The Effect of Inter-Organizational Team Cooperation on Collaborative Innovation Performance

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ABSTRACT

Collaborations between organizations have become increasingly important in today's business in order to enhance one's innovativeness. However, these collaborations still show high failure rates, for which it is crucial to determine the factors enabling success (and failure) of these collaborations. Therefore, this study will focus on the effect of cooperation within inter-organizational teams that arise during such collaboration, on collaborative innovativeness by investigating the degree of cooperation within an inter-organizational team, as well as the degree of inter-organizational cooperation within a team. The results show a positive relationship between the degree of inter-organizational cooperation and collaborative innovativeness, whereas there is not enough evidence to establish the relationship between the degree of cooperation within a team and collaborative innovativeness.

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Keywords

Strategic alliances, innovation, collaborative performance, collaborative innovation, inter-organizational cooperation

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1. INTRODUCTION

A fast growing number of organizations have recently engaged themselves in some form of collaboration, or strategic alliance, as an attempt to gain either a competitive advantage or growth (Anand and Khanna, 2000; Kale and Singh, 2009). Strategic alliances can be defined as "voluntary arrangements between firms involving exchange, sharing, or co-development of products, technologies, or services" (Gulati, 1998). A few years ago, the top 500 of global businesses already reached an average of 60 strategic alliances each (Dyer et al., 2001). According to Dyer et al. (2001), strategic alliances are used as a fast and flexible way to gain access to complementary resources and skills. Organizations involved in strategic alliances try to benefit from such collaborations through the acquisition/creation of new knowledge, the acceleration of existing information (Caloghirou et al., 2003), and access to complementary information and assets (Hagedoorn, 1993; Hite and Hesterly, 2001; Scott, 1996), and sharing of costs and risks among the members of the cooperative agreement (Beath et al., 1998; Hagedoorn, 1993; Sakakibara, 1997). As a result, organizations can foster a competitive advantage (Kogut, 1988) and gain market power (Pfeffer and Nowak, 1976) through developing more technological and innovative successes (Aschhoff and Schmidt, 2008).

However, inter-organizational collaborations can also turn out to be remarkably complex and risky (Gulati et al., 2012). Many have already examined the occurrence of failure in strategic alliances, and often found failure rates exceeding 50% (Kale et al., 2002; Kale and Singh, 2009; Lunnan and Haugland, 2008). With such high failure rates, it is crucial for managers to recognize and understand the features that are on the base of success (or failure) of these strategic alliances in order to be able to manage their alliances optimally. These determinant features can be examined within two main streams (Lui and Ngo, 2005). On the one hand focus can be on input; which elements do partners bring into the collaboration. On the other hand, emphasis can be on the process and development occurring throughout the collaboration. Both streams have their own influence on the organization's output performance. The input of partners – e.g. complementary resources – within alliances has been the center of research for a long time. Nevertheless, current literature also proposes that failure of strategic alliances is not due to the lack of complementarity of resources, but because of the absence of compatible operating systems, decision-making processes, and cultures (Buono and Bowditch, 1989), which is still agreed upon by multiple researchers (e.g. Friedman et al., 2015; Giessner et al., in press; Schein, 2010). So, failure is not only due to input complications, but also because of the process during collaboration. Dyer et al. (2001) identified some reasons of failure appearing during the process of collaboration. They concluded that cultural clashes causing conflict, shifting objectives that no longer match the individual objectives, and lacking abilities to provide the right internal coordination are among the most important sources of failure. Furthermore, to make strategic alliances work, participating organizations need to cooperate and constantly evaluate (Stilles, 1994). It requires commitment of all members partaking in the strategic alliance.

Besides, within the current complex and highly competitive market (Kale and Singh, 2009), collaboration and strategic alliances have also become an increasingly important element of the innovation process (Aschhoff and Schmidt, 2008) as new product development teams are playing a key role in securing organizational success in terms of developing new and innovative products (Katila and Ahuja, 2002). Hence, it has already been concluded that cooperation among team members does increase innovativeness significantly (De clercq et al., 2011; Sethi et al., 2001). And successful integration of strengths from all participating organizations in such teams requires cooperation, interaction, and knowledge sharing among individual team members (Hesamamiri et al., 2013; Mahdavi and Hesamamiri, 2014; Jafari et al., 2011). For managers it is essential to understand how these inter-organizational teams will perform best and what influence this will have on their innovative performances. But whereas team effectiveness has received frequent attention concerning optimal team composition and formation to perform most effective (e.g. Baiden and Price, 2011; Barrick et al., 1998; Cohen and Bailey, 1997; Loo, 2003), evidence regarding actual cooperation within inter-organizational teams and their relation to innovate performance is still scarce in the current literature. Therefore, this research will contribute to the current literature by empirically examining the effect of this cooperation on the collaborative performance of the inter-organizational team. This research also contributes to the field by providing practical information for managers that are – currently or in the near future – managing and coordinating inter-organizational teams rising from strategic alliances with other organizations. Consequently, this research will focus on the following question in order to narrow this knowledge gap:

To what extent does cooperation in inter-organizational teams have an effect on collaborative innovation performance?

To be able to answer this question, first existing literature is analyzed concerning the topics of inter-organizational teams and team effectiveness, after which an empirical experiment is conducted to gather data from which the effect of coordination on the innovativeness of teams can be examined. Furthermore, a discussion will be provided from which a conclusion is drawn, ending with several limitations and implications.

2. LITERATURE REVIEW AND HYPOTHESIS

2.1 Inter-Organizational Teams and Team Effectiveness

Many claim that teamwork is a crucial success factor for an organization as well as in collaborations between organizations (e.g. Hoegl and Gemuenden, 2001; Kirkman and Rosen, 1999). Furthermore, according to De Dreu and Weingart (2003), teamwork is increasingly important to enhance innovation within organizations. And as a result of a collaboration between two or more organizations, inter-organizational teams are being organized. Inter-organizational teams can be defined as teams of which the members originate from different organizations assigned to work together for a common objective, share resources, interact socially, exhibit task interdependencies, and retain and manage boundaries. Using inter-organizational teams is seen as most beneficial in case of highly complex tasks, since such teams are more suitable to share not only resources, but also the workload, monitor behavior of other members, and the possibility for members to develop and contribute expertise (Mathieu et al., 2000). But in order to truly obtain all benefits, it is crucial that these teams cooperate in an optimal way such that they can perform most effective and innovative.

Team effectiveness in this context is defined as "the extent to which a team achieves its goals" (Hackman, 1987). Berné (1963) concluded that the effectiveness of inter-organizational teams is depending on two main factors: team composition and power distribution. According to Berné (1963) and Stock (2006), the outcomes of such inter-organizational teams are most effective and innovative when each partaking organization gets to be represented equally within the team, which is thus a matter of team composition. According to these researchers, it is best if all participating organizations can send the same number of team members to the collaboration, rather than one organization obtaining a majority and therefore more power.

Another perspective on team effectiveness is provided by McGrath (1964) and Mathieu et al. (2008). They proposed that other factors such as individual team member characteristics (e.g. competences, personalities), team-level factors (e.g. task structure, leader influences), and organizational and contextual factors (organizational design, environmental complexity) determine the degree of team effectiveness as well.

Furthermore, team size has also shown to be an important determinant for corporate success. But with a larger team size comes the importance of participation of all team members. A team can consist of twenty team members, where only a handful is working together, while in another team of five members, all five are also contributing. Therefore, team size and the number of people participating is an important factor, eventually influencing the performances of these teams. This is a topic that has already been extensively investigated (Bales and Borgatta, 1966; Bales et al., 1951; Callahan et al., 1974; Diehl and Strobe, 1987; Gentry, 1980; Schneider and Zimet, 1969). All of these studies concluded that as team size increased, the amount of communication and cooperation decreased (Wheelan, 2009). Additionally, others established that small teams tend to be more efficient and productive (Gist et al., 1987; Laughlin, et al., 2006; Wheelan and McKeage, 1993). However, on the contrary some found that with an increased team size, productivity and performance also increased (Fink and Thomas, 1963; Fox et al., 1953). But more recently, Wheelan (2009) found that teams of three to six members were more productive and innovative than larger teams. Moreover, she also found that teams consisting of three to four members were significantly more productive and innovative than groups of five to six, or less than three, members. Accordingly, considering team size there seems to be an optimum of when teams are most effective and innovative. This knowledge can be taken into account talking about cooperating within inter-organizational teams, to formulate the following hypothesis:

H1: The number of team members actually working together on the job has an inverted U-shaped effect on innovative performances of the team with an optimum between three and four people.

Additionally, a question that has been the center of numerous researches regarding team effectiveness is whether to emphasize and encourage cooperation, or competition (Beersma et al., 2003). According to Beersma et al., some belief that by rewarding team members for good performance and imposing sanctions for bad performances, efficiency and innovation increases as it encourages members to outperform one another. But on the other hand they also think that competition could support own interests above the objectives and interests of the overall organization. They concluded that organizations should emphasize cooperation over competition to promote trust, cohesiveness, and mutually supportive behavior among team members so that it eventually endorses innovativeness (Ivancevich and Matteson, 1999). Moreover, Blindenbach-Driessen (2015) states that simply putting together a team consisting of members with different backgrounds does not automatically leads to high innovation levels, but can, for instance, brings new ideas into the process. Overall, it has been concluded that inter-organizational teams that cooperate extensively with team members of all participating organizations outperform those that do not (Lovelace et al., 2001; Nakata and Im, 2010; Stock et al., 2013). They found that the better the different parties cooperate with one another, rather than maintaining within their own network even though they are on one team together, the better their efficiency and innovative performances will be. Accordingly, the following hypothesis will be tested throughout this study:

H2: The degree of inter-organizational cooperation has a positive effect on innovative performance of the team.

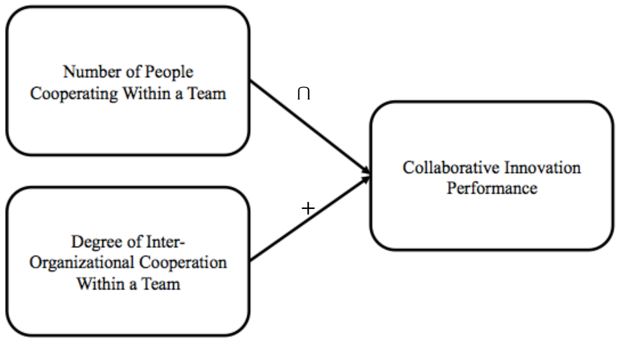

Figure 1: The effect of the number of people cooperating within teams (H1) and the degree of inter-organizational cooperation within teams (H2) on collaborative innovation performance

3. METHODOLOGY

To test the hypotheses, this study draws on the data collected in an experiment of Spin (2011). The following subsections will elaborate the operationalization of the dependent and independent variable and analysis.

3.1 Participants

The sample in the experiment consisted of 210 college-students of the University of Twente, which were randomly assigned to 35 groups of six participants each[1]. All participants received an incentive for their participation in the form of a lottery ticket worth three Euros.

3.2 Procedure

The experiment consisted of three different phases[2] in which simple airplanes are build, from which two phases are used in this research: (1) learning the routine, and (2) collaboration. In phase one, a randomly assigned group of three participants learns one out of four routines: parallel versus serial production, paired with body versus wing production. In the parallel production method, participants learn to produce a model simultaneously, while in the serial production method participants learn to produce a model all together in a serial manner.

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[1] Since this data is obtained from another experiment by Spin (2011), information on the spread of male/female and ages of the sample cannot be received by now.

[2] The first two phases of the experiment were part of a bigger experiment conducted by Spin (2011) from which the data could be used in this study.

In the second phase of the experiment, two groups of each three participants (from phase one) are assigned as a team of six members to work together to construct multiple airplane models. Each team is given a time of exactly 30 minutes to complete a maximum of 15 (different) prototypical airplanes. The composition of each team is either compatible (both groups of three persons learned either the parallel or the serial production method), or complementary (one group of three persons learned the parallel production method and one group of three persons learned the serial method). For the construction of the airplanes, Stickle bricks are utilized. During this phase, limited information is provided only stating the 15 assignments without an explanation on how to build them. This second phase, in which the construction and collaboration took place, is recorded on camera, which simultaneously is the raw data used for this particular study.

After these two phases of the original experiment, the videos made during the collaboration phase were analyzed according a coding scheme (see Appendix I) to determine the degree of cooperation within each team.

3.3 Measures

Data used in this study is collected through the video recordings made during the collaboration phase of the experiment, together with the innovation ratings of each team as already established within the study of Spin (2011).

3.3.1 Dependent Variable

The dependent variable in this study is collaborative innovation performance. Innovativeness is conceptualized as the product innovativeness of the airplanes produced during the collaboration phase of the experiment. As innovation is a variable challenging to quantify, there is no straightforward measure for it (Spin, 2011). Several previous studies have used patent calculates as a proper proxy (Tomlinson, 2010), but this experiment allows different measures for innovation than real-life situations. Other measures that have been regularly used are the number of innovations brought to the market, or perceptions on innovations of people from within the organization (e.g. Lai and Chang, 2010). However, in this experiment, all groups receive the exact same product descriptions, and so they have to produce the same kind of new products, which eventually will be comparable to each other.

In this study, innovativeness is measured using a method described by Troyer and Youngreen (2009), where innovativeness is determined by calculating the frequency of each solution across all collaborations in all conditions of the experiment as a proportion of the total number of solutions generated. The inverse of that proportion will be taken resulting in a higher value for a more innovative solution. Because a total of 15 different models could be generated in this experiment, every single solution was rated against all other solutions within the model made by other groups. Ratings were provided on a point scale from three (very innovative) to one (least innovative).

3.3.2 Independent Variables

The first independent variable in this study is the degree of cooperation within an inter-organizational team, and is operationalized through counting the number of team members actually working on the given task. All 35 videos retrieved from the collaboration phase of the experiment were analyzed per accomplished model (and per group) to determine how many team members out of six are actually contributing to the end-product (the airplane). Throughout the process of 30 minutes, each team will be analyzed per produced model for how many team members are contributing. This will give a total, from which a team average of contributing participants per model can be calculated, which will then be compared to the corresponding innovation rates of the team. That way, the higher the average, the higher the degree of cooperation within an inter-organizational team.

Table 1. Operationalization of Variables

Variables	*Definition*	*Operationalization*
Collaborative innovation performance	Innovativeness of the end-product produced by a team	Measured by calculating the frequency of each solution across all collaborations in all conditions of the experiment as proportion of the total number of solutions. Taking the inverse of that proportion generates a rating. Cohen's Kappa is used to determine the inter-rater reliability.[3]
Degree of cooperation within inter-organizational teams	Number of team members contributing to the end-product	Measured by analyzing the videos of each team to see how many team members are contributing per generated model. The end total of team members contributing will then be divided by the number of models generated to get an average number of participants contributing per model. Again, Cohen's Kappa is used to measure the inter-rater reliability, which was calculated per team, resulting in ratings ranging from .706 and 1, with an average of .863.
Degree of inter-organizational cooperation	The degree of collaboration between both participating organizations during the collaboration	Measured by analyzing the videos of each team to determine per model whether the contributing team members are from group A and/or group B so that an end-total of members from group A and B will be found. Then, an average for both groups will be generated by dividing the total by the number of models produced. To generate a cooperation ratio, the smallest average (either from group A or group B) will be divided by the biggest of both, per team. Now, a higher ratio indicates a higher degree of collaboration. For this variable, the inter-rater reliability is calculated (using Cohen's Kappa again) separately for group A and group B of each team. These ratings range respectively from .707 to 1 with an average of .870, and from .793 to 1, with an average of .876.

[3] Due to the reliability on the data from another experiment conducted by Spin (2011), the exact inter-rater reliability rate cannot be received, as this rate is not yet determined.

Table 2. Descriptive statistics (in) dependent variables

	M	*SD*	*N*
Innovation scores	.5203	.10145	35
Average number of people working together	2.75643	.915487	35
Average number of people working together (squared)	8.41207	5.356822	35
Degree of inter-organizational cooperation (ratio)	.69454	.193223	35

The second independent variable is the degree of inter-organizational cooperation. Since each team of six participants consists of two separate groups of three members, who already start working together in phase one of the experiment, the videos will not only be analyzed for the degree of cooperation but also to determine whether the team members contributing to the end-product ascend from only one original three-person team, or whether there exists inter-organizational cooperation between both original teams. So, besides analyzing the number of team members participating per model, it will also be analyzed whether they are from the original group A or group B. That way, two totals per team will arise; one for group A and one for group B. These totals will also be divided by the number of models produced by the team to get two averages per team. Following, a cooperation ratio will be calculated by dividing the smallest average of a team (independent of their original group A or B) by the bigger average of the same team. So you either divide the average of group A by group B, or the other way around. This is done so that the bigger the cooperation ratio, the better the inter-organizational cooperation of the team is. These ratios can then be analyzed against the corresponding innovation rates to check the hypothesis.

4. RESULTS

The means and standard deviations of all variables are given in table 2. For the purpose of this research, the 'squared average number of people working together' is used, rather than the 'average number of people working together'. Additionally, several assumptions are tested for this linear model (see Appendix II). At first, Bartlett's test of sphericity is used to determine the significance of the correlations. The results show a significant relationship (Bartlett's test = 13.660, p = .003). Second, by plotting the standardized residuals against the standardized predicted values; it displays an equally dispersed figure. Hence, there is also presence of homoscedasticity. Additionally, to test multicollinearity the variance inflation factor (VIF) was used (VIF = 1.032). Therefore it can be concluded that the variables are not inter-correlated, as the VIF is lower than 10. Finally, the model is tested for a normal distribution using Shapiro's Wilk test (Shapiro's Wilk = .924, p = .018). Despite all other assumptions are met, there is no normal distribution of the model as $p < .05$.

4.1 Degree of Cooperation in Inter-Organizational Teams (H1)

The first hypothesis of this research assumed that the number of team members actually working together on the job has an inverted U-shaped effect on innovative performances of the team, including some point of optimum along the curve. To be able to test this hypothesis, a quadratic regression analysis was performed on the average number of team members contributing to the end-product (in table 2: squared number of people working together) and the innovation performances of the team (see table 3). The SPSS results can be found in Appendix III. The results show that the effect of the number of people working on the job on collaborative innovation performance is indeed an inverted U-shape with no clear optimum (see figure 2), but the results are not significant enough to accept the proposed hypothesis (p = .330). Therefore, hypothesis 1 is rejected.

Figure 2. The effect of the average number of people working on the job on innovation performances.

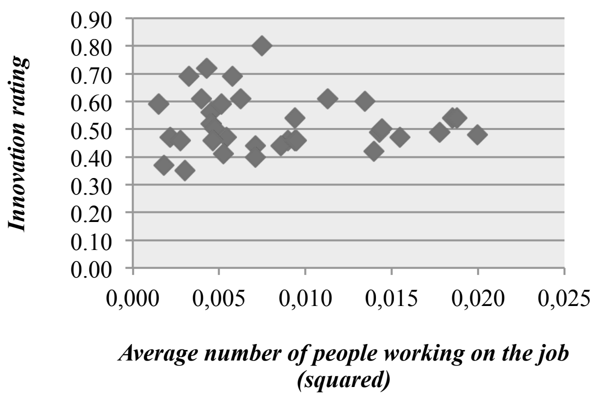

Table 3. Results of the (multiple) regression analysis

	B	SE (B)	*β*	*p*
Average number of people working together	.088	.107	.790	.418
Average number of people working together (squared)	-.018	.018	-.952	.330
Degree of inter-organizational cooperation (ratio)	.318	.082	.575	.001

Note: N = 35, Adjusted R^2 *= .275.*

4.2 Degree of Inter-Organizational Cooperation (H2)

Hypothesis 2 assumed that the degree of inter-organizational cooperation has a positive effect on collaborative innovativeness. Meaning that teams in which the number of team members cooperating together with members of all participating organizations to accomplish given tasks is higher, would perform better in terms of innovativeness. In order to test this hypothesis, a regression analysis was conducted to determine the relationship between the degree of inter-organizational cooperation and innovation performances (table 3). The results show, as expected, a positive effect between the degree of inter-organizational cooperation and collaborative innovativeness (B = .318, p = .001). Since $p < .05$, these findings are considered significant. This indicates that, as assumed, the better the degree of cooperation is between group A and group B, the higher the collaborative innovation performance of the team will be, and that there is indeed a positive relationship. Therefore, hypothesis 2 is to be accepted.

Overall, the model has an adjusted R^2 of .275, meaning that 27.5% of the variance is explained by the model.

5. DISCUSSION AND CONCLUSION

The results of this research contribute to the current field of literature regarding cooperation within inter-organizational teams. Besides, managers could use the information when organizing, coordinating, and controlling their inter-organizational teams. However, the results were not entirely as expected. At first, the first analysis showed a non-significant effect between the number of team members contributing to the end-product and the collaborative innovativeness of the team. Even though the results did show an inversed U-shape, they were just not significant enough. One reason for this non-significant result can be the initially learned routine in the first phase of the experiment. For example, the participants who learned the batch-method were learned to make a complete model by themselves, rather than working together on one model. Therefore it is possible that those participants held on to their previously learned method, either batch or serial, which could have biased the degree of cooperation and therefore the numbers found in the experiment.

Nevertheless, the second hypothesis tested in this research was found to be as expected and significant. As hypothesized, there was a positive relationship between the degree of inter-organizational cooperation and collaborative performance, meaning the better the cooperation between both groups within an inter-organizational team, the better their collaborative innovation performances. However, even though both teams should resemble two organizations having different (complementary) resources that require cooperation, this is not an outcome that can be generalized on an organizational level yet. For that, the experiment is too simplified, not resembling an actual organizational collaboration. An organizational setting for collaborations between organizations is much different that the setting and circumstances of this research. However, these positive results definitely leave room for further investigation.

In conclusion, were it was not confirmed that the number of team members cooperating within a collaboration contained an optimum designed as an inverted U-shape, the degree of inter-organizational cooperation did show a positive and significant effect with collaborative innovation, as expected. Nonetheless, there is still not enough evidence to draw the same conclusions on an organizational level. That is something that leaves room for further investigation. But overall it is expected that there is, to some extent and based on this experiment, a certain effect of cooperation of inter-organizational teams on collaborative innovation performances.

6. LIMITATIONS

A number of limitations can be addressed for this research. First, there was dependency on the data of a previously conducted research by Spin (2011). Therefore, the experimental design could not be optimized for this particular research objective in order to allow for a more accurate representation of the investigation. The initial experiment was focused on routines, rather than cooperation, and so the experimental setting was based upon routines, which could affect the optimal results of this research.

Secondly, in the videos that were analyzed from the initial experiment, it was sometimes hard to see what was going on and who was doing the work due to camera positions, plastic bags in front of the camera, and participants sitting in front of each other. Even though eventually all videos were analyzed the best way possible, it still did cost more time than taken into account and still lefts the possibility that something is coded inappropriately.

Thirdly – as was already shortly mentioned in the discussion part – the experimental sample consisted of students rather than employees of organizations. Due to this simplified experimental setting, the results cannot be generalized to an organizational level. Besides, building airplanes is a rather simple task compared to complex business problems.

Fourthly, the calculation of the collaborative innovation could also be a limitation to the results found in this research. Measuring the innovation levels in this setting is a hard task and more of a subjective given, so the validity of the scores can be questioned. Furthermore, regarding inter-rater reliability, both raters had insight on the research question and hypothesis that were tested, which could have increased the risk of a bias.

Finally, besides the lottery ticket given to the students for participating in the experiment, there were no specific incentives matching the purposes of this study. For instance an incentive that will increase when overall team performance increases. This would then promote (inter-organizational) cooperation more, which could change the results as well.

7. FUTURE RESEARCH

For the take of future research it is suggested to examine the hypothesis on a more organizational level. Even though that the second hypothesis was as expected and accepted in this experiment, it still was too simplified to generalize it to an organizational level, and so it is recommended to investigate it on a higher (organizational) level. One could, for instance, investigate the situations in real-life organizations where strategic alliances and inter-organizational teams already exist, and observe these teams and the outcomes these teams produce.

Moreover, to be able to reach a more generalizable outcome, one could also set up a different experiment that would allow generalizability to the organizational level more. For instance, by using real-life employees rather than students. And perhaps also make them work on a task that is more in line with their day-to-day business. Or at least more in line with day-to-day tasks, compared to simple airplane building. That way, the experiment is already showing a more organizational setting that allows generalizing the results to an organizational level more.

Additionally, using videos during an experiment is endorsed and highly recommended in order to be able to look back moments and avoid making the research depend on what is being analyzed only at the moment itself. The use of videos could enhance and promote the reliability of the research.

Finally, it is recommended to have – in case of an experimental setting – the experiment more adapted to the actual purpose of the research. Whereas in this research the experimental setting had focus on routines, which could bias the results as was mentioned in the limitations, an experimental setting that has emphasis on the cooperation part within inter-organizational teams could provide with more accurate and significant results. In this case, an experiment focused on cooperation within an inter-organizational team, perhaps with incentives encouraging such cooperation.

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10. APPENDIX

10.1 Coding Scheme

Group …	*Who's doing the work*									
Round	*Person 1* *A / B*	*Person 2* *A / B*	*Person 3* *A / B*	*Person 4* *A / B*	*Person 5* *A / B*	*Person 6* *A / B*	*N/A*	*Total working*	*Total A*	*Total B*
1	☐	☐	☐	☐	☐	☐	☐			
2	☐	☐	☐	☐	☐	☐	☐			
3	☐	☐	☐	☐	☐	☐	☐			
4	☐	☐	☐	☐	☐	☐	☐			
5	☐	☐	☐	☐	☐	☐	☐			
6	☐	☐	☐	☐	☐	☐	☐			
7	☐	☐	☐	☐	☐	☐	☐			
8	☐	☐	☐	☐	☐	☐	☐			
9	☐	☐	☐	☐	☐	☐	☐			
10	☐	☐	☐	☐	☐	☐	☐			
11	☐	☐	☐	☐	☐	☐	☐			
12	☐	☐	☐	☐	☐	☐	☐			
13	☐	☐	☐	☐	☐	☐	☐			
14	☐	☐	☐	☐	☐	☐	☐			
15	☐	☐	☐	☐	☐	☐	☐			
							Totals:			
							Averages :			

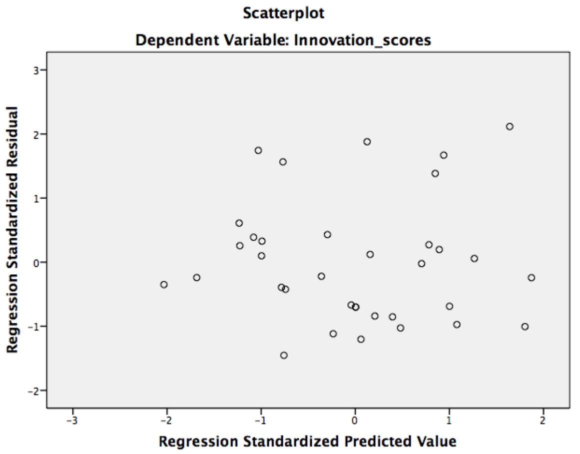
10.2 Assumptions Linear Model (SPSS)

10.2.1 Barlett's Test of Sphericity

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling uacy.		.437
Bartlett's Test of ricity	Approx. Chi-Square	13.660
	df	3
	Sig.	.003

10.2.2 Homoscedasticity



10.2.3 Multicollinearity (VIF)

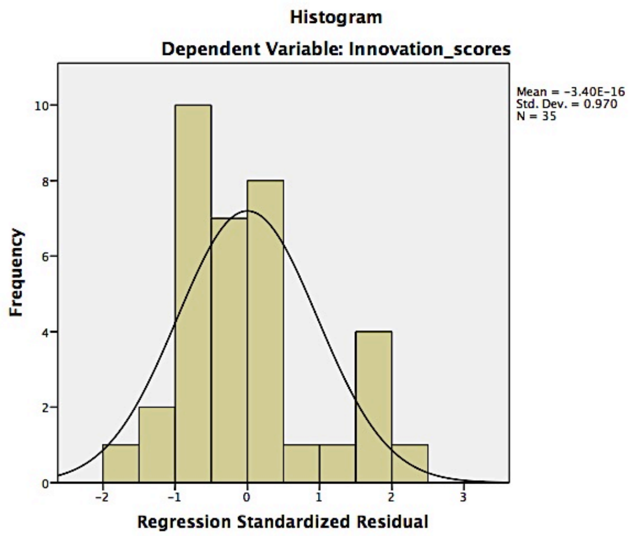
Model	Unstandardized Coefficients		Standardized Coefficients	Collinearity Statistics	
	B	Std. Error	Beta	Tolerance	VIF
1(Constant)	.326	.059			
Ratio2	.318	.082	.575	.969	1.032
Average_squared	-.003	.003	-.171	.969	1.032

10.2.4 Shapiro's Wilk Test for Normality

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Standardized lual	.126	35	.175	.924	35	.018

a. Lilliefors Significance Correction



10.3 Results Linear Regression (SPSS)

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.209	.154		1.356	.185
	Average_working_t ier	.088	.107	.790	.822	.418
	Average_squared	-.018	.018	-.952	-.990	.330
	Ratio2	.318	.082	.575	3.878	.001

a. Dependent Variable: Innovation_scores

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.582[a]	.339	.275	.08636

a. Predictors: (Constant), Ratio2, Average_working_together, Average_squared

b. Dependent Variable: Innovation_scores