Intra-organizational Routine Alignment and Collaboration Performance: The Role of Task Conflict and Relationship Conflict

by

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ABSTRACT: Intra-organizational collaboration has become an increasingly important element of today's business environment. However, failure rates of strategic alliances are alarmingly high. As a result, understanding, the causes for failure and devising solutions has been the concern of numerous studies. More recently, intra-organizational routines alignment has been shown to play a role in influencing collaboration performance. To understand this relationship in more detail, employing an experimental design, this study examines the role which the process variable of conflict plays in the relationship between intra-organizational routines alignment and collaboration performance. It is proposed that different types of conflict (relationship conflict vs. task conflict) will have different influencing effects. However, the results show no support for the proposed assumptions and it becomes apparent that a more sophisticated experimental design is required to allow for a more accurate representation and measurement of the variables under investigation.

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1. INTRODUCTION

Collaboration between organizations, for example in the form of strategic alliances, has become an increasingly widespread and important practice for a growing number of institutions since they can allow them to increase their competitive position in the marketplace by, for instance, providing them access to critical and complementary resources (Day, 1995; Sivadas & Dwyer, 2000).

Nevertheless, the failure rate of alliances has been reported to be quite high (J. H. Dyer, Kale, & Singh, 2001). Some studies have reported that alliance failure rate lies between 30 and 70%, with alliances failing to meet the goals of their parent companies and/or not delivering the operational or strategic benefits they were expected to provide (Kogut, 1989; Park & Russo, 1996). As Kale and Singh (2009) put it, this creates an alliance paradox since the advantages that strategic alliances may provide can be easily overthrown by their drawbacks when alliance partners fail to properly understand and manage the underlying factors that drive alliance success. Providing answers on how to approach the management of strategic alliances and collaboration projects to increase successful outcomes has been the purpose of many scholars conducting empirical research on the topic (J. H. Dyer, et al., 2001; Kale & Singh, 2009; Lunnan & Haugland, 2008; Mitsuhashi & Greve, 2009; Sarkar, Echambadi, Tamer Cavusgil, & Aulakh, 2001; Wittmann, Hunt, & Arnett, 2009).

Yet, to a larger extent, studies have placed an emphasis on studying initial factors brought by partners into the collaboration such as partner characteristics including complementarity and compatibility and the impact they have on alliance success (Kale & Singh, 2009; Mitsuhashi & Greve, 2009; Sarkar, et al., 2001) while process factors, such as conflict, have received less attention in empirical studies and, in particular, almost no experiments have been performed to measure their impact (Spin, 2011). In her study, Spin (2011) tested the effects of intra-organizational routine alignment on collaborative performance by conducting an experiment designed to replicate the conditions of a strategic alliance. Spin (2011) provided empirical evidence suggesting that partners bringing in complementary routines—meaning different types of routines which are useful for the collaboration— into a collaboration show higher levels of collaborative performance than those bringing along supplementary routines—routines which do not differ between partners—but she also pointed out that process variables (e.g. routine, trust, leadership, conflict and cooperation) and their effect on collaborative performance should be studied in further research to provide a more complete picture of the original relationship. To fill this gap, building on the experimental research conducted by Spin (2011), and as part of a wider study on the topic of collaboration, this study examines the contingent role of conflict on collaborations where partners contribute different intra-organizational routines.

Thus the research question can be expressed as follows:

How does conflict affect the relationship between intra-organizational routines alignment and collaboration performance?

2. THEORY AND HYPOTHESES

2.1 Intra-organizational routines alignment and collaboration performance

Resource alignment, referring to the way in which partner resources are matched and integrated in an alliance, has been introduced as an important factor affecting collaboration performance (Das & Teng, 2000). While there is an ongoing discussion about what kind of resources are more important in regard to collaboration performance, many authors have presented strong arguments highlighting the significance of complementary resources (dissimilar but performing resources) in relation to collaboration performance (Das & Teng, 2000; J. H. Dyer & Singh, 1998; Lunnan & Haugland, 2008; Sarkar, et al., 2001; Wittmann, et al., 2009) and some have also presented empirical evidence in support of this view (Lunnan & Haugland, 2008; Murray & Kotabe, 2005; Sarkar, et al., 2001; Wittmann, et al., 2009).

Although this study deals with routines rather than resources, it can be argued that the debate about complementarity also applies to routines and their impact on collaboration performance. For example, routines can be perceived as skills since people usually require training and instruction to be able to master a particular kind of routine, and since skills are seen as knowledge-based resources (Das & Teng, 2000), it can be argued that routines are also a kind of resource. As previously remarked, Spin (2011) found out that complementary partner routines affected collaborative performance more positively than supplementary routines. While this study works with the data collected in the experiment conducted by Spin (2011) and thus the suggested relationship between intra-organizational routines alignment and collaboration performance should be the same, the methods which are used in this study to measure the levels of collaboration performance are slightly different. Firstly, in this study collaboration performance is measured solely in terms of collaborative innovation. Secondly, the measure for collaborative innovation was re-evaluated and improved. For this reason, the relationship between intra-organizational routine alignment and collaboration performance will be re-tested. Nevertheless, the premise suggesting that complementary intra-organizational routines should affect collaborative innovation more positively than supplementary intra-organizational routines remains the same. Accordingly, the following hypothesis is tested:

Hypothesis 1: Complementary intra-organizational routines affect the overall collaborative innovation performance more positively than supplementary intra-organizational routines.

2.2 Different types of conflict and their effects in collaborations

Conflict is a highly complex social phenomenon which is caused by the intricacy and complexity of social interactions; the notions of the concept can vary but it has been defined as " A serious disagreement or argument, typically a protracted one" (OxfordUniversityPress, 2013). Conflict can manifest itself in any kind of social interaction which make it pertinent for collaborations between groups and organizations. For instance, alliances are bound to encounter conflict as a result of having to deal with partner opportunism, goal divergence (Doz, 1996; Parkhe, 1993) and cross-cultural differences (Kale, Singh, & Perlmutter, 2000; Shaughnessy, 1995) which is why it has been proposed that conflict management mechanisms are essential to allow firms to cope with these difficulties (Kale, et al., 2000). However, to truly understand the influence which conflict can have on organizational and collaboration performance one has to dig deeper into the research which has been conducted on the matter. Early research on the topic has looked at conflict predominantly from a harmful perspective, suggesting that conflict has a negative influence on organizational functioning and expressing the need for managing it to avoid its potential negative influence (Brett, 1984; Pondy, 1967). In line with this train of thought, conflict resolution mechanisms such as structuring conflict, training negotiators in bargaining

techniques and relying on third parties to act as mediators have been suggested (Brett, 1984).

In contrast, more recent research suggests that conflict can actually be beneficial in certain cases and under certain circumstances (de Clercq, Thongpapanl, & Dimov, 2009; De Dreu, 2006; Hardy & Phillips, 1998; Vliert & deDreu, 1994).

However, to make it possible to understand how conflict may in some cases contribute to collaboration performance, while in others have a negative impact on the same, it is necessary to understand that conflict can manifest itself in different ways. This is a crucial step since only by acknowledging the fact that there may be different kinds of conflict, is it possible to understand how conflict may in some cases be beneficial, while in others be detrimental to collaboration performance. In fact, similar considerations prompted Eisenhardt and Zbaracki (1992) who, amongst other things, examined the role of conflict in the context strategic decision making, to call for research investigating whether some sources of conflict where more beneficial than others.

Jehn (1995) made a significant contribution in this direction by developing the Intragroup Conflict Scale (ICS) to measure two theoretically distinct dimensions of conflict: 'relationship (or affective) conflict' and 'task conflict'. Jehn (1995) describes relationship conflict as existing when there are interpersonal incompatibilities among group members, which can manifest in the form of tension, animosity, dislike and annoyance among members of a group; she also explains that task conflict exists when there are disagreements among group members about the content of the tasks being undertaken, including different viewpoints, opinions and ideas. Jehn's (1995) main findings revealed that relationship and task conflicts have a negative association with individuals' satisfaction, liking of other group members and their intent to remain in the group. However, while the influence of relationship conflict on group performance was purely detrimental, the influence of task conflict on groups performing non-routine tasks was not negative and in some cases even positive (Jehn, 1995).

To provide an illustration, in situations where goals are clear and where efficient processes require adherence to established routines and procedures, for example mass production of very simple products, task conflict between collaborating partners is likely to have a detrimental effect on collaborative performance as its benefits (encouraging creative thinking and considering the perspectives of different individuals) are not really useful for the task at hand. However, in situations where creativity and critical thinking are of essence, for example in new product development initiatives, task conflict can contribute new perspectives which can lead to new and better solutions, thus increasing the collaborative performance of the task group, at least in regard to collaborative innovation.

The notion that a healthy dose of conflict can have a beneficial effect on innovation efforts is also supported by B. Dyer and Song (1998) who explored the link between strategy and conflict, and the effect of this link on NPD success. In another study, De Clercq et al. (2009) also examined the relationship between conflict and innovation and they found out that social interaction has a moderating effect on the relationship; they showed that higher levels of social interaction, led to a stronger positive relationship between task conflict and innovation, and also a stronger negative relationship between relationship conflict and innovation.

By now, it becomes quite evident that conflict can indeed play an important role in influencing collaboration performance but the effects can be either negative or positive depending on the type of conflict and the type of goals which are being pursued.

2.2.1 The mediating role of relationship conflict on the relationship between intra-organizational routines alignment and collaboration performance

When it comes to conflict and intra-organizational routine alignment, there is reason to assume that partners bringing along different organizational routines into a collaborative engagement may be faced with more challenges, resulting in higher levels of conflict, then partners who contribute routines which do not differ greatly from each other. On a general level, Kesting, Smolinski and Speakman (2012), have pointed to routines as a potential source of task, affective, and process conflicts within organizations. In addition, evidence suggests that when the organizational routines, which partners bring into a collaboration engagement, are discrepant, this can also lead to conflicts, tensions, slow and ineffective response to the need of coordination between the partners, and people 'opting out' of the relationship (Doz, 1996). In his study, Doz (1996) also remarked that the different intra-organizational routines which were brought by partners into the collaboration became baffling, disconcerting and ultimately aggravating to members of the collaboration. Therefore, it is assumable that intra-organizational routine alignment will have a positive effect on relationship conflict, but the levels will be higher for partners contributing complementary intra-organizational routines into the collaboration than for those contributing supplementary ones. Accordingly, the following hypothesis is presented:

Hypothesis 2: Complementary intra-organizational routines will affect relationship conflict levels more positively than supplementary intra-organizational routines.

Past studies have revealed that relationship conflict has a negative impact on group member satisfaction, individual and group performance, and the probability that a group will work together again in the future (Jehn, 1995; Shah & Jehn, 1993). Thus, relationship conflict, or the presence of interpersonal incompatibility within a group, has been entirely linked to bad performance (Peterson & Behfar, 2003). The reasons for this are manifold. First, the groups' information processing ability is negatively impacted by relationship conflict since it leads group members to expend more time and energy focusing on each other instead than on the groups' tasks (de Clercq, et al., 2009; Jehn & Mannix, 2001; Pelled, 1996). Second, the cognitive performance of group members is also negatively affected by increased levels of anxiety, tension and stress, resulting from the presence of relationship conflict (Jehn & Mannix, 2001; Pelled, 1996; Staw, Sandelands, & Dutton, 1981). Finally, relationship conflict stimulates group members to criticize each other in an unconstructive manner and make accusations for other group members' behavior, which can lead to a vicious circle of increased mutual hostility and conflict intensification (R. A. Baron, 1991; Janssen, Van De Vliert, & Veenstra, 1999; Peterson & Behfar, 2003).

Accordingly, since relationship conflict hinders groups in working efficiently and keeps their minds of the task at hand by inducing tension, animosity, and annoyance among group members—while not showing any beneficial characteristics—it can be inferred that its presence can only be detrimental to collaboration performance. This leads to the following hypothesis:

Hypothesis 3: Relationship conflict will have a negative effect on collaboration performance.

In hypothesis 1 a positive relationship between intra-organizational routines alignment and collaboration performance was suggested. Furthermore, in hypothesis 2 it was

proposed that intra-organizational routines alignment would be positively related to relationship conflict as well. Now, since hypothesis 3 suggests that relationship conflict will affect collaboration performance in a negative way, it logically follows that when relationship conflict is brought into the equation, the original relationship between intra-organizational routines alignment and collaboration performance should be reduced with increasing levels of relationship conflict. If these assumptions hold, then the conditions for mediation, as presented by Baron and Kenny (1986), would be fulfilled. Consequently, the following hypothesis is proposed:

Hypothesis 4: The positive effect of intra-organizational routines alignment on collaboration performance will be negatively mediated by relationship conflict.

2.2.2 The effect of task conflict on collaboration performance

From literature it can be concluded that relationship conflict has been identified as the harmful type of conflict which partners should seek to avoid (de Clercq, et al., 2009). In contrast, there is empirical evidence suggesting that, in moderate amounts, task conflict can be beneficial as it may contribute to a healthy level of discussion which may increase creativity and innovation—particularly relevant for complex cognitive tasks—and lead to overall better decision making by taking different perspectives into account when approaching problem solving (Amason, 1996; Janssen, et al., 1999; Jehn, 1995, 1997; Shah & Jehn, 1993). Nevertheless, it is assumable that very high levels of task conflict may again be detrimental for collaborative innovation since partners may not arrive at any consensus whatsoever, thus hindering performance. In fact, these considerations are supported by the findings of De Dreu (2006), who examined task conflict in relation to innovation teams; his findings indicate the existence of a curvilinear relationship between task conflict and innovation. Jehn (1995) also talked about the existence of a curvilinear relationship between task conflict and the performance of groups conducting non-routine tasks, suggesting that an optimal level of task conflict could be found. For this reason, it seems justified to assume a curvilinear effect between task conflict and collaboration performance. However, if task conflict does indeed show a curvilinear relationship to collaboration performance, then this would complicate the process for examining a mediating effect of task conflict on the relationship between intra-organizational routines alignment and collaboration performance. For this reason, the following hypothesis will be tested:

Hypothesis 5: Task conflict will affect collaboration performance in a curvilinear fashion.

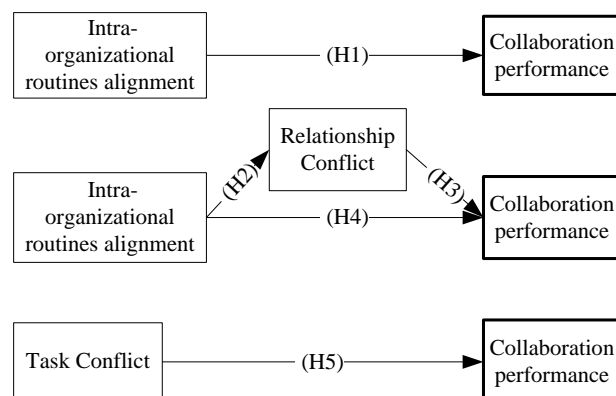The suggested causal relationships are illustrated bellow:

Figure 1. Examined causal relationships

3. METHODS

To investigate the hypotheses, the study draws on the data collected in the experiment conducted by Spin (2011), who employed a one factor between-subjects experimental design. Experiments are often used in social research to develop generalized understandings about specific issues and are particularly suitable for testing hypotheses as they focus on the determination of causation (Babbie, 2007). In summary, this section provides an overview of the conducted experiment as well as a description of how the data was collected, it illustrates the measures that were employed, and it presents the type of analysis which was carried out.

3.1 Sample

The sample in the experiment consisted of 192 college-students who were randomly assigned to groups of three to be exposed to the treatment. After the treatment, two groups of three were assigned to one group of six for the collaboration. A total of 32 groups were formed in this manner, of which, 31 delivered results which were suitable for the inclusion in the ensuing analysis. Data of 190 participants, mostly aged between 17 and 28, were included in the dataset as not all questionnaires were returned. Of the 190 participants 132 were male and 58 were female. To elicit participation, an incentive in the form of a lottery ticket (worth € 3.-) was given to each participant. Finally, before the experiment was executed, a pre-test was conducted to provide insights for making adjustments to the procedure and questionnaires.

3.2 Procedure

The procedure consisted of three phases. The first phase was the treatment phase. The second phase was the actual collaboration phase, and in the third and final phase, all participants were asked to fill out a questionnaire.

The first and third phases took around 30 minutes to complete while the collaboration phase took exactly 30 minutes.

The participants were randomly assigned to either supplementary or complementary collaboration. In every condition six participants collaborated. Supplementary groups consisted of either two groups of three that were taught to work in a serial way or two groups of three that worked in a parallel fashion. Complementary groups consisted of one group of three accustomed to work serially, and the other group had been taught to work in a parallel manner.

To acquire those two conditions, the first phase of the experiment subjected the participants to the treatment procedure. In the experiment, participants had to build plane models out of Stickle Bricks (similar to LEGO blocks). In the serial routine condition the participants had to work together and each participant had to execute one step of the design to jointly produce every model. They were also told what model to make an in what quantity. In contrast, in the parallel routine condition, participants worked individually on one model and where not told what model to make.

The main experiment took place in the second phase when teams could be brought together for the collaboration. In the collaboration phase, the teams were faced with the challenge to address different customer's problems in innovative ways (creating different types of airplanes). Only little information on the requirements was given to encourage creativity and innovation, and to facilitate the comparison of solutions, to make it possible to measure the collaboration's performance. Nevertheless, participants were provided with some guidelines such as having to take part in the collaboration and having to decide on the amount of time spent on each solution.

In the final phase of the experiment, the participants were dismissed and asked to fill out a questionnaire. In addition, video recordings of the collaboration phase were made to provide data for further research.

3.3 Measures

3.3.1 Dependent variable

Collaboration performance is the main dependent variable of the experiment and it was measured in terms of collaborative innovation.

Collaborative innovation was calculated by comparing the planes which were created by each of the groups in the collaboration, based on the model type (out of a maximum of 15 possible models). Pictures were taken of all of the planes which were created during the collaboration and, after a process of randomization, each time four planes (appertaining to a particular model type) of four different groups were compared with one another and ranked from most innovative (receiving 4 points) to least innovative (receiving 1 point). All comparisons were carried out by two independent scorers to test for inter-rater reliability.

Finally, after averaging the scores given by the two raters to each of the planes which were produced by each group, the scores were added up and divided by the total number of planes produced by each group. This provided the final collaborative innovation score for each group. To examine the level of inter-rater reliability the Kappa statistic was calculated to compare the scores which were given by the two raters. The result for Kappa was 0.515, which can be interpreted as moderate agreement (Landis & Koch, 1977). To establish an index for the collaborative innovation score; the mean of the collaborative innovativeness' scores across the groups was calculated.

3.3.2 Independent and mediating variables

Intra-organizational routines alignment is the main independent variable in this study and it was measured in the same way as was done by Spin (2011), meaning that it was operationalized as supplementary and complementary intra-organizational routines which were manipulated in the experiment and induced through the procedure. Two types of routines were induced (serial and parallel work routines) which yielded supplementary or complementary intra-organizational routines alignment in the collaborating groups.

Thus, supplementary groups where those in which two groups of three people which were all trained in either serial or parallel work routines were put together. In contrast, complementary groups were formed by assigning one group trained in parallel work routines and one trained in serial work routines, together.

Due to the expected curvilinear effect of task conflict on collaboration performance, task conflict was included as a second independent variable in terms of its relationship with the outcome variable. In contrast, relationship conflict was presented as a mediating variable in the relationship between complementary intra-organizational routine alignment and collaboration performance. To calculate the levels of task conflict and relationship conflict within the groups, a questionnaire was employed which is based on the items presented in the Intra-group conflict scale developed by Jehn (1995). Five questions were used to measure relationship conflict and four to measure task conflict. Answers could be given on a 5-point Likert scale (e.g.: 1 = very little/none, 5 = very much; for more details on the questionnaires see the Appendix). However, this provided a measurement of the conflict variables at the individual level, but since this study measures the proposed relationships at the group level, it was necessary to aggregate the results of the questionnaires to arrive at a group level measurement of the variables. For this purpose, the points corresponding to each of the answers which were given in the questionnaires by each member of each group were added up and divided by the number of questions for each construct, as well as the number of group members. This provided an average measure of the level of task conflict and relationship conflict which was present in each group. Individual missing values for the items in the questionnaires were substituted by the individual's group average for that particular item, provided that not more than the score for one item was missing in his or her answers.

To ensure that the different items which were used in the questionnaire provided a valid measurement for task conflict and relationship conflict a factor analysis was conducted. A factor analysis is commonly used to test the construct validity of a questionnaire (Rattray & Jones, 2007). The Kaiser-Meyer-Olkin Measure confirmed the adequacy of the sample for the analysis (KMO = .839) The results of the factor analysis were quite satisfactory since they showed that the questions one to five of the questionnaire loaded highly on the first factor (above 0.7) and since these five questions measure relationship conflict this was the expected result. On the other hand, the questions seven to nine load highly on the second factor (above 0.8), representing task conflict, so this was also as expected. Only question six, which was also supposed to measure task conflict, showed high loadings on both factors (above 0.5) but when looking at the question in more detail this is not surprising since the questions asks about the level of disagreements over the opinions of group members and for strong disagreements over opinions it can sometimes be difficult to distinguish if they are task related or relationship related. Nevertheless, the content of the question has been used by many past studies as an indicator of task conflict so its validity as an indicator of this type of conflict is quite justified (Doz, 1996; Jehn, 1995, 1997; Jehn & Mannix, 2001). To test the reliability of the constructs the Cronbach's α statistic was calculated; the results for the five items related to relationship conflict as well as the 4 items related to task conflict showed high reliability (Cronbach's α = 0.92, and 0.88 respectively).

3.3.3 Type of analysis

To test the proposed hypotheses linear regression was chosen as the method of analysis. Regression analysis is suitable to predict the outcome of one variable from another (Field, 2009) and, since the presented hypotheses revolve around predicting the outcome of collaboration performance using different variables as individual predictors, regression analysis is applicable. However, regression analysis usually requires continuous variables of a higher measurement level (at least interval) (Field, 2009), and since intra-organizational routines alignment is a dichotomous categorical variable, in this case, the technique of dummy coding had to be employed. The technique of dummy coding consists of recoding the categories of the categorical variable in such a way that only 0's and 1's are used as values; when there are more than two categories new variables have to be created (Field, 2009), however, in this case it was only necessary to change the original values such that a 0 was used to represent complementary intra-organizational routines and a 1 was used for supplementary routines.

4. RESULTS

Table 1 below provides a summary of the correlations, means and standard deviations of the variables which were examined in this study.

Table 1. Means, standard deviations and correlations of the variables (N = 31)

	Mean	St. dev.	1	2	3	4	5
Task_conflict	1,95	,41	1				
Task_conflict_squared	3,97	1,74	,994**	1			
Compl(0) vs. Suppl(1)	,35	,49	-,130	-,115	1		
Innovation_score	2,52	,45	-,089	-,072	,447*	1	
Relation_conflict	1,46	,34	,575**	,615**	,019	-,068	1

Notes.: *p<0.05; **p<0.01 (2-tailed)

Hypothesis 1 assumed that complementary intra-organizational routines would affect collaboration performance more positively than supplementary routines. Contrary to what was assumed, the results of the first regression analysis (see Table 2.) show that supplementary intra-organizational routines are more positively related to collaborative innovation than complementary routines. The mean innovation score for complementary groups was 2.38 (SD = .38) whereas supplementary groups showed on a mean score of 2.79 (SD = .45), this result was also significant (p = .01). In addition, the model explains 20% of the variability of collaborative innovation (R^2 = .2).

Table 2. Summary for regression analysis of intra-organizational routines alignment and collaborative innovation (N = 31)

Variable	B	SE(B)	ß	t	Sig.(p)
(Constant)	2,376	,091		26,127	,000
Compl(0) vs. Suppl(1)	,411	,153	,447	2,694	,012

Note.: R^2 = 0.20

Hypothesis 2 suggested that complementary intra-organizational routines would affect relationship conflict levels more positively than supplementary routines. As turned out (see Table 3.), the mean relationship conflict level for supplementary intra-organizational routines was marginally higher than the one for complementary routines (M = 1.47 vs. 1.46, respectively). However, R^2 was 0 and the result was not significant (p = .92).

Table. 3 Summary for regression analysis of intra-organizational routines alignment and relationship conflict (N = 31)

Variable	B	SE(B)	ß	t	Sig.(p)
(Constant)	1,457	,078		18,680	,000
Compl(0) vs. Suppl(1)	,014	,131	,019	0,104	,918

Note.: R^2 = 0

In hypothesis three a negative relationship between relationship conflict and collaboration performance was presented. While the beta coefficient was as expected negative (b = -.09), the results (see Table 4.) showed that relationship conflict was not a good predictor of collaboration performance (R^2 = .01) and, the outcome was not statistically significant (p = .72).

Table. 4 Summary for regression analysis of relationship conflict and collaborative innovation (N = 31)

Variable	B	SE(B)	ß	t	Sig.(p)
(Constant)	2,651	,362		7,316	,000
Compl(0) vs. Suppl(1)	-,088	,241	-,068	-,365	,718

Note.: R^2 = 0.05

Hypothesis 4 suggested a negative mediating effect of relationship conflict on the relationship between intra-organizational routines alignment and collaboration performance. However, since hypothesis 2 and 3 already showed insignificant results, a mediating effect cannot be confirmed, since the conditions for mediation are not established (R. M. Baron & Kenny, 1986).

Finally, hypothesis 5 suggested a curvilinear relationship between task conflict and collaboration performance, and it was examined using hierarchical regression analysis. To look for a linear effect, the squared term of task conflict was calculated as has been done in past studies (De Dreu, 2006; Jehn, 1995). While the results of the analysis (see Table 5.) show that there is a notable increase in the variance of collaborative innovation which is explained by task conflict when assuming a curvilinear rather than a linear effect on predicted variable (R^2 increases from .01 to .03.), in both cases the results were not significant (p = .45 and .64, respectively). Therefore, it is not possible to confirm the assumption made in hypothesis 5. In addition, as is revealed by the beta coefficients of the model, the curvilinear relationship which came out was U-shaped and not inverted as was expected. This would mean that low levels and high levels of task conflict would be more beneficial for collaborative innovation then moderate levels, and this would contradict the findings which have been made in several other studies (De Dreu, 2006; Jehn, 1995, 1997).

Table 5. Summary for regression analysis of task conflict and collaborative innovation (N = 31)

M[*]	Variable	B	SE(B)	ß	t	Sig.(p)
1	(Constant)	2,71	,405		6,71	,000
	Task_con-flict	-,097	,203	-,089	-,48	,635
2	(Constant)	4,11	1,88		2,19	,037
	Task_con-flict	-1,47	1,81	-1,34	-,81	,425
	Task_con-flict_squared	,32	,42	1,26	,76	,454

Notes.: [*]=Model; Model 1: R^2 = 0.08; Model 2: R^2 = 0.28

5. DISCUSSION AND CONCLUSION

Overall the results were not as expected. In the first place, it was surprising to find out that supplementary intra-organizational routines were more positively related to collaborative innovation than complementary routines, since more diversity is usually beneficial for innovation and creative processes. Nevertheless, there are many potential explanations for the results that were encountered. For example, as was mentioned before, routine alignment is not the same a resource alignment and while there is a fair amount of literature talking about the advantages of complementary resource alignment, in the end this doesn't mean that the same does apply to routines. In fact, as was also argued, differing intra-organizational routines can have many negative influences on collaboration performance (e.g. they can become baffling, disconcerting and ultimately aggravating to members of the collaboration) (Doz, 1996). In addition, the approach which was chosen in the experiment for representing collaborative innovation within the groups, allows only for an, arguably, one-sided and incomplete measure of innovation, as will be illustrated in more detail in the limitations section. This of course affects the outcomes of the entire investigation.

The results for the remaining hypotheses were not significant, but here it has to be stated that the overall levels of task conflict and relationship conflict which were measured with help of the questionnaires were in general pretty low; the mean relationship conflict levels were close to the none/very little category (M = 1.46, SD = .34) and task conflict levels were also on average quite low (M = 1.95 SD = .41) and of course this makes it difficult to accurately assess the impact of differing levels of conflict on the examined relationships.

However, it is not surprising to encounter such low levels of conflict within the collaborating groups since the participants of the collaboration didn't have anything at stake as would be the case between partners of a real world collaboration engagement where there are often performance, financial and strategic pressures at work. As a result, participants in the experiment didn't have the kind of pressures which may typically lead to higher levels of conflict between collaborating partners, since bad performance didn't result in any kind of negative repercussions which may have incentivized individuals to being more persistent in defending their opinions. Consequently, it is assumable that emerging conflict situations were quickly superseded by indifference as getting hung up in disputes was simply not worth it.

In addition, while task conflict was less affected by this, the way in which the experiment was designed (e.g. trying to simulate a collaboration initiative in a single 30 minute collaboration engagement) made it quite difficult for relationship conflict to develop, as 30 minutes barely gives the group members enough time to get to know each other, so it is unlikely for interpersonal conflicts to develop and become apparent so fast.

Consequently, the substantially low levels of conflict which were measured within the collaborating groups didn't allow for an appropriate testing of the subsequent hypotheses since the influence which varying levels of conflict have on collaboration performance could not be adequately examined as the actual results were largely clustered at the lower levels. Particularly the fifth hypothesis would require a fair amount of groups indicating higher levels of task conflict to enable the proper testing of a curvilinear relationship between that type of conflict and collaboration performance.

In conclusion, aside from the finding that supplementary intra-organizational routines affected collaboration performance (collaborative innovation) more positively than complementary routines, which is, arguably, a controversial finding, the remaining results were inconclusive and not statistically significant. Nevertheless, conflict remains a very interesting social phenomenon and understanding the role that the different types of conflict play in influencing the performance of intra-organizational collaborations remains a topic worth studying as there is a considerable amount of theory and empirical evidence suggesting that different types of conflict can in fact affect the relationship differently (de Clercq, et al., 2009; De Dreu, 2006; Janssen, et al., 1999; Jehn, 1995; Jehn & Mannix, 2001; Vliert & deDreu, 1994). However, a proper assessment of this relationship would require an experimental design which sets up conditions that could induce the unfolding of conflict in a more natural way. In addition, a sample which is large enough to make it possible to capture the different types of conflict at as many levels as possible would also be desirable to allow for a more accurate assessment of their effects on collaboration performance. Yet, this is something which will have to be left to future research.

6. LIMITATIONS AND SUGGESTIONS FOR FURTHER RESEARCH

There were a number of limitations in this study which have to be addressed.

Firstly, the research had to carried out with the data which had already been collected in the experiment conducted by Spin (2011). As a result, the experimental design could not be optimized to allow for a more accurate representation of the constructs under investigation. Secondly—as an experiment was employed—the sample consisted of students and not employees of companies involved in a collaboration engagement, which limits the generalizability of the findings.

Thirdly, one of the more obvious limitations in the experiment was the relatively low sample size; it is assumable that a bigger sample could have provided a better distribution of the collected data. However, for conflict levels to truly become more representative of a real life situation, adjustments to the experimental design would have to be made. For instance, one way to increase commitment and participation which could also in turn increase opportunities and stimulation for confrontation would be to offer a prize for the best performing (or most innovative) group(s). Yet, it still remains questionable whether a small group of students engaging in a single 30 min. collaboration process can accurately capture the complex processes which take place in a real world collaboration engagement between two organizations.

Fourthly, as was touched before, another factor which affected the results was the approach which was used for representing

collaborative innovation in the experiment. Measuring innovation levels in the given experimental setting was not an easy task since the items which had to be produced in the collaboration process where only very simple plane models which didn't have to meet any functional or financial requirements (e.g. airworthiness or costs of production) so the measure was based entirely on design. This is, arguably, an incomplete measure of innovation since innovation in organizations usually involves making changes to (or creating new) processes and/or products which can help organizations grow by delivering more value to customers (Sullivan & Dooley, 2009). As a result, no matter how the measurement for collaborative innovation was designed, collaborative innovation could only be measured in a fairly one-sided fashion which may not be representative of the type of innovation which is usually pursued by partners of real world collaborations.

In addition, originally it was intended to make use of observational data—from the videos recorded in the experiment—to allow for an improved assessment of the levels of the process variables such as task conflict and relationship conflict. Unfortunately, a number of issues, which included; time constraints, language barriers, and inconsistencies with the videos themselves, made this task unfeasible for the scope of this research. Nevertheless, an observational coding scheme was developed which could be used in future research, along with an observational coding program such as The Observer XT, to provide an even better assessment of the levels of task conflict and relationship conflict present within the studied groups, by comparing the measurements from the observational coding with those acquired from questionnaires. To develop the coding scheme, previous research which has also dealt with observational data from video recordings was consulted. Künzle, Zala-Mezö, Kolbe, Wacker, and Grote (2010), established an observational coding scheme to code for leadership in anesthesia teams. The coding scheme of Künzle et al. (2010) consisted of four elements, namely; the main category, the code, the observational behavior, and an example of the given behavior. Using this as a guide, the items from the Intra-group conflict scale developed by Jehn (1995) where adapted into the coding scheme to enable observational measurement of the conflict variables. This resulted in the coding scheme presented in Table 6.

7. ACKNOWLEDGMENTS

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Table.6 Coding scheme for task and relationship conflict

Main Category	Code	Observable behavior	Example
Task Conflict	Disagreements about opinions	Group members express strongly conflicting opinions	"You are wrong! A jet fighter looks like this!"
	Conflicts about ideas	Group members propose different ideas on how to solve problems	"I have an idea, why don't we do it like this". "No, I think I have a better idea…"
	Conflicts about work tasks	Group members show conflicting viewpoints on how to best proceed with the given tasks	"I think we should work on a serial manner" "No, the parallel way is better"
	Differences in opinions	Group members express more or less conflicting opinions	"A space shuttle needs wings!" "Yes but the wings should be very small"
Relationship Conflict	Friction	Group members clash constantly against each other and the focus of their disputes shifts from the tasks towards personal indignations.	"That is just stupid, where did you learn that?" "No, you are being stupid!"
	Personality conflicts	Group members show strongly differing personalities which hinder them from working together as a group	Faction building is observable where the group gets divided (informally but observably) into sub-groups.
	Tension	The atmosphere in the group is not relaxed or even calm. Instead group members show signs of strain and discomfort.	Group members may draw themselves back from the collaboration process.
	Emotional conflicts	Group members react with strong emotions towards other group members contributions. Feelings get hurt.	Individual group members are clearly angered and some (more sensitive ones) might even start sobbing or even crying.

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APPENDIX
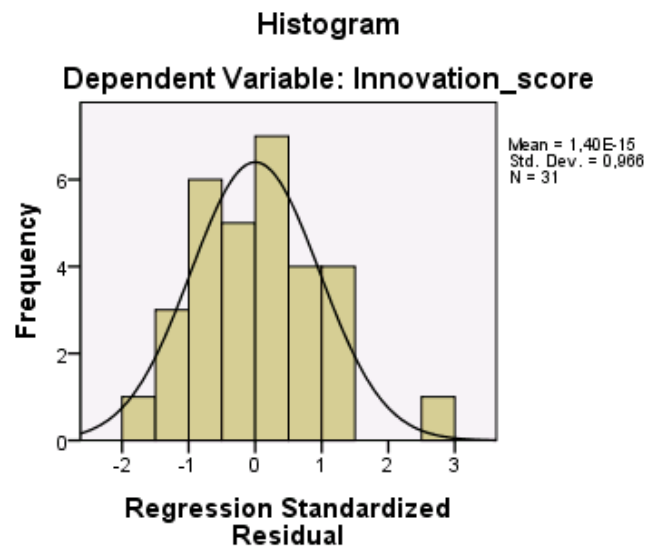
A.1 Questionnaire for measuring conflict

Jehn (1992, 1994) developed the Intragroup Conflict Scale (ICS) to measure two theoretically distinct dimensions of conflict: relationship and task conflict. Items 1-5 represent relationship conflict; items 6-9 represent task conflict. None of the items are reversed-scored.

	Very little / none	A little	Not little / not much	Much	Very much
1. How much emotional conflict was there among the members of the collaboration?	☐	☐	☐	☐	☐
2. How much anger was there among the members of the collaboration?	☐	☐	☐	☐	☐
3. How much personal friction[1] was there in the collaboration during decisions?	☐	☐	☐	☐	☐
4. How much were personality clashes between members of the collaboration evident?	☐	☐	☐	☐	☐
5. How much tension was there in the collaboration during decisions?	☐	☐	☐	☐	☐
6. How much disagreement was there among members of your collaboration over their opinions?	☐	☐	☐	☐	☐

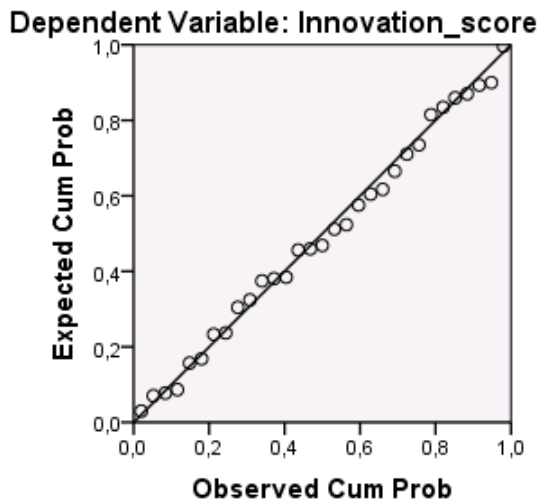|	Very few / none	A few	Not few / not many	Several	Many
7. How many disagreements over different ideas were there?	☐	☐	☐	☐	☐
8. How many differences about the content of decisions did the collaboration have to work through?	☐	☐	☐	☐	☐
9. How many differences of opinion were there within the group?	☐	☐	☐	☐	☐

A.2 Histogram and residuals for regression of relationship conflict and collaborative innovation
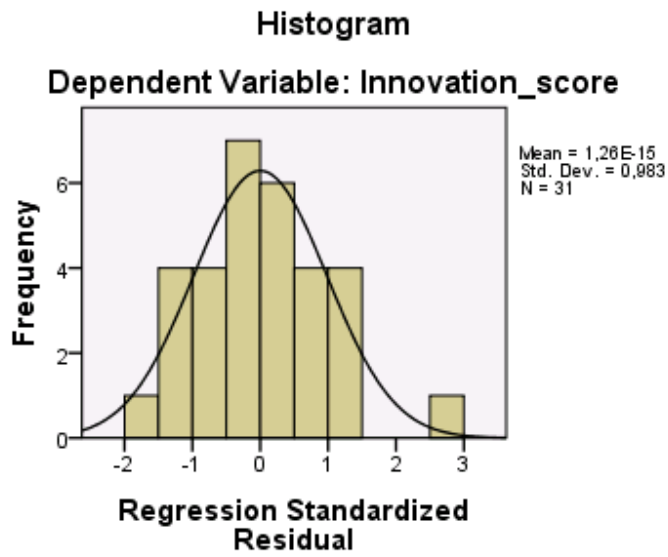
A.3 Histogram and residuals for regression of task conflict and collaborative innovation