



How does proximity affect interfirm marketing cooperation? A study of an agribusiness cluster



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ABSTRACT

This study examines marketing cooperation between firms co-localized in an agribusiness cluster, using the proximity perspective developed in economic geography. After a review of the relevant literature, we develop a scale to measure both interfirm marketing cooperation and different dimensions of proximity (cognitive, geographical, institutional, organizational and social), and test the interrelationships among these elements within the context of Chile, an emerging economy. The findings support the conclusion that interfirm marketing cooperation in the chosen agribusiness cluster is mainly dependent on social proximity. Moreover, contrary to what is found in the literature on other types of cooperation, geographical proximity is not particularly relevant.

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1. Introduction

Research on the role of geographic proximity between firms has grown exponentially over the last decades. Countless studies have notably discussed its role in explaining the intensity of trade flows, technological innovation and competitiveness. One of the main reasons for this interest is that geographic proximity facilitates knowledge spillovers. In what would eventually become known as the Marshall–Arrow–Romer approach, economic studies as early as the turn of the 20th century note that spillovers occur when employees from different firms in an industry exchange ideas about new products and new ways to produce goods (Glaeser, Kallal, Scheinkman, & Shleifer, 1992; Marshall, 1890). Recent research on industrial clusters emphasizes the role of knowledge spillovers in innovation and their contribution to the competitiveness of specialized and geographically-concentrated industries (Guilani, 2007; Ketelhohn, 2006; McCann, 2008). However, the benefits from co-localization derived by firms should have greatly diminished with the advent of the Internet and related information and communication technologies—the cumulative effect of which was heralded as the “death of distance.” Fifteen years later, clusters of co-localized companies continue to exist, and proximity still matters even though knowledge spillovers can occur at a distance. Why is that?

Economic geography provides a useful lens through which to address this question. In particular, Boschma (2004, 2005) and Boschma and Frenken (2010) note that geographic proximity is only one of several dimensions of proximity and that all dimensions matter in explaining positive externalities (innovation in particular) for co-localized companies. Boschma (2004, p. 8) argues that “proximity means more than geography. It is a wide concept that incorporates similarity or adherence between actors or organizations, including spatial and non-spatial dimensions.” In the same vein, Molina-Morales (2001) and Malmberg and Power (2005) note that shared resources among firms co-localized in industrial districts along with social interaction among individuals are key factors in knowledge creation and transfer. Furthermore, the existing literature has confirmed the role of joint actions among local firms in enabling them better to compete globally (e.g., Schmitz, 1999).

The study here builds on this research perspective by testing and extending Boschma's (2005) work in two directions: by looking at interfirm marketing cooperation, an underexplored area of positive externalities in clusters; and by studying a different geographic and economic context, namely, an agribusiness cluster in Chile. It aims to answer several related questions: Apart from the much investigated topic of technological innovation, how does proximity affect other positive externalities in clusters, such as interfirm marketing cooperation? How is it possible to operationalize the measurement of proximity along the various dimensions proposed by Boschma (2005), namely, cognitive, geographical, institutional, organizational, and social proximities? Are these dimensions equally important? What is their relative importance in explaining positive externalities for co-localized

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companies? Are the dimensions of proximity in developed economies also valid in emerging economies?

Interfirm cooperation in marketing activities (such as in market research, marketing delegations, trade missions, branding and sales) is particularly interesting because it has important implications for business strategies and the design of public programs (Brown & Bell, 2001; Brown, McNaughton, & Bell, 2010; Felzensztein, Gimmon & Carter, 2010; Felzensztein, Huemer & Gimmon, 2010). A better understanding of all sources of competitive advantage, including the overlooked ones such as interfirm marketing cooperation in clusters, is of tremendous importance, especially for small but fast growing economies like Chile's. Extending existing work in developed economies to the context of emerging economies, this study should provide useful knowledge for business managers (by broadening the study of interfirm marketing cooperation) and industrial policy makers (by further investigating the role of proximity in cluster settings).

The study's specific objectives are thus twofold: developing and testing a measurement scale of proximity including its different dimensions (cognitive, geographical, institutional, organizational and social); and testing the relationships between the various dimensions of proximity and interfirm marketing cooperation. To this end, the paper has the following structure. Section 2 sets out the study's theoretical background and outlines the hypothesized relationships; Section 3 provides more details about the research context and design, data collection and analytical methods; Section 4 presents and discusses the results; and finally, Section 5 concludes with the study's implications, limitations and avenues for future research.

2. Theoretical background, model and hypotheses

Interest grows in the issue of clusters as an approach to improving firm competitiveness and to promoting regional economic development (Delgado, Porter, & Stern, 2010; Organization for Economic Co-operation and Development [OECD], 2009; Sölvell, 2009). Creating and sustaining a competitive advantage through innovation is central in this research stream. Innovation arises from the synergy and linkages among firms, universities, government and other stakeholders in a given geographical location. Local externalities and economies of agglomeration facilitate these linkages (Ketels, Lindqvist, & Sölvell, 2006; Saito & Gopinath, 2009; Sölvell, 2009). Although clusters have been studied from various analytical perspectives (Nicholson, Tsagdis, & Brennan, 2013), little attention has been paid to non-technological innovation such as interfirm cooperation in marketing activities.

Interfirm marketing cooperation qualifies as a non-technological innovation from both the marketing and organizational perspectives. Indeed, the Oslo Manual (OECD, 2005; p. 48) defines marketing innovation as “the implementation of a new marketing method involving significant changes in product design or packaging, product placement, product promotion or pricing,” and organizational innovation as “the implementation of a new organizational method in the firm's business practices, workplace organization or external relations”. Mothe and Nguyen (2010) note that few researchers report on organizational and marketing innovations despite their potential for technological innovation. Interest in interfirm marketing cooperation is only a decade-old despite its contribution to enhancing firm competitiveness (Brown, McNaughton, & Bell, 2010; Felzensztein, Gimmon, & Aqueveque, 2012).

2.1. Interfirm marketing cooperation in clusters

Authors study interfirm cooperation from an array of perspectives and relate it to many positive outcomes, including technological innovation (e.g., Axelrod, 1984; Faria, Lima, & Santos, 2010; Heavey & Murphy, 2012; Ragatz, Handfield, & Scannell, 1997), increased performance (e.g., Gummesson, 2004; Sharma, Tzokas, Saren, & Kyziridis, 1999) and competitiveness (e.g., Gulati, Nohria, & Zaheer, 2000; Jarillo, 1988;

Schmitz, 1999). “Interfirm cooperation” is the extent to which companies voluntarily undertake similar or complementary actions to achieve mutual or singular outcomes with expected reciprocation over time (Anderson & Narus, 1990). Overall, the concept of cooperation refers to joint coordination, sharing and planning of activities, and resources and competencies among trade partners (Brousseau, 1993). Cooperation emerges when firms' goals are compatible (Parsons, 2002) and translates mainly into joint action and conflict resolution. “Joint action” is the extent to which parties undertake similar or complementary actions jointly rather than unilaterally (Heide & John, 1990; Kim, 1999). For its part, conflict resolution is the search for “mutually acceptable compromises without having to resort to formal procedures” (Ruyter, Moorman, & Lemmink, 2001, p. 274).

Product and service marketing is one of the business areas in which firms cooperate. Joint actions—and conflict resolution within the framework of these actions—can be developed across the full spectrum of marketing-related activities, from market research to new product development, distribution, communication and promotion. Felzensztein, Gimmon, and Carter (2010, p. 676) show that “inter-firm marketing cooperation captures many types of co-operative arrangements, including joint ventures, market research and joint marketing activities, joint distribution strategies, joint product development and co-branding. Such inter-firm co-operation can be either vertical with buyers or suppliers or horizontal across value chain activities.” They also position this kind of cooperation as a positive externality that creates marketing benefits through the active participation of co-localized firms in joint actions. This view is in line with Brown, McNaughton, and Bell's (2010) typology of cluster externalities which distinguishes between supply- and demand-driven externalities and between passive and active externalities. In this view, joint marketing actions are an important demand-driven and active externality in clusters. These actions include participation in trade fairs, delegations to clients, trade missions, firm referrals and information gathering/sharing.

2.2. Antecedents to interfirm marketing cooperation: social networks and proximity

Felzensztein and Gimmon (2008) compare three natural-resource-based clusters in Chile and show that while both social networks and geographical proximity facilitate interfirm cooperation in marketing, their effects vary among clusters. In their study of salmon industry clusters in Chile and Scotland, Felzensztein and Gimmon (2009) show that social networks and “close proximity” facilitate interfirm marketing cooperation. They also find differences across countries, which they explain by cultural aspects, in particular differing levels of collectivism in national social orientations. Based on their analysis of Scottish and Chilean clusters, Felzensztein, Huemer, and Gimmon (2010) suggest that co-location is beneficial for firms in clusters, especially with regard to marketing externalities (e.g., purchase of intermediate goods, increased reputation, and joint participation in trade fairs). Additionally, Felzensztein, Gimmon, and Carter (2010) evoke the influence of regional and national cultural environments when they argue that informal social networks help explain the relationships between geographic proximity and interfirm marketing cooperation in clusters. They also stress the need for further research into interfirm cooperation in cluster settings, including the use of representative samples and more rigorous statistical analyses in order to understand the effects of proximity on cooperation.

2.3. The multidimensionality of proximity

The economics and international business management literatures make extensive use of the concepts of spatial and psychic distances to explain international trade patterns and internationalization strategies. The management and industrial organization literature is more attentive to the concept of proximity in explaining innovation and

competitiveness. **Knoben and Oerlemans (2006, p. 71)** note that “the proximity concept has been used in many different ways in the literature, including different measures and definitions, with the generation of overlapping and under- or over-specification.” It is therefore challenging to provide an overall definition of this concept. A review of the literature in the fields of industrial marketing, strategic management, and economic geography reveals that the concept of proximity usually encompasses the following notions: geographic or spatial location of organizations (**Oerlemans & Meeus, 2005; Porter, 1998**), perceptions of “closeness,” i.e., the existence of close and working relationships (**Nielson, 1998**), and perceptions of technical, institutional and cultural proximities, i.e., similarities in technological background, business practices, language, national culture and so on (**Evans & Bridson, 2005**).

Research in economic geography conceptualizes proximity as a multidimensional construct. Notably, **Boschma and Frenken (2010)** identify the following five dimensions: i) cognitive proximity (i.e., when firms share the same references and knowledge) as an important dimension in processing new information and understanding changes in the environment; ii) geographical proximity as the physical distance between actors; iii) institutional proximity (the set of practices, laws, rules and routines that facilitate collective action); iv) organizational proximity (i.e., when firms share the same relationships) as a key factor in controlling uncertainty and opportunism; and v) social proximity (related to trust-based interactions between business actors). Other studies have focused on a few of these dimensions. For instance, **Asheim and Isaksen (2002, p. 83)** highlight the importance of the socio-cultural and institutional dimensions, notably in the role played by “research and higher education institutes, technology transfer agencies, vocational training organizations, business associations, finance institutions, etc.” **Bellandi and Caloffi (2008)** also emphasize socio-cultural and institutional dimensions in their study of Italian and Chinese industrial clusters and districts while specifically underlining the importance of the industry structure (prevalence of SMEs or larger firms). In addition, firm size is widely discussed as an important factor. Indeed, clusters are traditionally made up of small and medium size companies but the presence of a few larger firms can entail different behaviors in knowledge transfer and innovation outcomes (e.g., **Hoffmann, Bandeira-de-Mello, & Molina-Morales, 2011**).

Overall, researchers situate geographic proximity as an antecedent to positive externalities in clusters, and especially to innovation. Specifically, proximity provides opportunities for repeated interactions which, in turn, promote the development of social capital (in the form of formal and informal social and professional networks). **Molina-Morales and Martínez-Fernández (2010, p. 262)** note that “proximity provides frequent, repeated, nonmarked, informal contacts, all of which facilitate strong ties and the density of the network ties.” They conclude that the development of such social capital is a key factor for innovation. These social and professional networks serve as channels for information exchange about important technological developments as well as emerging market opportunities (**Owen-Smith & Powell, 2004**). The repetition of these interactions and the expectation of future interactions also enable the parties to observe and monitor each other's behavior, allowing for the development of trust and norms of exchange (e.g., **Korsgaard, Brodt, & Whitener, 2002**). Co-localization provides opportunities for interactions and experience sharing along with the development of overlapping social and professional connections. It thus creates an environment that facilitates trust and the rapid, effective diffusion of ideas and collaborations (**Kogut, 2000**).

Knowledge creation and transfer play a central role in the innovation process. **Asheim and Isaksen's (2002)** study of clusters in Norway highlights important characteristics of localized knowledge for enhancing innovation and, ultimately, firms' global competitiveness. These characteristics include a combination of formal (scientific) and informal knowledge (both “know-how” and “know-who”) dependent upon the individuals in presence. What they call “sticky” knowledge is place-specific knowledge which has been acquired in an interactive manner.

They explain that this type of knowledge is “partly embedded in local patterns of interaction, and in the fact that the local area holds persons with first-hand experience of the knowledge and on how to put it into use. The best way for firms to acquire this ‘sticky’ knowledge is to be located (through their own firms, suppliers or strategic partners) in areas where learning processes that develop new and economically useful knowledge takes place” (**Asheim & Isaksen, 2002, p. 86**). **Malmberg and Power (2005)** also note the role of various forms of localized collaborative phenomena (namely, interfirm business transactions such as local buyer–seller relations, non-transactional forms of interfirm collaboration such as joint development projects, and partnerships between firms and nearby R&D institutes, universities and so on) along with other elements such as the intensity of competitive rivalry and the mobility and sociability of workers, managers and entrepreneurs. **Hoffmann, Bandeira-de-Melo, and Molina-Morales (2011)** find that knowledge transfer in two Brazilian clusters (ceramic tiles and clothing) is derived from the workforce adaptability, the role of institutions as discussion sites, and indirect cooperation among firms. However, they could not validate the direct effect of knowledge transfer on innovation, as previously claimed by **Asheim and Isaksen (2002)**. Factors like contextual cluster characteristics, industry differences (e.g., the nature of the product or structure of the industry), and variations in firm size are possible explanations for this result.

Apart from innovation, other positive outcomes of proximity in cluster settings include the potential to sustain a competitive advantage through the exploitation of the “origin effect.” For instance, **Wilk and Fensterseifer (2003)** use the resource-based view to show that co-located firms benefit from a positive effect of origin for their products (in this case, wine) through the mechanism of controlled denominations of origin. Consumer behavior in the food and beverages sector is particularly sensitive to origin cues (especially with regard to product and quality evaluations, willingness-to-pay, and intention to purchase). Extensive research in international marketing has documented this phenomenon.

However, proximity levels are important in determining how positive the outcomes will turn out to be. Too little proximity between firms could be detrimental to interactive learning and network formation whereas too much proximity could create “lock in” problems (**Boschma, 2005**). This so-called “paradox of proximity” mirrors the well-documented “paradox of psychic distance” (e.g., **Evans & Bridson, 2005; O'Grady & Lane, 1996**). **Carbonara and Giannoccaro (2011)** validate the paradox of proximity in the case of industrial district competitiveness. **Broekel and Boschma (2011)** find evidence that too much geographical and cognitive proximity can reduce interfirm knowledge exchange. In a broader perspective, **Bellandi and Caloffi (2008)** observe that cluster-to-cluster exchanges also benefit from a mixture of similarities and dissimilarities in terms of business activities and socio-cultural and institutional conditions.

Researchers argue that there is a correlation between different types of proximity. Geographical proximity, for example, facilitates other dimensions of proximity in interorganizational networks, especially in the case of innovation (e.g., **Broekel & Boschma, 2011; Ozman, 2009**). Moreover, **Salom and Albertos (2009)** show that social proximity might enhance cognitive proximity and organizational proximity might increase social proximity. In turn, the organizational and social dimensions of proximity might not be sufficient for organizations located in different institutional contexts.

In light of the consequences of proximity and its various dimensions, extensive research focuses on innovation and organizational performance. Studies also seek to provide a better understanding of which dimensions of proximity have a stronger impact on these consequences. **Carbonara and Giannoccaro (2011)**, for example, argue that cognitive, geographical, organizational and social proximities enhance the firm performance in industrial districts. **Cantù (2010)** argues that the convergence of cognitive and technological proximities can generate innovation. More recently, **Marrocu, Paci, and Usai (2011)** argue that

cognitive and technological proximities are more important than geographical proximity for a region's innovative capacity. A similar account of the effects of proximity and its various dimensions on interfirm marketing cooperation is inexistent. The following theoretical model and hypotheses address this knowledge gap.

2.4. Theoretical model and hypotheses

This study uses Boschma's (2005) typology of proximities, owing to its widespread acceptance in the literature. While many studies describe various relations among the dimensions of proximity in different industrial sectors, there is little research on the effects of proximity on interfirm marketing cooperation in clusters, as a specific case of non-technological innovation. Felzensztein, Gimmon, and Carter (2010), for example, only note a relation with social proximity. Advances in the analysis of the interrelations among different dimensions of proximity are necessary. The first hypothesis proposes positive relations between interfirm marketing cooperation and the dimensions of proximity (Fig. 1). H1: All dimensions of proximity relates positively to interfirm marketing cooperation, such that:

H1.1. Cognitive proximity is positively related to interfirm marketing cooperation.

H1.2. Geographical proximity is positively related to interfirm marketing cooperation.

H1.3. Institutional proximity is positively related to interfirm marketing cooperation.

H1.4. Organizational proximity is positively related to interfirm marketing cooperation.

H1.5. Social proximity is positively related to interfirm marketing cooperation.

Second, this study also factors in the correlation existing between different dimensions of non-spatial proximity (e.g. Boschma & Frenken, 2010; Broekel & Boschma, 2011; Cantù, 2010; Carbonara & Giannoccaro, 2011; Knobens & Oerlemans, 2006; Marrocu, Paci, & Usai, 2011; Salom & Albertos, 2009). As the topic of this paper is interfirm cooperation in a cluster, the focus is put on how geographical proximity mediates the relationship between the non-spatial dimensions of proximity and interfirm marketing cooperation. Geographical proximity is a necessary, though not sufficient, condition for network formation between firms. This discussion translates into the following hypothesis:

H2. Geographical proximity moderates the relationship between interfirm marketing cooperation and non-spatial dimensions of proximity,

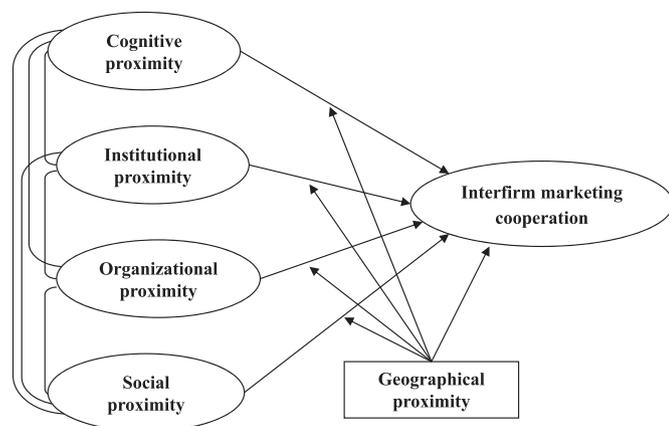


Fig. 1. Proposed model: Relationships among proximities and interfirm marketing cooperation.

such as the higher the geographical proximity (i.e., the lower the geographical distance), the stronger the relationship between non-spatial dimensions of proximity and interfirm marketing cooperation.

3. Research context, research design, method and data

3.1. Research context

The backdrop of this study is the agribusiness sector owing to its specific territorial dimension (Felzensztein, Gimmon, & Carter, 2010; Nicholson, Tsagdis, & Brennan, 2013). One of this sector's main challenges is product differentiation and the overwhelming presence of SMEs, which requires a marketing focus on consumers (Gálvez-Nogales, 2010). Edwards and Schultz (2005, p. 1) define agribusiness as: "a dynamic and systematic endeavor of multiple value chains that deliver value goods and services derived from sustainable orchestration of food fiber and natural resources." These authors note the economic importance of this sector in North America. In 2004, over 30% of jobs were in agribusiness with less than 1% being directly involved in production or employed as farmworkers.

The choice of a Latin-American emerging economy stems from a desire to shift from traditional areas of research, i.e., industry clusters in the United States and Europe (Delgado, Porter, & Stern, 2010). More specifically, this study looks at Chile which has a small but fast growing economy gaining visibility on global export-markets for agricultural products. According to the Oficina de Estudios y Políticas Agrarias [ODEPA] (2012), the Chilean agribusiness industry exported over USD14 billion in 2011, positioning the country among the top 20 global exporters of agricultural and forestry products and accounted for about 10% of its GDP (this includes food, agriculture and forestry) and 10% of national employment.

This study's particular focus is on the Limarí Province's agribusiness cluster in north-central Chile. The province has an area of 13,553.2 km² and a population of 167,391. In this semi-arid region, productive agricultural firms flourish in the valleys near the river streams whereas firms in the related industrial sector group in urban centers. Limarí's main agricultural products are grapes, wine, avocados and mandarins, with approximately 131,039 ha of crops (Instituto Nacional de Estadísticas [INE], 2007).

3.2. Research design and method

The design of this study consists of two stages linked to two different data collection activities. The first stage is based on an online survey to gather observations from a pilot sample and is used to refine and test the study's measurement instrument. The second stage relies on a field survey to gather observations from another sample of the same population.

In the first stage, factorial analysis (EFA and CFA) was used to improve the scales and represent the constructs or latent variables of interfirm marketing cooperation and each dimension of proximity proposed by Boschma (2005), who defines them in qualitative terms. A review of the literature was then conducted to identify empirical indicators for each proximity dimension proposed by various scholars (see the Theoretical background, model and hypotheses section). Additionally, joint marketing activities (Felzensztein, Gimmon, & Carter, 2010) and marketing externalities (Brown, McNaughton, & Bell, 2010) were employed as indicators for capturing interfirm marketing cooperation in a cluster. A set of measured variables or items was used for each defined construct and assessed on a five-point Likert scale designed for this study. An online survey with 6 latent variables and 25 items or indicators was also designed for this study (Appendix A).

The survey was pretested with 10 professionals and leading academics around the world. It was then emailed to 1544 agribusiness firms in the selected region. Email addresses of the firms were obtained

from the public register of regional organizations such as the Regional Development Corporation, the Directory of Exporters, the Institute of Agriculture Development (INDAP), the National Institute of Agriculture (INIA) and the Food Processing Firm Directory. The survey was resent after weeks one and three (Dillman, Smyth, & Leach, 2008). This process yielded 162 completed questionnaires (10.49% response rate), 43 of which were rejected because of missing data, which left a sample of 119 completed questionnaires (7.71% effective response rate). An exploratory analysis was done to detect missing values and outliers and to test assumptions of multivariate analysis such as normality, multicollinearity and homoscedasticity (in line with Pérez, 2004). The results of this exploratory analysis were satisfactory, indicating that the proposed methods could be applied.

The next step entailed using an EFA (Hair, Black, Barry, & Anderson, 2010) and the maximum likelihood extraction method to estimate the number of constructs. Variables with communalities and factor loadings of less than 0.5 were eliminated. The new factor matrix was then rotated with direct oblimin (0.3.) As a result, four constructs were identified along with their items. A CFA was then conducted to evaluate the reliability and validity of the proposed constructs. Reliability was assessed using: i) measures related to each separate item: item-to-total correlation (>0.5) and inter-item correlation (>0.3); and ii) Cronbach's alpha for exploratory research (>0.6). Convergent validity was assessed based on: i) standardized factor loading (FLs > 0.5); ii) average variance extracted (AVE > 0.5); and iii) construct reliability (CR > 0.7). Discriminant validity was assessed using: i) AVE $>$ MSV (maximum shared squared variance); and ii) AVE $>$ average shared squared variance (ASV).

In light of the results obtained in the first stage, a questionnaire was designed and administered by three research assistants, who were given detailed instructions and equipped with a GPS (global positioning system) to estimate the spatial localization in UTM coordinates of each participating firm. Doing so enables inclusion of the average Euclidean distance from one firm to another as a measure of geographical proximity (De Smith, Goodchild, & Longley, 2013). For this field survey, 3453 agribusiness firms in the Limarí province (SII, 2012) were considered and the sample was stratified according to the number of companies in each of the region's *comunas*. A convenience sample was applied to 312 companies because there was no publically-available official list of firms. This sample included 9.0% of all firms, representing a 95% confidence interval and a 5.3% margin of error. Fig. 2 demonstrates that the distribution of firms geographically was concentrated around the rivers in the basin. Additionally, the “mean center” of the cluster and the localization for firms that cooperate (or not) with one another in marketing activities are shown.

Lastly, an EFA with the new database was developed which partly confirmed the results obtained during the study's first stage. A CFA was then conducted to establish the measurement of the proposed theoretical model. Structural equation modeling (SEM) was developed to analyze the relationships between interfirm marketing cooperation and the dimensions of proximity. The EFA and CFA follow the steps outlined above and proposed by Hair, Black, Barry, and Anderson (2010) while the SEM follows recommendations by Hair, Black, Barry, and Anderson (2010) and Byrne (2010). Specifically, the chi-square test and different indicators were considered with their level of minimum fit and good fit, respectively: i) χ^2/df ($2 < x < 3$; $x < 2$); ii) NFI

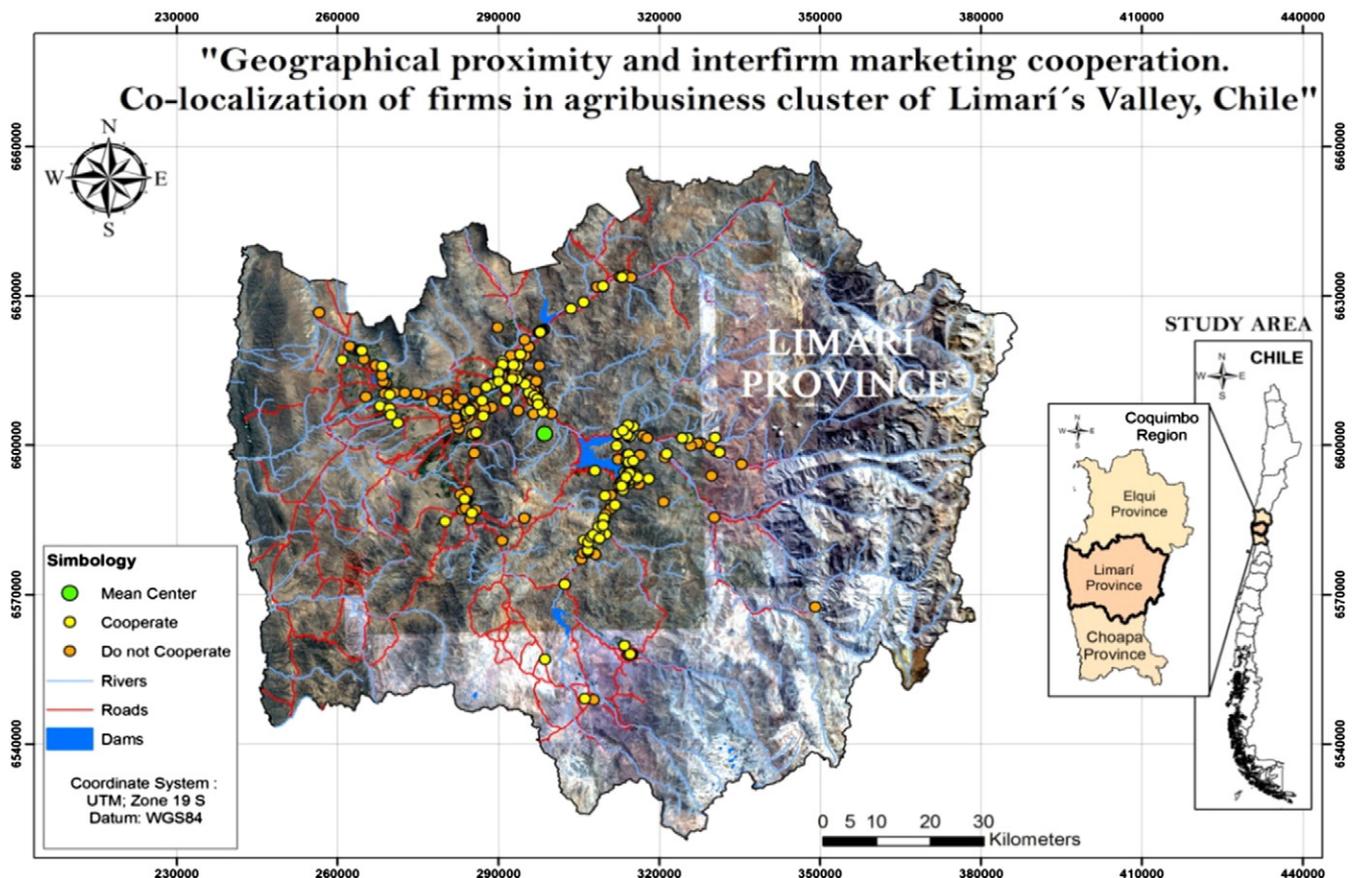


Fig. 2. Distribution of firms in the agribusiness cluster.

(0.90; 0.95); iii) CFI (0.95; 0.99); iv) GFI (0.95; 0.99); and v) RMSEA (0.05 < x < 0.08; x < 0.05).

3.3. Data description

Using the first data set, 25 items in 5 constructs were analyzed: interfirm marketing cooperation (7), cognitive proximity (5), institutional proximity (4), organizational proximity (4) and social proximity (5). This number of items allows a minimum number of five surveys for each item analyzed in exploratory factor analysis and a minimum of 100 in the sample size (Hair, Black, Barry, & Anderson, 2010). Moreover, the normality of each item tested with the Kolmogorov–Smirnov displayed acceptable values (Pérez, 2004).

With regard to the second data set, the sample consisted of microenterprises (77.2%), small businesses (16.3%), medium size businesses (4.2%) and large businesses (2.2%).¹ In terms of annual sales, 49.4% were microenterprises, 17% small businesses, 9.7% medium size businesses and 4.5% large businesses.² Some 75.6% were in the production sector. Additionally, it is important to note that while 42.9% of firms cooperated with other firms in general terms, only 36.2% cooperated in joint marketing activities. Firms that cooperated displayed a statistically significant higher average to those that did not cooperate in terms of foreign capital, number of employees, annual sales and percentages of exports.

4. Results and discussion

Observations from the EFA and CFA lead to reduction of the originally-proposed number of items from 25 to 18 (Appendix A). The results indicate that it is possible to identify four latent variables instead of the five proposed ones because there is no clear difference between cognitive proximity and institutional proximity. The results of reliability and validity tests of latent variables indicate that interfirm marketing cooperation and organizational proximity meet all the minimum reliability and validity requirements. In contrast, the latent variables cognitive and institutional proximity and social proximity have values slightly below 0.5, the minimum for AVE. While social proximity also has a Cronbach's alpha of less than 0.7, it can be an acceptable value in exploratory analysis (Morales, 2008) (Table 1).

The proposed scales are valid as a first approach to measuring the non-spatial dimensions of proximity and interfirm marketing cooperation. As such and notwithstanding the original intention to reduce the number of items, the field survey incorporates the initial 25 items. The exploratory nature of the online survey and the intention to increase sample size justify this decision (factor analysis is sensitive to sample size; Hair, Black, Barry, & Anderson, 2010).

4.1. The measurement model and SEM

The analysis of the field data differs from the variables obtained from the online survey, confirming the decision to incorporate the original 25 items. The effect of the sample size (Hair et al., 2010; Tabachnick & Fidell, 2007), the exploratory nature of the study and the fact that there is some confusion and overlap in the definitions of proximity (Knoben & Oerlemans, 2006) explain the difference. The final analysis of the measurement model identifies geographical proximity and four

Table 1
Confirmatory factorial analysis for the online survey.

Construct	Cronbach's alpha	AVE	CR	MSV	ASV
Interfirm marketing cooperation	0.89	0.70	0.87	0.10	0.04
Cognitive–institutional proximity	0.83	0.46	0.87	0.34	0.26
Organizational proximity	0.75	0.54	0.82	0.40	0.13
Social proximity	0.59	0.47	0.73	0.40	0.09

latent variables: interfirm marketing cooperation, the mixed cognitive–organizational proximity, institutional proximity and social proximity, with 12 items in total. All these latent variables present good levels of reliability and validity (Table 2). In the case of reliability, the Cronbach's alpha has a minimum of 0.73 for social proximity and a maximum of 0.87 for cognitive–organizational proximity. For the convergent validity, AVE is over 0.6 and CR is over 0.8 for all the latent variables. In addition, the discriminant validity presents good levels for each latent variable with MSV and ASV less than AVE. The necessary indicators of fit for the measurement model and SEM are also specified: CMIN/df, GFI, NFI, CFI, RMSEA and AGFI (Table 2). These results confirm that the specific scale provides a good means for measuring these phenomena.

The usual procedure of multiplying the coefficient of the impact of non-spatial dimension of proximity with that of the geographical proximity on interfirm marketing cooperation is used to calculate the moderation effects. Geographical distance is scaled to a low–medium–high variable in order to be compatible with the scales of latent variables. The SEM of the proposed model (Fig. 3) reveals that there is no statistically significant correlation between geographical proximity and the various non-spatial dimensions of proximity and with interfirm marketing cooperation.

As for hypothesis H1 (“All dimensions of proximity have a positive direct impact on interfirm marketing cooperation”), only the relationship with social proximity is statistically significant (99%), with a correlation of 0.6 (Fig. 3). This result only confirms H1.5 (“Social proximity is positively related to interfirm marketing cooperation”) and validates the relations proposed by Felzensztein, Gimmon, and Carter (2010). The fact that social proximity entails direct or indirect interfirm interactions—thus allowing managers to observe and monitor one another's behavior and build mutual trust—can explain this observation (Axelrod, 1984; Coleman, 1988; Kogut, 2000; Korsgaard, Brodt, & Whitener, 2002; Whitener, Brodt, Korsgaard, & Werner, 1998). Social proximity is a necessary ingredient of interfirm cooperation and an element that confirms the existence of the cluster. Indeed, several authors emphasize the role of social interactions, social capital and labor market dynamics as key characteristics of clusters (Molina-Morales, 2001; Molina-Morales & Martínez-Fernández, 2010). Social proximity could also be important to other kinds of collaborations between firms and other local institutions (Hoffmann, Bandeira-De-Mello, & Molina-Morales, 2011; Malmberg, & Power, 2005; Schmitz, 1999).

Statistically significant correlations (99%) materialize between cognitive–organizational proximity and social proximity (0.30), between cognitive–organizational proximity and institutional proximity (0.72), and between institutional proximity and social proximity (0.47). These results confirm the interrelations among various dimensions of proximity found in other studies (Broekel & Boschma, 2011; Knoben & Oerlemans, 2006; Ozman, 2009; Salom & Albertos, 2009).

The path analysis indicates that there are two paths to explain interfirm marketing cooperation. The first one is as follows: institutional proximity \leftarrow (0.72) \rightarrow cognitive–organizational proximity \leftarrow (0.30) \rightarrow social proximity (0.26) \rightarrow interfirm marketing cooperation. The second path consists of: institutional proximity \leftarrow (0.47) \rightarrow social proximity (0.26) \rightarrow interfirm marketing cooperation. This finding supports previous studies showing

¹ Classification according to number of employees: 1–10 microenterprises; 10–49 small businesses; 50–250 medium-sized businesses; >250 large businesses (National Institute of Statistics, Chile).

² Classification according to annual sales: less than US\$110,000, microenterprise, US\$110,000–1,146,000, small businesses; US\$1,146,000–4,591,000, medium businesses, over US\$4,591,000 large businesses (approximate values, US\$1 = \$490 Chilean pesos) (Ministry of Economy, Chile).

Table 2
Confirmatory factorial analysis for the measurement model.

Latent variable	FL	C's alpha	AVE	CR	MSV	ASV
Interfirm marketing cooperation		0.86	0.59	0.81	0.00	0.00
IMC_03: Delegations (search) to new customers	0.75					
IMC_02: Commercial missions	0.90					
IMC_01: Trade fairs and promotions	0.81					
Institutional proximity		0.83	0.81	0.93	0.19	0.07
IP_04: Similar habits and routines	0.90					
IP_03: Common values	0.81					
IP_02: Same cultural norms	0.91					
Cognitive–organizational proximity		0.87	0.70	0.88	0.19	0.06
CP_02: Same level of experience	0.88					
OP_03: Similar inter-organizational relationships	0.82					
CP_01: Same knowledge base	0.77					
Social Proximity		0.73	0.69	0.87	0.01	0.01
SP_05: Reputation	0.57					
SP_04: Common experiences	0.72					
SP_03: Previously known	0.79					
Model fit	CMIN/df	GFI	NFI	CFI	RMSEA	AGFI
Model	2.64	0.94	0.93	0.95	0.07	0.89
Minimum	2 < x < 3	0.90	0.90	0.95	0.05 < x < 0.1	x > 0.80
Good	x < 2	0.95	0.95	0.99	x < 0.05	x > 0.85

the central role of local support institutions (e.g., Bellandi & Caloffi, 2008; Hoffmann, Bandeira-De-Mello, & Molina-Morales, 2011). In addition, the analysis of standardized effects related to interfirm marketing cooperation shows that indirect effects are zero for all latent variables. As such, total effects are the same as direct effects: cognitive–organizational proximity (-0.114), geographical proximity (-0.08), institutional proximity (0.037), and social proximity (0.257). These results demonstrate that the variables considered for the models are well established.

For its part, hypothesis H2 (“Geographical proximity mediates the relationship between interfirm marketing cooperation and non-spatial dimensions of proximity, such as the higher the proximity, the stronger the relationship”) is invalidated. This finding not only invalidates expected results based on Felzensztein, Gimmon, and Carter (2010) for interfirm marketing cooperation, but also stands contrary to expected results based on studies suggesting that geographical proximity facilitates other non-spatial dimensions of proximity (e.g., Boschma, 2005; Boschma & Frenken, 2010; Broekel & Boschma, 2011; Cantù, 2010; Carbonara & Giannoccaro, 2011; Knobens & Oerlemans, 2006; Ozman, 2009). Several factors can explain the irrelevance of geographical proximity in the present findings. First, this study focuses on an emerging economy whereas the majority of previous studies of proximity look

at developed economies. The inherent differences between emerging and developed economies with regard to a vast array of conditions (e.g., country risk levels, institutional conditions, consumer purchasing power) could have an impact on the relationship between spatial and non-spatial proximities and, in turn, on interfirm cooperation in ways that remain to be explored. The market-related differences between emerging and developed economies may even be more relevant because the present study investigates a specific form of interfirm cooperation (i.e., marketing cooperation), which obviously targets the way firms relate to their customers and markets (through promotion, for instance). Second, the high level of competition in commodity industries such as the agribusiness sector (Edwards & Shultz, 2005; Furtan & Sauer, 2008; Gálvez-Nogales, 2010) could be less conducive to interfirm cooperation and might significantly reduce the role of geographical proximity in this context. This possible explanation is in line with other studies which show that contextual cluster characteristics and industry differences (such as the product type or industry structure) are important (e.g., Hoffmann, Bandeira-De-Mello, & Molina-Morales, 2011; Malmberg & Power, 2005). Finally, the degree of geographical closeness observed in the firm sample (Fig. 2 shows that firms are located within a 30 kilometer radius from the cluster mean center) might be so high as to render the role of geographic proximity insignificant.

One of this study's important findings is that social proximity is the only dimension of proximity that really affects interfirm marketing cooperation. As such, it may uncover some of the specificities of non-technological innovations compared to technological innovations (for a related discussion, see Geldes & Felzensztein, 2013). Indeed, the vast majority of previous studies investigate the way firms work together through joint actions to innovate technologically. Cognitive proximity (i.e., a set of common references and knowledge) and institutional proximity (i.e., a set of common laws, rules and routines), as defined by Boschma (2005), occur in the antecedents in this case. The present study investigates a type of non-technological innovation that takes the form of interfirm cooperation in marketing activities. Joint participation in trade fairs and commercial missions and delegations to search for new customers likely relies more on interfirm trust and the quality of interpersonal relationships (i.e., social proximity) than other forms of proximity.

Lastly, the results suggest that interfirm marketing cooperation in clusters may well be more dependent on other factors such as i) market opportunities and threats, as previously identified by

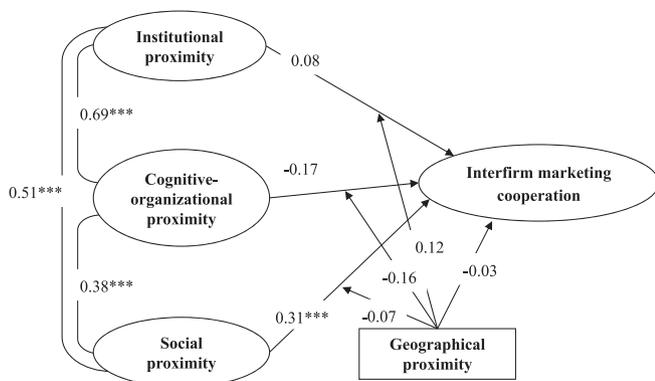


Fig. 3. SEM: Proximity dimensions and interfirm marketing cooperation (correlations statistically significant: ***99%, **95%, *90%).

Bellandi and Caloffi (2008) and Capitanio, Coppola, and Pascucci (2010) for product and process innovations, ii) the dominant market orientation, as suggested by Traill and Meulenbergh (2002), iii) the role of other actors such as trade and business associations (Andersson, Schwaag-Serger, Sörvik & Wise, 2004; Bellandi & Caloffi, 2008; Sölvell, 2009), and iv) the industry structure and levels of competitive rivalry such as occasioned by the presence of larger firms with extensive resources (Hoffmann, Bandeira-De-Mello, & Molina-Morales, 2011).

5. Conclusions, implications and future research

This study seeks to advance the theorization of interfirm marketing cooperation in industrial clusters and to explore the role of proximity as a facilitator in this context. The specific scale used in the present study provides a good means for measuring these phenomena with good levels of reliability and validity. In particular, this scale represents an important contribution by empirically validating the role of social proximity and institutional proximity and by showing that Knobben and Oerlemans' (2006) conceptualization of cognitive proximity and organizational proximity only works in one dimension. In the specific case of interfirm marketing cooperation, this scale has high levels of validity and reliability and includes three items: trade fairs and promotional activities, commercial missions and delegations to attract new customers. In this study, Brown, McNaughton, and Bell's (2010) indicators were found to fit better with measuring interfirm cooperation than those proposed by Felzensztein, Gimmon, and Carter (2010).

Additionally, this study shows that geographical proximity does not the relationship between interfirm marketing cooperation and non-spatial dimensions of proximity in the context of an agribusiness cluster in an emerging country such as Chile. This finding is surprising in light of previous research in developed countries (e.g., Cantù, 2010). On the other hand, the study finds that cognitive and technological proximities are more important than geographical proximity for interfirm cooperation. This result could be due to the fact that firm proximity within the cluster is not relevant enough, which leads to the suggestion that future studies should include outside firms as control variables.

With regard to the non-spatial dimensions of proximity, the study concludes that social proximity is the only statistically significant (99%) dimension related to interfirm marketing cooperation (0.26), confirming results by Felzensztein, Huemer, and Gimmon (2010). In addition, the results reveal a statistically significant (99%) interrelation between some dimensions of proximity: i) cognitive–organizational proximity and social proximity (0.30); ii) institutional proximity and social proximity (0.47); and iii) cognitive–organizational proximity and institutional proximity (0.72). These results are novel because the interrelations between proximities in previous research (Broekel & Boschma, 2011; Knobben & Oerlemans, 2006; Ozman, 2009) are related more to technological innovations (processing and production) than to non-technological innovations (specifically, interfirm marketing cooperation in clusters). The results point to the conclusion that the proximity approach needs to integrate other determinants in order to better explain the interfirm marketing cooperation phenomenon. The increasing use of new information and communication technologies such as email, the Internet and online social networks could facilitate interfirm cooperation while decreasing the importance of geographic proximity.

From an academic perspective, the analysis of interfirm marketing cooperation will gain from examining which types of joint activity have a greater impact on the creation of active externalities and benefits for cluster actors. For instance, is joint participation in trade fairs, commercial missions or delegations abroad more conducive to positive results? Moreover, it is imperative to develop complementary approaches to explaining the interfirm marketing cooperation phenomenon given its importance in promoting industry competitiveness. In addition to focusing on firms, it is important to expand the research focus to external factors and to examine the role of other actors (such

as trade and business associations or the government) in clusters that play an important role in promoting and facilitating interfirm activities (Ketels, Lindqvist, & Sölvell, 2006; Malmberg & Power, 2005; Molina-Morales, 2001). In the specific case of geographical proximity, it could be interesting to explore other measurement perspectives. Based on techniques used in spatial analysis and econometrics (gravity models), for example, future research could measure the distance between firms and the distance of these firms from other cities, harbors or borders with other countries and taking into consideration roads and communication channels. Doing so could provide a richer picture of the role of geographical distance in explaining interfirm cooperation than by simply measuring the physical distance between firms.

The managerial implications of this study relate to the design of public or private programs aimed at developing activities identified as part of interfirm marketing cooperation. The identification of items for cognitive–organizational proximity, institutional proximity and social proximity as latent variables also reveals the activities that are essential for developing interfirm cooperation programs. The study here shows that interfirm marketing cooperation depends more on social proximity than on geographic proximity in a cluster setting. Because social proximity is related to institutional proximity and to cognitive–organizational proximity, policymakers and managers need to find ways to reinforce these central types of proximities. Overall, this paper demonstrates the important mechanisms in incenting a particular type of non-technological innovation, namely, interfirm marketing cooperation. It shows the role of such non-technological innovation in increasing clustered firms'–and therefore countries'–competitiveness on international markets.

These managerial implications are especially important in the context of Latin America. First, Latin America is lagging behind other regions in terms of innovation (both technological and non-technological). As one of the many indicators of this situation, the latest country ranking in the World Intellectual Property Organization's (WIPO) report of "Who filed the most patents, trademarks, and designs applications" includes countries in North America, Europe and Asia but absolutely none from all of Latin America (WIPO, 2013). Another meaningful, if imperfect indicator of this situation, is the flagrant disproportion between the region's global economic weight and its innovative activity. For instance, only 0.19% of the patents registered at the United States Patent and Trademark Office (USPTO) between 2008 and 2012 came from Latin American firms although the region represented about 10% of the global GDP in this time period (Ketelhohn & Ogliastris, 2013). Concerted efforts to change this situation are under way, and Chile is among the regional leaders who make an effort to incentivize innovation. For instance, the very first pan-Latin American Innovation Summit was held in Santiago de Chile in 2013. Second, Latin America's agribusiness sector is a major contributor to most of the region's domestic product, exports and labor force employment. In addition, the region is a major supply source for feeding the world (World Bank, 2013a). In this light, it is worthwhile to invest in improving the sector's competitiveness. An effort of this nature should consolidate the region's position and possibly protect it from future threats, such as the expected emergence of Africa as an agribusiness superpower by 2030 (World Bank, 2013b).

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Appendix A. Proposal items for constructs

Items/constructs	Media	S.D.	Correlation
<i>Interfirm marketing cooperation</i>			
IMC_01 Trade fairs and promotions	2.21	1.13	0.54
IMC_02 Commercial missions	2.64	1.10	0.75
IMC_03 Delegations (search) to new customers	2.52	1.06	0.72
IMC_04 Achieving/share market information	2.23	0.99	0.43
IMC_05 Make references (recommendations) for nearby businesses	2.36	1.07	0.59
IMC_06 Joint market research	2.62	1.10	0.36
IMC_07 New product development	2.46	1.16	0.54
<i>Cognitive proximity</i>			
CP_01 Same knowledge base	2.12	0.87	0.60
CP_02 Same level of experience	2.28	0.97	0.60
CP_03 Same language	1.79	0.74	0.53
CP_04 Same educational level	2.48	0.94	0.63
CP_05 Same cultural level	2.53	0.96	0.54
<i>Institutional proximity</i>			
IP_01 Compliance with laws and regulations	1.81	0.77	0.27
IP_02 Same cultural norms	2.35	0.90	0.53
IP_03 Common values	1.97	0.80	0.55
IP_04 Similar habits and routines	2.49	0.87	0.53
<i>Organizational proximity</i>			
OP_01 Similar organizational culture	2.32	0.78	0.54
OP_02 Similar organizational structure	2.52	0.80	0.70
OP_03 Similar inter-organizational relationships	2.41	0.81	0.57
OP_04 Using the same technology	2.49	0.99	0.62
<i>Social proximity</i>			
SP_01 Friendship	1.67	0.84	0.37
SP_02 Confidence (trust)	1.30	0.56	0.30
SP_03 Previously known	1.89	0.80	0.48
SP_04 Common experiences	1.73	0.64	0.42
SP_05 Reputation	1.61	0.78	0.39

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