

Impacts of Interpersonal Trust on Team Performance: A Case Study in Electrical Engineering Practical Training Course

Youchao Yang^{1*}, Jinsong Tao², Yamin Liu³ and Shengping Wang⁴

¹Doctoral candidate in School of Political Science and Public Administration, Wuhan University, Hubei, 430072, China; an associate professor in School of Languages and Media, Anhui University of Finance and Economics, Bengbu, Anhui, 233030, China.

²Professor in School of Electrical Engineering and Automation, Wuhan University, Wuhan, Hubei, 430072, China.

³Professor in School of Education, Huazhong University of Science and Technology, Wuhan, Hubei, 430074, China.

⁴Professor in School of Teacher Education, Taizhou University, Taizhou, Zhejiang, 317000, China.

Corresponding Author: Youchao Yang, Doctoral candidate in School of Political Science and Public Administration, Wuhan University, Hubei, 430072, China; an associate professor in School of Languages and Media, Anhui University of Finance and Economics, Bengbu, Anhui, 233030, China.

Received: 📅 2024 Dec 30

Accepted: 📅 2025 Jan 20

Published: 📅 2025 Jan 31

Peer Reviewed: This Article Has Undergone Peer Review

Abstract

The study discusses the relationship between interpersonal trust and team performance in an exploratory way. The empirical data is collected from students in Electrical Engineering Practice Training Course classes to evaluate their team performance.

Background: Interpersonal trust within a team plays a critical role in solving problems and enhancing group performance effectiveness.

Research Question: Does interpersonal trust within a team have an impact on team performance? Can interpersonal trust between teammates be improved?

Design/Approach: This research presents a case study of 132 electrical engineering university students in China. The students worked in teams completing six simulation experiments in a semester.

Findings: The teams always with permanent teammates had the highest level of interpersonal trust and performed the best and the teams always with tentative teammates had the lowest level of trust interpersonal trust and performed worse and worse while the teams whose members were fixed by the instructor increased their interpersonal trust quickly and performed better and better over time.

Conclusions: The higher the interpersonal trust within a team, the better the team performance; low initial interpersonal trust within a team can be promoted through intervention.

Keywords: Interpersonal Trust, Team Performance, Electrical Engineering Training, Higher Education

1. Introduction

Teamwork is an indispensable part of an organization because teamwork is an effective approach to solve unexpected intra-organizational problems [1,2]. In fact, every organization sets up teams to accomplish their own goals for different purposes. However, team performance varies significantly from one team to another because team performance is affected by many numerous intervening variables, including working hours, pay, job satisfaction, working environments and so on. Of all, the most important factor is interpersonal trust within a team [3].

Interpersonal trust within a team refers to the trust between teammates at the individual level and was proved to be significantly related to intra-organizational performance [4,3,5]. The higher levels of interpersonal trust within an organization, the better performance the organization has [6-8]. On the other hand, mistrust can lead to less efficiency and worse performance [9,10].

Although some researchers have paid much attention to interpersonal trust and team performance, they concentrated more on theoretical study and virtual teams. While other researchers studied this relationship between

organizational trust and its performance at a broader level instead of at a team level and little literature can be found on trust in higher education through Emerald, Google Scholar, Pro-Quest Corpora and Web of Science [11]. Therefore, there leaves much room for research on interpersonal trust and team performance in tertiary education. The current study helps us understand the relationship between interpersonal trust and team performance.

2. Methodology

2.1. Sample

The data was collected from a convenience sample of 162 first-year university students from the same Electrical Engineering Practice Training Course classes in China. At first, we compared the students' academic performance in their China's National Higher Education Entrance Examination and selected 148 students who had scored similar marks in each subject in China College Entrance Exam. Next, we observed the 148 students for a month to select all the students who were sociable, outgoing and amiable, and finally had 132 participants (24 female, 108 male) for the experiment.

2.2. Measures

There are six simulation experiments in Electrical Engineering Practice Training Course, and all the students from Electrical Engineering Practice Training Course classes are required to join a team of six students to accomplish six simulation experiments after learning the related knowledge according to the Curriculum Requirements in China. Each simulation experiment has its own standard operating procedures. Generally speaking, the more standardized the operation is, the less time it takes to complete the experiment. That's to say, the better a team performs, the shorter the time is needed to complete each experiment. The experiment time is recorded in seconds for each team and assessed to represent the team's performance and achievements.

2.3. Procedure

As prescribed in curriculum design, all the students from the Electrical Engineering Practice Training Course classes have to complete six simulation experiments, otherwise they

will fail the course. Before the first simulation experiment, all the students were asked to join a team of six at their own will. Then the instructor began to teach the students what to do and how to finish the assignment. During the simulation experiments, we recorded each team's performance as well as every team member's performance.

After the approval from the administrative teaching affairs office and the consent from the students, we put all the teams into Group A (8 teams) and Group B (14 teams). Group A was referred to as those teams whose members argued fiercely and didn't trust each other in the first experiment. Then, all the team members in Group A were asked not to change the teammates in the whole semester. That's to say they couldn't join another team in the next five simulation experiments. On the contrary, all the team members in Group B could join a new team at their own will in the rest five simulation experiments.

When all the stimulation experiments were finished, we found that the members of some teams in Group B never changed from the very beginning to the end. Therefore, we regrouped the teams again: regrouping those teams whose members were fixed in Group B as Group 1 (4 teams), the rest teams in Group B as Group 2 (10 teams) and Group A as Group 3 (8 teams). After the data was ready, it was carefully analyzed with the help of SPSS 26.0. Paired samples test method was used to determine the relationship between interpersonal trust and team performance. Independent samples test method was employed to determine the relationship between groups. Estimated marginal means was utilized to observe the tendency of a group performance. The p-values were computed to test the significance between variables and performances' effectiveness.

3. Results

Profile plots of estimated marginal means illustrates that each group performed better and better in general but group 3 fluctuated widely. Generally speaking, the gap between group 1 and 3 was shrinking while the gap between group 2 and group 3 was growing (see Figure 1).

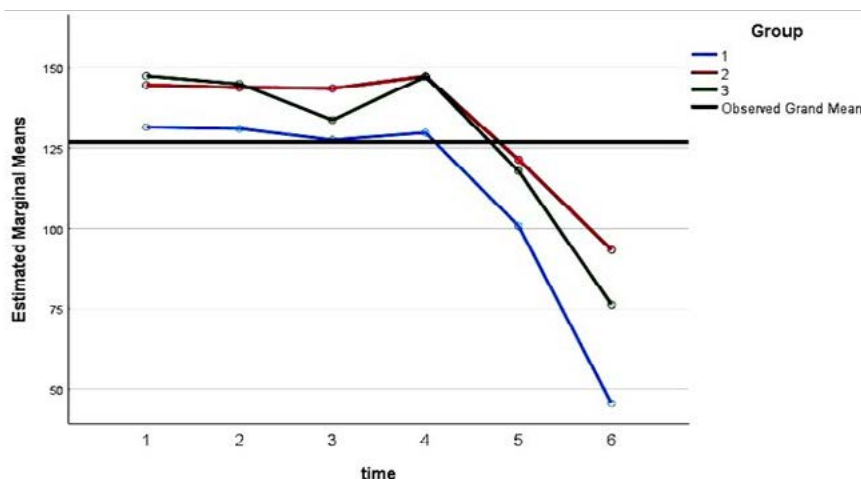


Figure 1: Estimated Marginal Means of Three Groups

In addition, Group 1 performed the best all the time and Group 3 came second except the first two experiments while Group 2 did the worst in the last four simulation experiments (see Table 1).

	Group	Time (Unit: seconds)						N
		1	2	3	4	5	6	
	1	131.50	131.00	127.50	129.75	100.75	45.50	4
	2	144.60	143.90	143.60	147.40	212.40	93.30	10
Mean	3	147.50	145.00	133.75	147.25	117.88	76.25	8
	Total	143.27	141.95	137.09	144.14	116.36	78.41	22

Table 1: Descriptive Statistics of the Sample

Table 2 presents team performance was statistically significant within each group with $p < 0.001$ and table 3 verifies that team performance was statistically significant between groups with $p < 0.05$.

Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
time	Sphericity Assumed	72494.001	5	14498.800	25.610	.000***	.574
	Greenhouse-Geisser	72494.001	3.407	21277.003	25.610	.000***	.574
	Huynh-Feldt	72494.001	4.679	15493.815	25.610	.000***	.574
	Lower-bound	72494.001	1.000	72494.001	25.610	.000***	.574
time * category1	Sphericity Assumed	3121.597	10	312.160	.551	.849	.055
	Greenhouse-Geisser	3121.597	6.814	458.095	.551	.788	.055
	Huynh-Feldt	3121.597	9.358	333.582	.551	.839	.055
	Lower-bound	3121.597	2.000	1560.798	.551	.585	.055
Error(time)	Sphericity Assumed	53783.229	95	566.139			
	Greenhouse-Geisser	53783.229	64.736	830.810			
	Huynh-Feldt	53783.229	88.899	604.992			
	Lowerbound	53783.229	19.000	2830.696			

Table 2: Tests of Within-Subjects Effects

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Intercept	1741475.169	1	1741475.169	2378.851	.000***	.992
category1	7912.065	2	3956.032	5.404	.014**	.363
Error(time)	13909.246	19	732.066			

Table 3: Tests of Between-Subjects Effects

Later, the paired samples test between teams' performance was found that the last two simulation experiments were statistically significant to the previous ones, ranging in p-values from $p < 0.0001$ to $p < 0.003$ (see Table 4). The independent samples tests showed that group 1 in general was statistically significant to group 2 with p-values ranging from $p < 0.066$ to $p < 0.022$ (see Table 5) and group 3 was not statistically significant to group 1 and 2 (see Tables 6 & 7).

Through our own observation and communications with the students, we found that the students in Group 1 trusted each other very much from the very beginning; the students in Group 2 had much difficulty in finding trustworthy teammates each time; the students in Group 3 distrusted each other at first, but when they were asked not to change the teams all the semester, they began to trust each other gradually.

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	1st time - 2nd time	1.318	25.604	5.459	-10.034	12.670	.241	21	.812
Pair 2	1st time - 3rd time	6.182	39.874	8.501	-11.497	23.861	.727	21	.475
Pair 3	1st time - 4th time	-.864	25.876	5.517	-12.336	10.609	-.157	21	.877
Pair 4	1st time - 5th time	26.909	27.915	5.951	14.532	39.286	4.521	21	.000***
Pair 5	1st time - exam	64.864	36.426	7.766	48.713	81.014	8.352	21	.000***
Pair 6	2nd time - 3rd time	4.864	42.832	9.132	-14.127	23.854	.533	21	.600
Pair 7	2nd time - 4th time	-2.182	23.124	4.930	-12.435	8.071	-.443	21	.663
Pair 8	2nd time - 5th time	25.591	27.700	5.906	13.309	37.872	4.333	21	.000***
Pair 9	2nd time - exam	63.545	40.353	8.603	45.654	81.437	7.386	21	.000***
Pair 10	3rd time - 4th time	-7.045	35.950	7.665	-22.985	8.894	-.919	21	.368
Pair 11	3rd time - 5th time	20.727	28.745	6.129	7.982	33.472	3.382	21	.003**
Pair 12	3rd time - exam	58.682	40.409	8.615	40.765	76.598	6.811	21	.000***
Pair 13	4th time - 5th time	27.773	16.945	3.613	20.260	35.286	7.688	21	.000***
Pair 14	4th exam	65.727	34.856	7.431	50.273	81.182	8.845	21	.000***
Pair 15	5th time - exam	37.955	34.909	7.443	22.477	53.432	5.100	21	.000***

Table 4: Paired Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means					95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
1st time	Equal variances assumed	.418	.530	-1.229	12	.243	-13.100	10.659	-36.324	10.124
	Equal variances not assumed			-1.480	8.710	.174	-13.100	8.849	-33.220	7.020
2nd time	Equal variances assumed	2.696	.127	-1.158	12	.269	-12.900	11.137	-37.166	11.366
	Equal variances not assumed			-.938	3.973	.402	-12.900	13.751	-51.183	25.383
3rd time	Equal variances assumed	5.671	.035**	-.749	12	.468	-16.100	21.502	-62.949	30.749
	Equal variances not assumed			-1.008	11.308	.334	-16.100	15.971	-51.135	18.935

4th time	Equal variances assumed	4.084	.066*	-2.030	12	.065*	-17.650	8.693	-36.591	1.291
	Equal variances not assumed			-1.632	3.936	.179	-17.650	10.815	-47.870	12.570
5th time	Equal variances assumed	1.138	.307	-2.069	12	.061	-20.650	9.980	-42.395	1.095
	Equal variances not assumed			-2.848	11.683	.015**	-20.650	7.252	-36.498	-4.802
exam	Equal variances assumed	6.946	.022**	-2.470	12	.030*	-47.800	19.356	-89.973	-5.627
	Equal variances not assumed			-3.966	9.361	.003**	-47.800	12.052	-74.904	-20.696

Table 5: Independent Samples Test between Group 1 and Group 2

		Levene's Test for Equality of Variances		t-test for Equality of Means					95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
1st time	Equal variances assumed	6.114	.033*	-1.118	10	.290	-16.000	14.313	-47.891	15.891
	Equal variances not			-1.407	9.992	.190	-16.000	11.371	-41.340	9.340
2nd time	Equal variances assumed	.026	.876	-.813	10	.435	-14.000	17.221	-52.370	24.370
	Equal variances not assumed			-.852	6.908	.423	-14.000	16.426	-52.946	24.946
3rd time	Equal variances assumed	.749	.407	-.420	10	.683	-6.250	14.865	-39.371	26.871
	Equal variances not assumed			-.470	8.193	.651	-6.250	13.296	-36.786	24.286
4th time	Equal variances assumed	.085	.777	-1.386	10	.196	-17.500	12.622	-45.623	10.623
	Equal variances not assumed			-1.402	6.276	.208	-17.500	12.482	-47.719	12.719
5th time	Equal variances assumed	1.451	.256	-2.129	10	.059*	-17.125	8.044	-35.049	.799
	Equal variances not assumed			-2.579	9.681	.028**	-17.125	6.640	-31.986	-2.264
exam	Equal variances assumed	3.169	.105	-2.340	10	.041**	-30.750	13.140	-60.029	-1.471
	Equal variances not			-3.345	7.487	.011**	-30.750	9.193	-52.205	-9.295

Table 6: Independent Samples Test Between Group 1 and Group 3

		Levene's Test for Equality of Variances		t-test for Equality of Means					95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
1st time	Equal variances assumed	2.702	.120	-.267	16	.793	-2.900	10.861	-25.924	20.124
	Equal variances not			-.258	12.477	.801	-2.900	11.260	-27.330	21.530
2nd time	Equal variances assumed	.835	.375	-.102	16	.920	-1.100	10.760	-23.910	21.710
	Equal variances not assumed			-.096	10.297	.925	-1.100	11.471	-26.559	24.359
3rd time	Equal variances assumed	3.898	.066*	.594	16	.561	9.850	16.584	-25.307	45.007
	Equal variances not assumed			.623	15.443	.542	9.850	15.802	-23.746	43.446
4th time	Equal variances assumed	1.517	.236	.019	16	.985	.150	7.864	-16.521	16.821
	Equal variances not assumed			.018	10.830	.986	.150	8.324	-18.206	18.506
5th time	Equal variances assumed	.091	.766	.432	16	.672	3.525	8.160	-13.774	20.824
	Equal variances not assumed			.445	15.998	.663	3.525	7.930	-13.286	20.336
exam	Equal variances assumed	1.831	.195	1.091	16	.292	17.050	15.633	-16.091	50.191
	Equal variances not			1.139	15.660	.272	17.050	14.964	-14.729	48.829

Table 7: Independent Samples Test Between Group 2 and Group 3

4. Discussion

The purpose of the research was to explore the relationship between interpersonal trust and team performance. After analyzing the data collected from the Electrical Engineering Practice Training Course classes, we found that the relationship could be divided into 3 categories. Students in group 1 were able to keep a high level of interpersonal trust all the time and performed the best; the students in group 3 shared a higher and higher level of interpersonal trust and performed better and better; the students in group 2 couldn't maintain a normal level of interpersonal trust and performed the worst of all in general.

Students in group 1 had higher levels of initial trust when it was newly formed with a finite life span which was maintained when the students got on well with each other over time [12-14]. High initial interpersonal trust within a team helped the students feel secure and cooperate more easily and perform better [15-17]. Students in group 2 were short of initial interpersonal trust from the others in teams. They distrusted each other and performed defensively against possible harm by others which led teammates to abandon their team goals and to concentrate on their own interests instead [18,10,19].

Consequently, interpersonal trust between them decreased over time and they began to engage in more defensive actions to protect themselves from harm by others. They were even reluctant to cooperate with other teammates and performed worse and worse [23,2]. Thus, the gap between group 2 and the other two groups became wider and wider.

Students in group 3 distrusted each other at the individual level in the first simulation experiment. Their low initial interpersonal trust in teams resulted in conflicts between teammates. They argued fiercely and couldn't come to a compromise with each other at first and performed the worst. When the team members remained fixed, they had no choice but to redefine themselves as a whole and demonstrate more trust to each other over time [24-31]. The interpersonal trust between them developed naturally and quickly and then they performed better and better which could well illustrate why the gap between group 2 and group 1 became smaller and smaller and the gap between group 2 and group 3 was wider and wider [32,33].

5. Conclusion

Interpersonal trust within a team can influence team

performance a lot. High levels of interpersonal trust within a team help the team do much better than those with low levels of interpersonal trust. After the research, we find that low initial interpersonal trust within a team can be promoted through intervention and it can also be applied to teaching and learning in tertiary education.

Although this research illustrates the importance of interpersonal trust on team performance, it does not explain how to classify the students into the right groups before stimulation experiments. This suggests that more research is needed to learn the defining factors affecting a student's interpersonal trust within a team. For example, this study measured students' interpersonal trust in teams only by the information from observation and interviews, it makes no reference to the foundations of the interpersonal trust each student has since trust can be cognitive, affective or something else.

Furthermore, the research doesn't illustrate whether or not the students in group 1 and 2 will have the same level of interpersonal trust and perform as well as each other or group 2 would even be better in the end if the course lasts long enough. This indicates that more study is needed to figure out the difference of interpersonal trust and its performance between the two groups.

Last but not least, the research doesn't take into account the ratio of males and females in the teams. Due to a combination of biological, social and cultural factors, males are associated with a higher level of assertiveness, independence, aggression and risk-taking behavior, while females are linked to greater empathy, cooperation and nurturing behaviors. It means that more study is needed to find out what might be the best ratio of males and females for a team.

Teams play an important role in an organizational success. Although there is much evidence suggesting that many factors have impacts on a team's performance, the research of trust in teams so far has unequivocally verified that interpersonal trust within a team has more influence on the productivity and performance. Given the influence of interpersonal trust on team performance, we hope that our research can further develop and advance.

Funding: Funded by National Office for Philosophy and Social Sciences (Project No.: 21BGL234); Integrating "Three Entrances" into College English Listening and Speaking: A Curriculum Ideological and Political Education Project in Anhui University of Finance and Trade (Project No. acszjydz2022009).

References

- Parker, G. M. (1996). *Team players and teamwork* (pp. 1-178). San Francisco, CA: Jossey-Bass.
- Erdem, F., Ozen, J., & Atsan, N. (2003). The relationship between trust and team performance. *Work study*, 52(7), 337-340.
- Wang, Y., Liang, P., & Chen, J. (2010, October). An empirical study on interaction among interpersonal trust, knowledge sharing and team performance. *In 2010 International Conference on Future Information Technology and Management Engineering* (Vol. 1, pp. 216-219). IEEE.
- Costa, A. C., Fulmer, C. A., & Anderson, N. R. (2018). Trust in work teams: An integrative review, multilevel model, and future directions. *Journal of organizational behavior*, 39(2), 169-184.
- Paul, D. L., & McDaniel Jr, R. R. (2004). A field study of the effect of interpersonal trust on virtual collaborative relationship performance. *MIS quarterly*, 183-227.
- De Jong, B. A., Kroon, D. P., & Schilke, O. (2017). The future of organizational trust research: A content-analysis and synthesis of future research directions. In *Human cooperation: Trust in social dilemmas*. Oxford University Press.
- Pucetaite, R., Novelskaite, A., & Markunaite, L. (2015). The mediating role of leadership relationship in building organisational trust on ethical culture of an organisation. *Economics & Sociology*, 8(3), 11.
- Lämsä, A. M. (2006). Development of organizational trust among employees from a contextual perspective. *Business Ethics: A European Review*, 15, 130-141.
- Colquitt, J. A., Lepine, J. A., & Wesson, M. J. (2015). *Organizational behavior: Improving performance and commitment*. Organizational Behaviour. McGraw-Hill Education. www.mhhe.com.
- Mayer, R. C., & Gavin, M. B. (2005). Trust in management and performance: Who minds the shop while the employees watch the boss?. *Academy of management journal*, 48(5), 874-888.
- Hassan, M., Toylan, N. V., Semerciöz, F., & Aksel, I. (2012). Interpersonal trust and its role in organizations. *International Business Research*, 5(8), 33.
- Meyerson, D. (1996). *Swift Trust and Temporary Groups*. Trust in Organizations: *Frontiers of Theory and Research*/ Thousand Oaks.
- van der Werff, L., & Buckley, F. (2017). Getting to know you: A longitudinal examination of trust cues and trust development during socialization. *Journal of Management*, 43(3), 742-770.
- Jarvenpaa, S. L., & Leidner, D. E. (1999). Communication and trust in global virtual teams. *Organization science*, 10(6), 791-815.
- Spadaro, G., Gangl, K., Van Prooijen, J. W., Van Lange, P. A., & Mosso, C. O. (2020). Enhancing feelings of security: How institutional trust promotes interpersonal trust. *PloS one*, 15(9), e0237934.
- Zand, D. E. (1972). Trust and managerial problem solving. *Administrative science quarterly*, 229-239.
- Erdem, F., & Ozen, J. (2003). Cognitive and affective dimensions of trust in developing team performance. *Team Performance Management: An International Journal*, 9(5/6), 131-135.
- Hasche, N., Höglund, L., & Mårtensson, M. (2021). Intra-organizational trust in public organizations—the study of interpersonal trust in both vertical and horizontal relationships from a bidirectional perspective. *Public Management Review*, 23(12), 1768-1788.
- Joshi, A., Lazarova, M. B., & Liao, H. (2009). Getting

- everyone on board: The role of inspirational leadership in geographically dispersed teams. *Organization science*, 20(1), 240-252.
20. Ambrose, M. L., & Schminke, M. (2003). Organization structure as a moderator of the relationship between procedural justice, interactional justice, perceived organizational support, and supervisory trust. *Journal of applied psychology*, 88(2), 295.
21. Aryee, S., Budhwar, P. S., & Chen, Z. X. (2002). Trust as a mediator of the relationship between organizational justice and work outcomes: Test of a social exchange model. *Journal of Organizational Behavior: The International Journal of Industrial, Occupational and Organizational Psychology and Behavior*, 23(3), 267-285.
22. Pavez, I., Gómez, H., Lauhié, L., & González, V. A. (2021). Project team resilience: The effect of group potency and interpersonal trust. *International Journal of Project Management*, 39(6), 697-708.
23. Sitkin, S. B., & Roth, N. L. (1993). Explaining the limited effectiveness of legalistic "remedies" for trust/distrust. *Organization science*, 4(3), 367-392.
24. Munns, A. K. (1995). Potential influence of trust on the successful completion of a project. *International Journal of project management*, 13(1), 19-24.
25. Simons, T. L., & Peterson, R. S. (2000). Task conflict and relationship conflict in top management teams: the pivotal role of intragroup trust. *Journal of applied psychology*, 85(1), 102.
26. Chowdhury, S. (2005). The role of affect-and cognition-based trust in complex knowledge sharing. *Journal of Managerial issues*, 310-326.
27. Turner, J. C. (1987). Rediscovering the social group: A self-categorization theory. Oxford: Blackwell.
28. Williams, M. (2001). In whom we trust: Group membership as an affective context for trust development. *Academy of management review*, 26(3), 377-396.
29. Brewer, M. B. (2008). Depersonalized trust and ingroup cooperation. In Rationality and social responsibility (pp. 215-232). Psychology Press.
30. Kramer, R. M., Shah, P. P., & Woerner, S. L. (1995). Why ultimatums fail: Social identity and moralistic aggression in coercive bargaining. In *Negotiation as a social process* (pp. 285-308). SAGE Publications, Inc..
31. Lewis, J. D. (1985). Trust as social reality. *Social Forces*.
32. Lewicki, R. J., Tomlinson, E. C., & Gillespie, N. (2006). Models of interpersonal trust development: Theoretical approaches, empirical evidence, and future directions. *Journal of management*, 32(6), 991-1022.
33. De Jong, B. A., & Dirks, K. T. (2012). Beyond shared perceptions of trust and monitoring in teams: Implications of asymmetry and dissensus. *Journal of Applied Psychology*, 97(2), 391.