Proximity and duration in temporary organisations

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Abstract: This study focuses on the effects of duration and proximity on collaborative outcomes in temporary organisations. With regard to proximity, it distinguishes between geographical and organisational proximity. The study is based on a regression analysis of an original dataset of 147 temporary organisations in the Netherlands. The results indicate that face-to face contact has a positive impact on the collaborative outcome, whereas the geographical distance between organisations does not seem to matter. Organisations with a high level of organisational proximity are also likely to achieve their goals better than organisations that are rather dissimilar. Furthermore, duration positively influences the relation between face-to-face contacts and goal attainment. However, it appears that duration as such has a negative influence on performance. This study shows that there are important differences between IORs that have to be taken into account since they matter for the level of goal achievement of a collaborative effort.

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1   Introduction

In the last 30 years, the practitioners' and academic attention towards collaboration and, more specifically, inter-organisational collaboration (IOC) has significantly increased (c.f. Oerlemans et al., 2007). IOC has become a ubiquitous phenomenon. For organisations, the old distinction between make or buy has been replaced by 'make, buy or team up'.

IOCs are commonly seen as a distinct governance form, different from both, markets and hierarchies (c.f. Powell et al., 1996; Lawrence et al., 2002). In this governance form, two or more legally and hierarchically independent organisations work together in order to achieve a certain task. However, there exists a great diversity in IOCs with regard to the intensity of collaboration, the level of importance, the expected outcomes, and the duration. For example, some IOCs are built around distinct tasks and cease to exist after the respective task is accomplished; other IOCs fall apart as a consequence of failure. Yet, others continue their collaboration for longer periods of time and encompass several different tasks thereby showing a certain stability and continuity in collaboration.

In IOC research, several key concepts are used. Structuralist approaches focus on characteristics of sets of IOCs, such as density and centrality (Borgatti and Foster, 2003; Oerlemans et al., 2007). Relational approaches, on the other hand, focus on qualitative characteristics of the relations between partners of IOCs. In this vein, proximity is one of the core concepts used to explore IOCs. This paper makes use of the relational concept of proximity in order to research factors that influence the outcome of IOCs. There is a large and growing body of empirical literature that shows different forms of proximity, and spatial and organisational proximity in particular, have an impact on the functioning and outcomes of IOCs (see Knoben and Oerlemans, 2006, for an overview). In this regard, spatial proximity refers to possibilities collaborating parties have to maintain face-to-face contacts, whereas organisational proximity refers to the similarities in collaborating partners in terms of organisational structure and culture (Knoben and Oerlemans, 2006).

Despite the differences between IOCs discussed in the above, the proximity literature predominantly treats all IOCs as one homogeneous form of organising. However, there are significant differences between different forms of IOCs (c.f. Camarinha-Matos and Afsarmanesh, 2005) as well as the modes how IOCs are managed (Provan and Kenis, 2007). Therefore, this paper rejects the homogeneity assumption that all IOCs are alike and instead takes the difference with regard to duration of IOCs into account. To illustrate our position, we focus on one form of IOCs, temporary organisations (TOs), the respective duration of collaboration and the two aforementioned forms of proximity. A

TO is defined here as a collaborative project group founded by permanent organisations to accomplish a joint task with the duration of the collaboration explicitly and ex ante fixed, either by a specific data or condition on the completion of the task for which it was undertaken (Janowicz-Panjaitan et al., 2009).

We will argue that differences in spatial and/or organisational proximity within TOs are likely to cause difference in the outcomes of these IOCs and, additionally, that this relationship is moderated by the duration of the collaboration. Therefore, we discuss the following research question: "What is the effect of spatial and organisational proximity on collaboration outcomes in TOs and what is the impact of collaboration duration on this relationship?"

In answering this question, we add to the literature in two ways. First, by examining differences in IOCs rather than assuming that all IOCs are identical, as is common practice in the proximity literature, we add more detailed insights regarding this particular governance form. Second, by empirically examining different forms of proximity and their impact on collaboration outcomes, we add insights into how relational characteristics influence relational outcomes to a field of literature that has so far been dominated by structuralist approaches (Borgatti and Foster, 2003).

This research focuses on proximity and duration in TOs, since they are characterised by a measurable duration. They are different from non-TOs because their duration is ex-ante determined and not a consequence of collaboration failure or disagreement between the parties of an IOC. In order to understand the role of proximity and duration in TOs, we first need to define and discuss the two concepts in use. Therefore, we begin this article with a discussion of different forms of proximity in TOs, followed by a discussion of duration of TOs. Subsequently, duration of TOs will be linked to these different forms of proximity. On the basis of our data analysis, we test five hypotheses. This article concludes with a brief discussion and reflection. Our is part of a large and ongoing research project of the Department of Organisation Studies at Tilburg University especially aiming at understanding the specificities of TOs (see Janowicz-Panjaitan et al., 2009).

2 Collaborative outcome of TOs

Collaboration as such is a well-researched phenomenon. However, different to single organisations, it is complicated to determine the outcomes of collaborations, especially in financial terms. There is nothing like a well-established bookkeeping or accounting system for IOCs and TOs. However, there are different rather qualitative interactionist methods to assess the success of collaboration. Gray (2000, p.245) distinguishes five different criteria for judging the success of collaboration, namely

1 goal achievement

2 generation of social capital

3 creation of shared meaning

4 changes in network structure

5 shifts in the power distribution.

Given the rather longitudinal character of the latter four criteria and the limited duration of TOs, a focus on goal achievement is the most logical choice in the context of TOs. Goal achievement, as such, is defined as the degree to which an intention is realised (Gollwitzer, 1993).

3   Proximity in TOs

The discussion of proximity and its consequences is known in several distinct disciplines (Boschma, 2005) and can be applied to persons, organisations, regions, societies, states and cultures, and so on (Kallscheuer, 1995; Heath et al., 1998). However, in this research we are limiting the discussion to proximity among organisations. Proximity as the concept of nearness between organisations has several dimensions. Although all of these dimensions refer to being close to something measured on a certain dimension, they are certainly not identical (Knoben and Oerlemans, 2006).

The first distinction in proximity of organisations is between spatial and non-spatial dimensions of proximity (O'Leary and Cummings, 2007; Gössling, 2004). The latter dimension can be further divided into the several forms of non-spatial proximity. While many different types of non-spatial proximity with overlapping or even contradictory definitions are used in the literature, in this chapter we will limit our discussion to one of the two forms of non-spatial proximity distinguished by Knoben and Oerlemans (2006) that are argued to be the most relevant in IOCs. Based on an extensive literature review, Knoben and Oerlemans distinguish organisational from technological proximity. The main difference between the two types of non-spatial proximity is that organisational proximity deals with the issue of how actors interact, whereas technological proximity deals with the issue of what they exchange and the potential value of these exchanges. In this article, we will focus on spatial – or geographical – and organisational proximity. The reason to exclude technological proximity from our analysis is in the nature of the different types of proximity. Technological proximity is to large extent related to the content of the relationship whereas geographical as well as organisational are related to the mode and quality of exchange. This paper focuses on the quality of relations.

3.1   Spatial proximity

Spatial proximity, also often referred to as territorial, geographical, local or physical, is the most frequently used dimension of proximity in the organisational literature. The spatial dimension of proximity is relatively easy to define and measure since it involves measuring local distances between actors and eventually relating them to infrastructure conditions like road access, density and overall mobility (Yilmaz et al., 2002). Mobility is necessary because spatial proximity is commonly defined as "the extent to which two collaborating actors can have daily face-to-face relations without prohibitive costs" (Knoben and Oerlemans, 2006). As a result, a spatial distance of, for example, 15 km implies a different level of spatial proximity in a rural area than in a dense urban area.

Several consequences of spatial proximity between collaborating organisations are commonly distinguished in the literature (Oerlemans et al., 2001). First, organisations are more likely to collaborate with partners that have a high level of spatial proximity than with very distant partners (Freel, 2003; Sohn, 2004). Moreover, spatial proximity facilitates face-to-face interactions (both planned and serendipitous) and can thereby have

a positive influence on the quality and quantity of communication (Bell and Zaheer, 2007). Interactions with a high level of information richness favour face-to-face interactions given the fact that this facilitates the exchange of tacit knowledge between actors (O'Leary and Cummings, 2007; Torre and Rallet, 2005). As a result, geographical proximate relations are argued to facilitate knowledge exchange better than non-proximate relations and, therefore, are also argued to be more beneficial for firm performance (Oerlemans and Meeus, 2005).

Based on these lines of reasoning the existing theoretical literature often points to a positive relationship between proximity and collaboration outcomes (c.f. Knoben and Oerlemans, 2006; Nooteboom, 2004). Therefore, we formulate the following hypothesis:

H1   The higher the level of geographical proximity between the partners in a TO, the better the outcome of the TO.

3.2   *Organisational proximity*

Organisational proximity is defined as "the set of explicit or implicit routines that allow coordination without having to define beforehand how to do so" (Knoben and Oerlemans, 2006). This concept encompasses several other forms of proximity that are found in the literature, among others institutional, cultural, and social proximity. These forms of proximity are integrated into a single concept because they all assume that shared routines, values, norms, cultures, and relations facilitate interactions between actors. Empirical research regarding this conceptualisation of organisational proximity has shown that these different forms of proximity can indeed be captured by this over-arching concept (Knoben and Oerlemans, 2008; Knoben et al., 2008).

The reasoning behind the importance of organisational proximity for IOCs is that IOCs are more efficient and lead to better results if the organisational context of interacting partners is similar due to the fact that this similarity facilitates mutual understanding (Das and Teng, 1998). For example, organisational proximity enables a better understanding of institution-based behaviour of the partner (Gössling, 2007). As such, organisational proximity generates a capacity to combine information and knowledge from the collaborating parties and to transfer tacit knowledge and other non-standardised resources between collaborating parties. Thus, this form of proximity is seen as a prerequisite for dyadic and collective learning and in the joint creation of new resources and innovation (Kirat and Lung, 1999).

Existing research shows positive effects of organisational proximity between partners of IOCs and the overall outcome. If organisations show a high level of similarity with regard to structure and culture, it will be easier for the partners to understand and anticipate processes and behaviour of the other partner. In short, collaboration will be easier if actors are more similar to each other (c.f. Todeva and Knoke, 2005). We therefore formulate the following hypothesis:

H2   The higher the level of organisational proximity between the partners of a TO, the better the outcome of the TO.

3.3   *The interplay between spatial and organisational proximity*

Although the two dimensions of proximity discussed in the above can be separated theoretically as well as empirically, they do interact with each other. Regarding this

interaction, two different positions can be found in the literature of which the first is more applicable for tie-formation, whereas the second refers to the process of collaboration. First, the two dimensions of proximity could be complementary. In this view, spatial proximity alone is of relatively little impact on the relationship between two actors if there is no other form of proximity or similarity between the two actors at all (Vetlesen, 1993). In other words, spatial proximity alone is not a sufficient reason for organisations to collaborate. This notion is supported by empirical research about the effects of spatial proximity on collaboration (c.f. Oerlemans and Meeus, 2005). Spatial proximity functions as a moderator for the relationship between non-spatial proximity and collaboration variables.

Second, the two dimensions of proximity could be substitutes. For example, two collaborating partners that are geographically dispersed face difficulties arranging face-to-face contacts. Firms that are proximate on the organisational dimension might be able to substitute these face-to-face contacts with modern communication technologies and thereby overcome the problems caused by large geographical distances (Knoben and Oerlemans, 2008). For firms with low levels of organisational proximity, however, trying to do so might result in even more problems due to miscommunication and misinterpretations of electronic communication (Cramton, 2001; O'Leary and Cummings, 2007). Given the fact that our focus here is not in tie-formation but rather on the quality of collaboration, we base our third hypothesis on this argument. Hence, we hypothesise a negative interaction effect between the two variables:

H3   The interaction between the level of organisational proximity between the partners of a TO and the level geographical proximity between the partners of a TO will have a negative effect on the outcome of the TO.

4   Duration of TOs

The duration of a TO is likely to impact on the relation between these different forms of proximity, on the one hand, and the collaboration outcomes, on the other. It is worth mentioning that many IOCs cease to exist at a certain point of time. The reasons for termination may be multiple. For example, conflict and poor performance, as well as miscommunication during a partnership, are typical reasons for termination (for a literature study, c.f. Oerlemans et al., 2007). The crucial difference between TOs and other forms of IOC is that the termination is pre-determined and related to goal achievement in TOs, but not in other forms of IOC.

It is known from the literature that there is a relationship between the duration of a TO and the complexity of the task for which it has been set up. More specifically, empirical findings indicate that short-termed TOs are most frequently set up for repetitive, routine tasks of very limited complexity, whereas TOs with a longer time horizon are often set up for single complex tasks (c.f. Bakker, forthcoming).
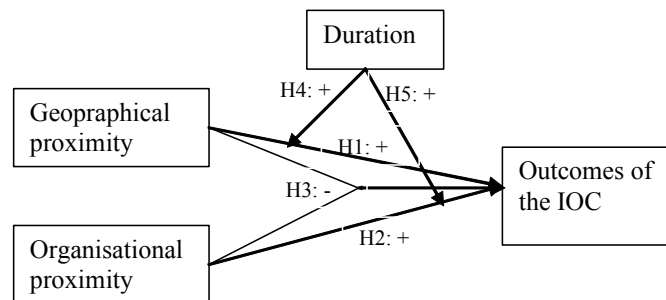
A low complexity of tasks requires less coordination and communication as compared with complex tasks. TOs with a somewhat longer duration encompass tasks of higher complexity; they require more coordination and communication. Therefore, large organisational and/or geographical distances will be perceived as being more hindering for these types of TOs as compared to very short-lived ones. Therefore, we argue that the

relation between geographical and organisational proximity, on the one hand, and the outcome of the TO, on the other, are positively moderated by the duration of the TO:

H4 The duration of a TO has a positive moderating effect on the impact of geographical proximity on the outcome of the TO.

H5 The duration of a TO has a positive moderating effect on the impact of organisational proximity on the outcome of the TO.

Our conceptual model can be visualised as presented in Figure 1:

Figure 1 Conceptual model

5 Data, measurements and methods

In order to gather data about temporary organisations and to test the hypotheses put forward in the above, a sample of such collaborations is required. Contrary to joint ventures and other more formalised forms of IOC, however, temporary organisations are not commonly registered in existing databases. Therefore, the first step of the data collection procedure was contacting organisations in order to find out whether they were involved in any temporary collaborations.

This first step was conducted by telephone interviews in 2007. Based on a sample of all Dutch SMEs, which was stratified by sector and size classes, firms were contacted until 1,500 complete interviews had been conducted. Of these 1,500 firms, 252 indicated to be involved in one or more TOs as defined earlier in this paper. When a firm indicated to be involved in at least one TO, the information of a contact person for that TO was obtained.

In a second step of the data collection procedure, these contact persons were interviewed to obtain data about the characteristics of the TO in 2008. Of the 252 identified TOs, 147 contact persons could be contacted successfully and were willing to participate in the interview (a response rate of 58%). The data in this second step was also gathered via a telephone survey. Prior to this survey, a pre-test version of the questionnaire was submitted to a limited number of Dutch SMEs. Based on these responses, the final questionnaire was improved by simplifying questions and adding brief explanations. The telephone survey was adjusted accordingly. Below, we will discuss which questions were asked in the telephone survey and how these questions have been used to measure the theoretical concepts discussed in the above.

5.1   Dependent variable: outcomes of the TO

As our measure of the outcomes of the TO we adopted a perceptual measure of the extent to which the goals of the TO were achieved. This was measured with a single question (on a five-point Likert scale) about the extent to which the main goal of the collaboration was achieved or was expected to be achieved by the end of the collaboration.

5.2   Independent variables

The level of spatial proximity of the TO is measured with two different questions. The first one captures the physical distance between the parties involved in the TO. Respondents could indicate whether all partners were located on the same location, the same region (i.e., province), or further apart than the same region. The responses to this question have been transformed into two dummy variables, with the highest level of geographical dispersion as the reference category. Even though this operationalisation is frequently used in earlier research, the above measure does not take differences in infrastructure into account. Especially when a firm is located at or near an infrastructural hub (for example an important highway or a high speed train station) it is quite possible to maintain frequent face-to-face contacts outside of their own region. Given the fact that the definition of geographical proximity focuses on the possibilities to maintain face-to-face contacts, rather than pure physical distance as such, we have included a second measure of geographical proximity.

The second measurement of the level of geographical proximity of the TO is based on the extent to which the parties involved are able to maintain frequent face-to-face contacts. To measure this second dimension of geographical proximity respondents were asked how frequent they had face-to-face contacts with the other parties in the TO. The possible answers range from

1   never

2   less than monthly

3   monthly

4   weekly

5   daily.

It is important to emphasise that, by using this measure, we do not conflate geographical proximity with the outcomes of thereof. Earlier research has shown that low travel times and small physical distances are conducive to face-to-face contacts but do not necessarily imply better collaborative outcomes (Weterings and Ponds, 2009). The level of organisational proximity of the TO was measured with a single question (on a five-point Likert scale) that captures the extent to which the parties involved in the TO work according to the same organisational norms and values. These were explained to the respondents to include aspects such as organisational structure, culture, and performance evaluation criteria.

The duration of the TO was measured with a single question that captured (measured in months) the total amount of time that the TO is planned to be in existence. Because the responses to this variable were highly skewed to the left, we took the natural logarithm of this variable as a measure of the duration of a TO.

5.3   Controls

We took two characteristics of the TO into account as control variables. First, the respondent was asked in which sector the TO was active. The responses to this question were dummy coded into three variables:

1   manufacturing

2   business services

3   other services.

The sector 'construction' was used as the reference category.

Second, we controlled for the number of firms involved in the TO. This is a particularly relevant control variable because the number of firms involved in the TO is very likely to influence the need for communication and coordination and therefore the salience of both geographical and organisational proximity.

5.4   Descriptives and collinearity diagnostics

The descriptive statistics for the measurements discussed in the above are given in Table 1. In order to check for potential multi-collinearity problems we calculated all bivariate correlations[1] as well as the variance inflation factors (VIFs) of all independent variables. None of the bivariate correlations even remotely can came close to problematic levels, which is also reflected in the VIFs which all stay well below the problematic threshold level of 10.

Table 1   Descriptive statistics

	Minimum	*Maximum*	*Mean*	*Std. deviation*	*VIF*
Goal attainment	1	5	3.90	1.01	-
Same location (dummy)	0	1	0.16	0.37	1.22
Same region (dummy)	0	1	0.37	0.48	1.38
Face-to-face contact frequency	2	5	3.50	0.86	1.07
Organisational proximity	1	5	3.41	1.13	1.07
Duration (ln)	0.69	5.29	3.15	0.90	1.10
Business services (dummy)	0	1	0.18	0.38	1.35
Other services (dummy)	0	1	0.34	0.48	1.55
Manufacturing (dummy)	0	1	0.18	0.39	1.38
Size of TO	1.00	60.00	5.22	6.50	1.02

5.5   Methods

The dependent variable that has been constructed, perceived goal attainment is measured on an ordinal scale. An ordinal regression is therefore used to analyse the determinants of perceived goal attainment (see Norušis, 2004).

In all models that were estimated we utilised a Huber/White robust specification of standard errors to control for potential heteroskedasticity issues in the data. As indicated by the VIFs in Table 1, collinearity poses no problem between the main variables. To

prevent collinearity problems with the interaction and mediation effects, all variables have been mean centred before calculating the interaction variables. The results of the estimations are reported in the following section.

6   Results

The results of the model estimation are reported in Table 2. As can be derived from this table, the model for the extent to which the main goal was attained is highly significant. When fitting an ordinal regression model (i.e., model 2), it is assumed that the relationships between the independent variables and the logits are the same for all logits. This assumption can be tested with the so called 'test of parallel lines'. Ordinal regression is an appropriate methodology when the value of this test is above 0.10 [Norušis, (2004), p.74]. As can be seen in Table 2, this assumption is not violated in model 2 (test value of 0.154) which makes ordinal regression the appropriate estimation technique for our data.

Table 2   Estimation results

	Goal attainment
Constant	-
Same location (dummy)	–2.08**
Same region (dummy)	–1.69
Face-to-face contact frequency	1.88**
Organisational proximity	1.79**
Organisational proximity * Same location (dummy)	–6.70
Organisational proximity * Same region (dummy)	0.41
Organisational proximity * Face-to-face contact frequency	–3.69*
Duration (ln)	–4.37**
Duration (ln) * Same location (dummy)	–4.33
Duration (ln) * Same region (dummy)	0.62
Duration (ln) * Face-to-face contact frequency	1.43**
Duration (ln) * Organisational proximity	0.27
Business services (dummy)	0.69
Other services (dummy)	0.88**
Manufacturing (dummy)	–0.68
Size of TO	–0.13***
Model type	Ordinal regression
Significance	0.000
N	143
Test of parallel lines	0.154
Adjusted R-squared	17.0%[a]

Notes: *$p < 0.10$, **$p < 0.05$, ***$p < 0.01$ (Based on a Huber/White robust specification of the standard errors), [a]Nagelkerke's pseudo R-squared

Hypothesis 1 predicted that geographical proximity would be positively related to the outcomes of a TO. The results presented in Table 2 support this prediction for the face-to-face contact frequency measure but not for the physical distance measures. For the most restrictive variable of the latter, being in the same location as your partners, a negative significant effect is even found. It should be noted, however, that being at the same location is a rather extreme version of geographical proximity. Moreover, given that it is possible to maintain face-to-face contacts outside of the home region, we think that the findings presented in Table 2 taken together are supportive of Hypothesis 1. Face-to-face contacts are associated with higher levels of goal achievement. However, physical proximity should not be taken to the extreme. An extremely high level of it, such as only selecting partners at your own location, leads to a very low availability of partners and an associated restrictive partner search. In other words, only working with partners from the same location is associated with over-embeddedness (Boschma, 2005). This is a strong support for Hypothesis 1.

With regard to organisational proximity it is found that higher levels of it are associated with higher levels of perceived goal achievement. Therefore, Hypothesis 2, which predicted a positive relation between organisational proximity and collaboration outcomes is also confirmed. Hypothesis 3 predicted a negative interaction effect between organisational and geographical proximity on the one hand and perceived goal achievement on the other. This effect is found but only for the measure of face-to-face contact frequency of geographical proximity. Given our earlier remarks about the restrictiveness of the other measures of geographical proximity, we consider Hypothesis 3 to be confirmed. Taking Hypothesis 1, 2, and 3 together we come to the conclusion that high levels of geographical or organisational proximity are beneficial for goal achievement in a TO, but that high levels of organisational and geographical proximity are not.

Hypothesis 4 and 5 predicted that the relation between organisational and geographical proximity on the one hand and perceived goal achievement on the other would be stronger for TOs with longer durations. Table 2 indicates that this prediction is confirmed for geographical proximity, albeit again only for the measure of face-to-face contact frequency, but not for organisational proximity. Hypothesis 4 is therefore confirmed, whereas Hypothesis 5 is rejected. These findings indicate that the higher coordination and communication demands posed by long-lived TOs can better be fulfilled by geographical proximity as compared to organisational proximity.

Another interesting result that is obtained is the direct negative effect of the duration of a TO on the level of goal attainment. This implies that TOs with a longer duration yield lower levels of goal attainment. This could be explained by the fact that TOs with longer durations often encompass more complex tasks (Bakker, forthcoming). It is therefore more difficult to explicate the goals up front and more unforeseen circumstances can occur due to the longer time-frame (Deeds and Rothaermel, 2003). But, as our findings indicate, this negative effect of duration can be negated by maintaining TOs with high levels of geographical proximity.

7   Discussion and conclusions

We started this paper by theoretically deriving hypotheses about the nature of proximity and duration and their influence on collaborative outcomes in TOs. The data indicate

strong support with regard to our hypotheses. Face-to-face contacts have a positive influence on perceived goal achievement as do high levels of organisational proximity. Importantly, however, organisational and geographical proximity act as substitutes rather than complements. Thus, if the partner is similar in organisational terms, the necessity for face-to-face-communication decreases and vice versa. This finding has important implications for (the managers of) organisations engaging in TOs. When face-to-face contacts can be maintained it is a waist to invest in creating organisational proximity with your partners. Trying to achieve cultural blending and/or aligning performance evaluation criteria, as examples of investments in organisational proximity (Das and Teng, 1998), is not necessary in such situations. Engaging in such activities is recommended, however, with partners with whom one has to rely on other forms of communication due to large(r) geographical distances. In short, managers should attune their arsenal to the geographical distance the TO is spanning.

A similar conclusion can be drawn regarding the duration of TOs. As predicted, duration has a positive moderating effect on the relation between geographical proximity and goal attainment. The explanation is that the stamina required for longer term more complex collaborations can only be mustered by partners that can easily look each other in the eyes every now and then. For geographically dispersed collaborations, the adagio 'out of sights out of mind' seems to hold. In other words, when selecting the partners for a specific TO, managers should make the distance over which to search for potential partners contingent on the duration and complexity of the task to be fulfilled. Long-lived TOs are more successful when partners can maintain frequent face-to-face contact and, once the TOs has been established, there is little managers can do about this as is evidenced by the lack of interaction effect between duration and organisational proximity.

This paper set out to contribute to the literature by adding 'relational' insights to a field dominated by 'structural' studies. In other words, we wanted to show that the characteristics of an IOC have important implications for its outcomes. In this vein, our findings regarding the effects of geographical and organisational proximity (combined) on perceived goal achievement provides strong evidence that paying attention to the characteristics of relations, rather than focusing only on their absence or presence, yields dividends. This by no means implies that structuralist approaches should be abandoned, but the strong emphasis on the structural rather than the relational element of IOC (Brass et al., 2004) seems unjustified and is likely to lead to incomplete, or perhaps even biased, results.

A second contribution we aimed to make with this paper was to the proximity literature by showing that the relation between different types of proximity and collaborative outcomes differs between types of IOC. In this perspective, our analyses show that duration of an IOC strongly influences the relation between (geographical) proximity and collaborative outcomes. Based on these findings, future research should take into account more forms of heterogeneity of IOCs besides heterogeneity in duration.

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Notes

1   Not shown here but available from the authors upon request.