multicollinearity, and homoscedasticity [81].

#### 4. Results

We created five latent proximity variables that served as explanatory variables for the multiple linear regression to explain CSA attractiveness [81]. The results of the principal component analysis and the reliability analysis are shown in Table 4.

**Table 4.** Results of the principal component analysis and the reliability analysis ( $n = 209$ ).

Factor Loadings ▼	Principal Components ►	1	2	3	4	5
<i>Principal component 1: Social–cognitive proximity among CSA members</i>						
Connection with CSA farmer(s) (CSA-internal social proximity)		0.845				
Connection with CSA community (CSA-internal social proximity)		0.682				
Empathy for CSA ideas (CSA-internal cognitive proximity)		0.675				
<i>Principal component 2: CSA farm’s geographic proximity to CSA members and land</i>						
Road for biking/walking (CSA-internal geographical proximity)			0.797			
Road for driving (CSA-internal geographical proximity)			0.724			
Suitability of land (CSA-external geographical proximity)			0.679			
Public transport (CSA-internal geographical proximity)			0.552			
<i>Principal component 3: CSA farm’s geographic proximity to external structures and resources</i>						
Community activities nearby (CSA-external geographical proximity)				0.793		
Services nearby (CSA-external geographical proximity)				0.748		
Networking nearby (CSA-external geographical proximity)				0.687		
<i>Principal component 4: CSA-external social–cognitive proximity</i>						
Positive attitudes about CSA (CSA-external social proximity)					0.742	
Local interest in CSA (CSA-external cognitive proximity)					0.720	
Understanding CSA model (CSA-external cognitive proximity)					0.624	
<i>Principal component 5: Institutional proximity among CSA members</i>						
Support of the new food market (CSA-internal proximity)						0.842
Independence from the regular market (CSA-internal proximity)						0.578
Traceability and transparency (CSA-internal proximity)						0.540
Eigenvalue		2.068	2.019	1.887	1.766	1.617
% of Variance		12.928	12.620	11.791	11.039	10.106
Cumulative %		12.928	25.548	37.340	48.379	58.485
Cronbach’s Alpha		0.696	0.646	0.723	0.636	0.546

Note: Extraction method: principal component analysis (Bartlett’s test of Sphericity: Significance: 0.000 (i.e., highly significant); Kaiser-Meyer Olkin Measure of Sampling Adequacy: 0.651 (i.e., relatively low but sufficient for our study, should be greater than 0.5 as a bare minimum); Residuals: there are 57 (47.0%) non-redundant residuals with absolute values greater than 0.05 (i.e., albeit the residuals with 47% of >0.05 are relatively high, they are below the 50% threshold) Rotation method: Varimax with Kaiser Normalization. Only factor loadings over 0.5 are shown. Rotation converged in 5 iterations [81].

Table 4 shows that analysis results in five principal components with an Eigenvalue greater than 1 [82]. In total, these principal components explain 55.616% of the variance. All factor loadings of the five principal components are above the acceptable limit of 0.5 [81]. Principal components 1–4 are internally consistent, as the values of Cronbach’s

alpha (i.e., a measure of internal consistency that indicates the extent to which all items in a test measure describe the same concept or construct) are in the range of 0.636 and 0.723, which are satisfactory values for exploratory research [83,84]. In contrast to the other principal components, Cronbach's alpha of principal component 5 is low, with a value of 0.546. Because this value is still respectable for social science studies [84], we included principal component 5 in the regression. The resulting factors in the rotated component matrix correspond to five different proximity dimensions:

- Principal component 1 groups CSA-internal social and cognitive proximities among CSA members. We labelled this factor *social–cognitive proximity among CSA members*.
- Principal component 2 includes variables describing *CSA farm's geographic proximity to CSA members and land* (hence the name of this component). The variables illustrate the location conflict between the proximity to CSA members, mainly located in the city, and suitable land for cultivation by the CSA farm.
- Principal component 3 also contains geographic variables that ask about *the CSA farm's geographic proximity to external structures and resources* (i.e., the name of this component), such as infrastructures and nearby services.
- Principal component 4 captures the CSA-external social and cognitive relations between the CSA members and CSA-external actors. We have referred to principal component 4 as *CSA-external social–cognitive proximity*.
- Principal component 5 contains variables on CSA members' institutional proximity. Therefore, we termed principal component 5 *institutional proximity among CSA members*.

#### 4.1. Interrelating Proximity to CSA Attractiveness

Multiple linear regression allowed us to explain the value of CSA attractiveness (i.e., the dependent variable) with the latent proximity variables (i.e., the explanatory variables) and demographic data (Table 5).

**Table 5.** Results of the multiple linear regression ( $n = 208$ ).

No.	Variables	B <sub>1</sub>	Standard Error <sub>2</sub>	$\beta$ <sub>3</sub>	SIGNIFICANCE <sub>4</sub>
	Constant	5.574	0.160		0.000
1	Principal component 1	0.248	0.052	0.330	0.000
2	Principal component 2	0.031	0.057	0.041	0.587
3	Principal component 3	−0.050	0.053	−0.066	0.350
4	Principal component 4	0.200	0.062	0.264	0.002
5	Principal component 5	0.115	0.053	0.144	0.032
6	Country: Japan	0.039	0.174	0.021	0.823
7	Country: Norway	0.108	0.139	0.070	0.436
8	Age: <24	−1.038	0.371	−0.193	0.006
9	Age: 25–44	−0.065	0.124	−0.040	0.601
10	Age: >65	−0.047	0.153	−0.027	0.758
11	Gender: Male	−0.251	0.118	−0.145	0.035
12	Employment: Full-time	−0.086	0.151	−0.050	0.572
13	Employment: Part-time	0.104	0.167	0.050	0.533
14	Employment: Self-employed	−0.098	0.165	−0.048	0.552
15	Employment: Other	−0.014	0.227	−0.004	0.952

Dependent variable: CSA attractiveness; in bold when  $p < 0.05$ . Reference variables: Age: 45–64; Country: Austria, Gender: Female; Work situation: Not employed (i.e., studying, retired, on parental leave, unemployed). (1): The B-values refer to the relationship between CSA attractiveness and each predictor. A positive value indicates a positive relationship between the predictor and the dependent variable, whereas a negative coefficient represents a negative relationship [81]. (2): The standard error associated with each B value indicates how these values vary in different samples [81]. (3): Beta values ( $\beta$ ) are standardized versions of the B values. They are measured in standard deviation units and are directly comparable (as they do not depend on the units of measure of the variables). Thus, they provide better insight into the importance of a predictor in the model [81]. (4): If the  $t$ -test associated with a B-value is significant (if the significance value is less than 0.05), then the predictor contributes significantly to the model. The smaller the significance value, the greater the contribution of the predictor [81].

Our results show a statistically significant fit of the data, as indicated by an  $F$ -test statistic of 3.953 (i.e., the  $F$ -test looks at whether using the regression model predicts the values of the dependent variable significantly better than using the mean of the dependent variable. If the improvement from fitting the regression model is much greater than the imprecision within the model, then the  $F$ -value is greater than 1 [81]) and a  $p$ -value below the 0.05 level. The model explains 24.8% of the variance in CSA attractiveness [81]. Principal component 1 (i.e., social–cognitive proximity among CSA members) and principal component 4 (i.e., CSA-external social–cognitive proximity) are positively related to CSA attractiveness ( $p < 5\%$ ). The standardized beta value for principal component 1 ( $\beta = 0.330$ ) indicates that social–cognitive proximity among CSA members shows the strongest interrelation with the attractiveness rating, followed by principal component 4 ( $\beta = 0.264$ ) (i.e., CSA-external social–cognitive proximity). Furthermore, our results suggest that principal component 5 ( $\beta = 0.144$ ) (i.e., institutional proximity among CSA members) is also positively related to CSA attractiveness ( $p < 0.05$ ). Finally, principal component 2 (i.e., CSA farm’s geographical proximity to members and land), and principal component 3 (i.e., CSA farm’s geographical proximity to external structures) are not significantly related to the respondents’ attractiveness ratings.

Compared to their reference group, the regression coefficients of two dummy variables in the multiple linear regression proved to be statistically significant: first, CSA members aged under 24 years ( $\beta = -0.193$ ) consider CSAs less attractive than the reference group of CSA members aged between 45 and 64 years; second, male CSA members ( $\beta = -0.145$ ) consider CSAs less attractive than their female counterparts.

#### 4.2. Descriptive Analysis of Country-Specific Results on Institutional and Organizational Proximity

The regression does not indicate a country effect. However, we also wanted to take a closer look at institutional and organizational proximity variables. Although these variables were collected in the survey, they were excluded from the analysis due to a lack of correlations or respondents (see proximity items highlighted with \* and \*\* in Table 3). For institutional proximity between CSA-external actors and CSA members, participants rated their agreement to adapt their CSA to, and independence from, production and market mechanisms of the dominant food system actors. Table 6 shows that CSA members agreed ( $\bar{O} = 4.57$ ) and disagreed ( $\bar{O} = 1.70$ ) with CSA’s independence from production and market mechanisms of the dominant actors. A cross-country comparison reveals that CSA members in all three countries disagreed with the CSA’s adaption to dominant food system structures. However, while Austrian and Norwegian CSA members agree with CSA’s independence from dominant food system structures, Japanese CSA members slightly disagree with the latter ( $\bar{O} = 3.19$ ).

**Table 6.** Institutional proximity to dominant food system structures ( $n = 209$ ).

	CSA Independence from Dominant Structures		CSA Adaption to Dominant Structures	
	Mean	Standard Deviation	Mean	Standard Deviation
Total ( $n = 209$ )	4.57	1.864	1.70	1.282
Austria	5.54	0.878	1.65	1.215
Japan	3.19	2.239	1.81	1.500
Norway	4.40	1.797	1.68	1.282

In terms of organizational proximity, CSA members in all three countries did not fully agree ( $\bar{O} = 3.34$ ,  $n = 209$ ) that CSAs should work with dominant food system actors to encourage them to become more sustainable. Furthermore, members who hold leadership positions within their CSAs ( $n = 14$ ) rated the level of support and hindrance from other organizations in the food system to reveal their organizational proximity to the CSA.



Norwegian CSA members perceived financial support from local, federal, and provincial governments (e.g., by Innovation Norway and county governors) during the establishment phase, but also desired support thereafter. The Norwegian CSA network, organized by the association Organic Norway (formerly OIKOS), has supported CSAs with networking opportunities and has increased their visibility. Furthermore, the Norwegian Agricultural Extension Service provides training and advice to organic farmers, including CSAs.

In contrast, Japanese and Austrian CSA members perceive the local, federal and provincial government, as well as organic associations, as rather unsupportive. Although they receive farm subsidies from the government (like any other farm), there is no specific financial support for the CSA scheme. Austrian CSA members point to the support from other CSAs, private individuals, farmers, and farmer markets in the form of financial support, space and infrastructure, networking opportunities, and advice. Japanese CSA members mentioned that they have been mainly supported by private individuals and a CSA study group in terms of visibility, networking, infrastructure, and machinery.

## 5. Discussion

In our exploratory analysis, we operationalized spatial–relational proximity dimensions for a multivariate analysis of CSA attractiveness. We differentiate not only between geographical, social, organizational, institutional, and cognitive proximity, but also between CSA-internal relations among members and CSA-external relations between members and external actors, as well as structures and resources. In the first step of our analysis, we used principal component analysis to create five latent proximity variables for CSA.

Principal components 2 and 3 (i.e., items loading on CSA geographical proximity) and 5 (items loading on institutional proximity) indicate latent variables corresponding to the proximity dimensions differentiated in the literature. In principle component 2, we have items describing geographical proximity to other members (internal) and land (which we labeled as external geographical proximity). However, the respondents seem to distinguish less between the human–bio-physical divide and more between what they perceive as part of the CSA, which for them includes members and farmland. In retrospect, this makes a lot of sense. Social–cognitive principal components 1 and 4 combine two proximity variables that have been analytically differentiated in the literature [16,21,48]. On the one hand, this result might confirm the supportive, complementary, or substitutive nature of proximity dimensions [55,56]. The dimensions that are clearly differentiated analytically might be messily interwoven in real life. On the other hand, the complementarity of social and cognitive proximity dimensions might be due to inadequate operationalization in survey items.

Multiple linear regression (as well as binary logistic regression) showed differences in the interrelations of latent proximity variables with members' CSA attractiveness ratings in Austria, Japan, and Norway. As hypothesized, relational proximities (i.e., social, cognitive, and institutional proximity) significantly predict CSA attractiveness in our model. Surprisingly and contrary to our hypothesis, however, this was not the case for the two geographical proximity variables. Social–cognitive proximity among CSA members (i.e., principal component 1) shows the strongest interrelation with member attractiveness ratings in the model. Thus, connection to other CSA members and farmer(s), as well as the sharing of CSA ideas, seem to be closely related to members' perceptions of CSA attractiveness. Furthermore, CSA-external social–cognitive proximity (i.e., principal component 4) shows the second highest correlation with CSA attractiveness in the model. Thus, CSA attractiveness might increase with a growing understanding of a rising interest in and a positive attitude toward the CSA and its concept in society. Our results confirm the importance of trust-building interactions within and outside the CSA [21]. Additionally, we confirm that empathy for the CSA model (i.e., cognitive proximity) promotes approval of the CSA, which was also addressed by Samoggia et al. [57].

Institutional proximity: Previous studies [18,21,60,67] emphasized that CSA institutions (i.e., rules, norms, values) contrast with the dominant institutions of the food system.

Therefore, in this study, we assumed that institutional proximity among CSA members reflects their shared values and identity based on being different from dominant food system structures. However, the related component 5 (i.e., institutional proximity among CSA members) shows low reliability with a Cronbach's alpha of 0.546. Future analyses are needed with other or more items to increase the reliability of an institutional proximity scale [81]. Multiple linear regression suggests that institutional proximity among CSA members (i.e., principal component 5) might be positively related to CSA attractiveness. Thus, the latter increases as CSA members strive for more independence from the regular food market and the establishment of a new one, as well as for traceable and transparent food (production).

Descriptive analysis shows that respondents criticized prevailing rules, norms, and values in the food system, wanted to change the latter, and aimed to avoid institutionalization of the CSA scheme, which is consistent with the findings of previous studies [21,60]. Most respondents in the three countries studies agreed that CSA schemes should rather avoid an adaptation to the dominant institutions of the food system. In other words, they do not want to conform to the latter. Following Coenen et al. [48], alternative (e.g., social) innovations (such as CSA), could be limited in their freedom and experimentation if they were oriented towards dominant institutions. Thus, too much institutional proximity to CSA-external (dominant) food system actors could have a negative impact on CSA attractiveness, as our study shows. However, the institutional distance of CSAs from dominant structures might also hinder cross-level learning, collaboration, and coordination between CSAs and dominant food system actors.

**Organizational proximity:** In Austria and Japan, political support for CSAs seems to be low. Austrian and Japanese CSA members stated that there has been support, if any, from other alternative innovations or private actors. In contrast, Norwegian CSA members pointed to various supporting measures for their CSAs from government organizations and interest groups, which Devik [71] and Hvitsand [30] had already pointed out. This might explain why organizational proximity of the CSA to dominant food system actors is perceived as relatively low, especially by Austrian and Japanese respondents (as described in Section 4.2). CSA members slightly disagree that their CSA should collaborate with dominant actors to encourage them to become more sustainable. CSA members might lack trust toward dominant food system actors (i.e., lack of social proximity) [21] and may be afraid of too much dependence and organizational control by the latter [48,73].

**Geographical proximity:** The regression demonstrated that the principal components related to geographical proximity (i.e., principal components 2 and 3) do not predict CSA attractiveness. Thus, the latter is neither significantly increased by the accessibility to members of a CSA farm from their homes nor by CSA farms' access to suitable farmland, the urban area, infrastructure, and social activities nearby. Linear distance (kilometers) and travel time variables from respondents' homes to the CSA farm did not correlate with the attractiveness ratings. This result might be different if we had also included non-members in our sample or members who live far away. The CSA membership of our respondents might result from a self-selection process that is strongly influenced by geographical proximity. On the other hand, the distance between members and the CSA farm is less relevant for CSA models in which members do not pick up the food at the farm but at one of several collection sites near the CSA members. In this case, distance to food collection points is more important than distance to the farm. Therefore, our results do not necessarily indicate that geographical proximity is irrelevant to sustainable food systems. However, our model suggests that relational proximity might be more relevant to CSA attractiveness than spatial proximity (i.e., geographical proximity). Although the overall goal of CSAs is to connect producers and consumers [3,5], which might be easier in spatially proximate situations, the latter might also be achieved "at a distance" [5,14,15]. Therefore, the focus of CSAs on relational proximity could reduce or even partially replace the importance of spatial (i.e., geographical) proximity [22].

**Demographic variables:** The generally low proportion of young members in our sample, especially in the Japanese and Norwegian subsamples, is in line with the Japanese literature [55,56]. The regression also shows that CSA attractiveness is significantly lower for the youngest age group (age: <24) compared to the reference group (age: 45–64). Furthermore, we found that most CSA members in all three country subsamples are females, as already highlighted by previous scholars [57,58]. Consequently, the regression demonstrated that male CSA members consider CSAs less attractive than female respondents. Finally, neither respondent nationality nor work situation showed a significant interrelation with attractiveness ratings. A limitation of our analysis is that we could not include comparable economic data (such as household income) that have been identified as relevant in other studies [39]. Furthermore, the survey was conducted only with Austrian, Japanese, and Norwegian CSA members (and not with former members or non-members) of six CSAs in three different countries. This limitation of our study points to the importance of studying CSAs in different countries and with nonmembers.

Finally, the development of CSAs has been stagnating in Austria and even declining in Japan. In Norway, on the other hand, the number of CSA farms has been steadily increasing, partly due to the supportive attitude of public bodies and various agricultural organizations, especially the association Organic Norway, towards CSAs.

## 6. Conclusions

Since AFNs (such as CSAs) have only recently come into existence, there still is a lack of knowledge about which factors should be used to promote them [25]. This article shows that the notion of proximity can help operationalize geographical, socio-cognitive, organizational, and institutional relations as explanatory variables in a linear regression model of CSA attractiveness. Multivariate analysis of empirical data from six CSA groups in Norway, Japan, and Austria highlights the importance of social–cognitive and institutional proximity to CSA attractiveness and thus, the relevance of increased trust, collaboration, shared knowledge, and shared values within and across organizations in the food system. Rather than focusing on geographical proximity, supporting social–cognitive and institutional relations within the CSA and beyond might support CSAs' attractiveness. The lack of a country effect suggests that the findings might be robust across socio-cultural and political contexts.

Future research could address this study's possible limitations of operationalization (i.e., the complementarity of social and cognitive proximity; the low reliability of principal component 5), and limitations of our sample (i.e., no inclusion of non-CSA members and economic data of respondents).

In our study, items for geographical, social, cognitive, institutional, and organizational dimensions of proximity were operationalized and tested. They cover network-internal and -external relations, human-to-human relations, and the relations of AFN members to their bio-physical context of land or infrastructure. We hope that our small methodological contribution will be useful for future structured AFN surveys and the advancement of diverse methods in relational rural sociology.

**Supplementary Materials:** The following are available online at <https://www.mdpi.com/article/10.3390/agriculture11101006/s1>.

**Author Contributions:** Conceptualization, methodology, data collection and analysis, writing—original draft, preparation, visualization, C.G.; conceptualization, methodology, data analysis, writing—review and editing, T.S.; conceptualization, methodology, data collection, writing—review and editing, C.H.; conceptualization, data collection and analysis, D.T.; conceptualization, methodology, N.S.; conceptualization, methodology, writing—review and editing, supervision, project administration, and funding acquisition, M.P. All authors have read and agreed to the published version of the manuscript.

**Funding:** This work was supported by the Vienna Science and Technology Fund (WWTF) Vienna, Austria [grant number ESR17042].

**Institutional Review Board Statement:** Considering the UNESCO Recommendation for Science and Scientific Researchers, this international comparative study followed social science ethical standards: transparency on study purpose, informed consent by CSA leaders and by individual respondents, privacy and anonymity, care in methods selection and analysis, no vulnerable groups involved. As BOKU established its Ethics Commission after data collection, this study was not subject to a formalized ethical review and approval.

**Data Availability Statement:** The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy restrictions.

**Acknowledgments:** The authors thank all survey participants for their enthusiastic participation. Without them, this research would not have been possible. We are particularly grateful for Christina Roder's editing support.

**Conflicts of Interest:** The authors declare no conflict of interest.

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