

## **Collective intelligence in mixed gender teams in outsourcing organizations**

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**Abstract.** Nowadays, the diversity of the teams in work organizations is measured as an indicator of better efficiency and higher knowledge. Collective intelligence (CI) refers to a group or a team's combined capacity and capability to perform a wide variety of tasks and solve diverse problems. The paper presents the collective intelligence survey in sample of 46 employees in outsourcing organization, divided in 15 gender different teams (male, female, mixed). The results are showing that within the current sample, on two of the CI subscales "Coordination" and "Networking" women or female teams are demonstrating higher levels. The derived result would serve to give overview of the value of diversity in work teams. The result is giving information of potential structure that could be implemented, giving an advantage of the women in organization for knowledge keepers and a pillar of successful communication leading to successful realization.

**Keywords:** collective intelligence, mixed-gender teams, outsourcing organization

### **Introduction**

Peter Drucker's catchphrase "Do what you do the best and outsource the rest" after than two decade is still relevant in today's business world in which outsourcing organizations are on the rise. Some definitions of outsourcing relate to sourcing activities that were previously conducted in-house (Gilley, Rasheed 2000). Lei and Hitt (1995) define outsourcing as "reliance on external sources for manufacturing components and other value-adding activities". There are many other motivations for outsourcing, beyond short-term cost savings. For example, it can enable firms to focus on "core" activities (Pralhad, Hamel 1990). Yajiong Xue, Sankar, Mbarika (2005) indicate in their research, that mission clarity, group cohesion, and personal satisfaction were significantly different between virtual teams and Face to Face teams in IT outsourcing sector.

There is different type of team structures at the workplace in outsourcing organizations involved in processes like finance, procurement, engineering, and pharmacy. The way they execute and prioritize their ongoing daily tasks is important to the success of many business structures. In service-providing

outsourcing organizations, there is a lack of information regarding the importance of the team content, gender structure or internal communication for better company results. In a world where a new competition is born every second, the core focus of companies should be on leveraging all the tools and techniques at their disposal; and outsourcing is outshining in this list. It not only allows you to manage business functions of any scale but also helps you cut down the business costs by 20-30% (Swati Sharma 2019). Efficiency, optimization, and automation could be implemented more easily by having a vision and strategy of the executed tasks and by knowing the abilities and the motivation of the employees, when the focus is on the team itself, rather than the individuals in it.

In addition to team efficiency and performance, this growing interest in collective intelligence (CI) is also closely linked to the increasing complexity of the problems faced by companies. They are trying to find the most suitable approaches to guarantee sustainability. The existing research and theories about collective intelligence are describing it as a general factor that “explains a group’s performance on a wide variety of tasks” (Woolley et al. 2010). One of the first things that became apparent to the researchers was that the gender composition of the team was important. Initially, it looked like just the number of women is affecting the final result, however with the time; the connection with the gender proportion appeared to be much more disputable (Dufwenberg, Muren 2006).

The purpose of the current report is to establish any difference in the levels of collective intelligence in teams with different “male-female” group proportion. We expect different results in the different team structures, supposing that the initially developed theory for “more female-higher CI” would be justified.

### **Literature overview**

Over the past two decades, numerous studies have focused on identifying various factors of team effectiveness, including group processes, trust, and others (for details see DeOrtentiis et al. 2013). Research on Bulgarian employees’ team effectiveness do not establish gender differences in interpersonal relationships related to trust, commitment, and conflicts in the team (Tair 2020). Lorenz and Rauhut (2011) proved that the diversity of views of the group would decline when the group was fully exchanging information. This means that the influence of group social impact on individual decision-making is related to the problem object of decision-making, while the more difficult the problem is, the greater the impact of group on individual will be. Individuals with stronger self-confidence are often not affected by a group when other conditions are consistent.

Collective intelligence was also explored to showcase how continuous performance on diverse tasks resulted in effective group outcomes. This, in turn, helped in predicting strongly about the group’s performance on future tasks. According to Woolley and Fuchs (2011), CI is supported by two interrelated processes. The first process is related to divergent thinking and independent

perspectives, while the second process is the opposite with convergence and interdependence related to action. Both processes support learning and result in the success of tasks undertaken, which were achieved only with the combination of both convergent and divergent processes.

Collective intelligence has proved to be instrumental in augmenting the results of the business as it helps to tap the knowledge and skills of the employees and provides management the ability to target the best candidates for the task forces and motivate them (Lesser et al. 2012).

The term “collective” describes a group of individuals who are not required to have the same attitudes or viewpoints. Different members can have different perspectives and approaches, and thus leading to better explanations or solutions to a given problem. “Intelligence” refers to the ability to learn and understand, to adapt to an environment by using own knowledge. This enables people to deal with changing and difficult situations. Definition that goes back to Wechsler (1964) defines intelligence as the global ability of an individual to act purposefully, think reasonably, and to effectively deal with its environment.

Empirical research on collective intelligence in the organizational context is not that widespread. Usually, the intelligence of a group has been measured as the average intelligence of all the individuals in that group.

According to Woolley, Aggarwal, Malone (2015), CI refers to a group or a team’s combined capacity and capability to perform various tasks and solve diverse problems. Results of the initial research are correlating positively and significantly the proportion of females in a group with the collective intelligence (Woolley et al. 2010). It appears to depend both on the composition of the group and factors that emerge from the way group members interact when they are assembled (Michaelsen, Watson, Black 1989).

There are different studies such as *Evidence for a collective intelligence factor in the performance of human groups* (2010) by A. Wooley et al. and *Collective intelligence: Scale development and validation* (2018) by Kaur and Shah, that are demonstrating that “c factor” is not strongly correlated with the average or maximum individual intelligence of group proportion of females in the group, with conclusion that women demonstrated greater social sensitivity and in turn greater collective intelligence compared to teams containing fewer women.

## **Objectives and hypothesis**

The purpose of the present study is to establish the level of collective intelligence among employees in an outsourcing organization and to derive gender differences in collective intelligence in gender mixed teams.

It will be realized through the following tasks:

1. The verification of the psychometric characteristics of the used instrument by conducting factor analysis and reliability analysis.
2. Establishing the level of collective intelligence in the studied sample.
3. Identifying differences in collective intelligence in teams depending on their gender composition.

The general hypothesis of the study assumes the existence of significant differences in collective intelligence in teams in outsourcing organizations based on the female presence among team members. Specifically, we hypothesize high levels of collective intelligence in female-dominated teams.

## Methodology

The research was conducted in June 2022 via “Typeform” platform. The sample includes 46 employees working in three different outsourcing organizations. The participants are members of actual teams, working together no more than one year. The intention is to follow the results based on the real environment as much as possible. In the selection we have a gender mixed team from company providing medical supplies, male only team from construction company and all type of the possible mixture in production company for shared services. 24 or 52% from total respondents are male and 22 or 48% are female. All of the participants are working in a combined working environment - office and remote location.

For the purposes of the study it was used collective intelligence scale of Kaur and Shah (2018) with a total of 17 items evaluated using a 5-Point Likert Scale from 1 “Strongly Disagree” to 5 “Strongly Agree”. The questionnaire includes four subscales: “Coordination”, containing five items; “Networking” with four items; “Diversity” with four items, and “Independence” with four items.

## Results and discussion

The first task of the research is the verification of the psychometric characteristics of the instrument. To check the sampling adequacy, the Kaiser-Meyer-Olkin (KMO) and Bartlett’s test of sphericity were conducted. KMO of .673 for sampling adequacy shows that data are suitable for factor analysis and Bartlett’s test of sphericity was approx. chi-square = 331.236 at df = 136, Sig. = .00 (Table 1).

Performed Factor Analysis is using Promax with Kaiser Normalization Method that was used initially when creating the scale by Kaur and Shah. Four factors were generated with eigenvalues >1.0 (Table 2).

**Table 1.** Results from KMO and Bartlett’s Test for collective intelligence scale

Kaiser-Meyer-Olkin measure of sampling adequacy		.673
Bartlett’s test of sphericity	Approx. chi-square	331.236
	Df	136
	Sig.	.000

**Table 2.** Results from Kaur & Shah Scale of CI with Promax Method and Maximum likelihood

Factors	Items values	F
<b>Coordination</b>		
I share knowledge and material to support the smooth workflow.	0.742	F2
I provide cooperation to any team member for accomplishing any task.	0.785	F2
I support to work collectively in a team for completion of work.	0.843	F2
I am open to receive feedback from others.	0.646	F2
While sending a message, I ensure the message is clear.	0.590	F3
<b>Networking</b>		
I try to build personal relations with whom I work.	0.475	F2
I easily get along with other people.	0.806	F1
I am quite good in mixing up with people.	0.793	F1
I have many trusted colleagues in all places where I work.	0.673	F1
<b>Diversity</b>		
I generate multiple options to solve a problem.	0.507	F1
It is interesting to draw different interpretations from the given information.	0.877	F4
I ensure different insights are drawn from data for decision- making.	0.784	F4
I have the ability to come up with a variety of ideas.	0.824	F1
<b>Independence</b>		
I do not hesitate to give feedback to others when deemed necessary.	0.719	F3
I do not hesitate to give my opinion to my superiors.	0.624	F3
I politely differ from the decisions of my seniors when needed.	0.727	F3
I am open to the opinions; however, I take my own decisions.	0.678	F3
<b>Total Variance Explained</b>	<b>61.14</b>	

“Coordination” is the factor that shows the extent to which a person is ready to work together with others efficiently and smoothly. Skill congruence gauges a group’s proficiency at achieving agreement between relative member skills and their contributions to work on a task; strategy captures a group’s ability to coordinate their work to accomplish all of the elements of the task; and effort captures the total amount of activity members contribute to task completion. In our data, skill congruence and strategy are strong positive predictors of group performance, while effort is not a significant predictor of group performance.

Factor “Networking” refers to the level of networking skills possessed. Networking represents the interaction with other employees or team members and developing smooth working relations. It increases the effectiveness of the task.

Factor 3 “Diversity” represents the diversity of perspectives toward a problem and ability to generate various ideas. Diversity matters. Regardless of what information-sharing strategy a team used, greater deep-level diversity was associated with more accurate decisions reached more rapidly.

Factor 4 “Independence” represents independent thinking. An independent thinker is someone who is able to produce an original idea and does not get easily influenced by other’s ideas. By independence, one can bear in mind the phenomenon in which collective members are freely in providing individual solutions to a given problem.

The four factors explain the variance of 61.14% which is completely satisfying and each factor itself is explaining more than 10% from the variation, except Factor 4 - “Diversity”, which is 9%. Item values are acceptable (above 0.5). The conclusion here is that even though we are using the original version of the scale, there is currently inconsistency in factor “Diversity”. This could be explained with the limited number of answers and also with a problem with understanding the items. The correlation between the factors is low to medium, which is considered normal for the construct Collective Intelligence. Overall analysis of the structure of the factors in the survey is acceptable for the sample of 46 respondents.

Cronbach’s alpha was calculated to measure the internal consistency of the subscales. The results in Table 3 are between 0.5 and 0.78 which is acceptable for the purpose of the study, showing internal consistency supporting the reliability of the subscales.

In details, the reliability of subscale “Diversity” is lower than the other subscales (.504), which based on the issue with the changed items in the factor analysis, will be acceptable. The result here from the original scale development is .754. There is a need to establish a base for differentiation between the examined team groups. Reliability of subscale “Independence” is .693 of Cronbach’s alpha from the analysis for all four items and closer to .669 from the original study of Kaur and Shah (2018). Reliability of subscale “Coordination” is best from the study with result of .786 of Cronbach’s alpha and higher than .738 from the

**Table 3.** Results from Cronbach’s alpha for subscales of CI subscales

Subscale	N of items	Cronbach’s alpha
1. Coordination	5	.786
2. Networking	4	.770
3. Diversity	4	.504
4. Independence	4	.693

**Table 4.** Descriptive statistics of the subscales of the CI method

Subscale	N	Minimum	Maximum	Mean	SD
Coordination	46	9.00	25.00	21.87	3.02
Networking	46	10.00	20.00	15.43	2.87
Diversity	46	13.00	20.00	16.24	1.75
Independence	46	8.00	20.00	15.65	2.40

validation research. Reliability of subscale “Networking” is also acceptable with result of .770 of Cronbach’s alpha from the analysis for the initially embedded four items in the scale and higher than .664 from the research of Kaur and Shah. Those comparisons come to show that the results can be considered for the hypotheses that are embedded in the current study.

Table 4 presents the means, standard deviations, minimum and maximum values of the subscales in total for the sample. The obtained results testify to high scores on subscale “Coordination” and above average scores on the other subscales. Therefore, the investigated employees demonstrate a high readiness for group interaction and effective implementation of the assigned tasks. Also, they present a relatively high willingness to generate ideas (“Diversity”). The scores on the other two scales are relatively close and indicate a moderate level of independence in thinking and networking skills.

Table 5 presents the results of the analysis of variance on the differences in CI between men and women in the sample. The obtained results present statistically significant gender differences in two subscales “Coordination” ( $t = 3.26$ ;  $p = .002$ ) and “Networking” ( $t = 2.07$ ;  $p = .044$ ), where the results of women are higher compared to those of men. Accordingly, women in the study demonstrated a greater willingness to work with others, to apply skills to achieve work goals, along with higher scores on networking and teamwork skills. There are no gender differences in other two subscales “Diversity” and “Independence”.

**Table 5.** Gender differences in CI subscales

Subscale	Gender	N	Mean	SD	t; p
Coordination	Female	21	23.24	1.51	3.26; .002
	Male	25	20.72	3.48	
Networking	Female	21	16.33	2.22	2.07; .044
	Male	25	14.68	3.17	
Diversity	Female	21	16.19	1.54	-.174; .863
	Male	25	16.28	1.95	
Independence	Female	21	16.10	1.48	1.22; .232
	Male	25	15.28	2.93	

Women and men did not differ in their ratings of independence in thinking and generating different points of view on problems related to their joint work.

The differences found regarding men's and women's willingness to apply their skills in achieving group goals can be related their cognitive process. For example, Lesser et al. (2012) found that women performed better at attention, word and facial memory, and social tasks. This is mostly related to the cognitive tasks and those of sensory motor coordination (Chraif, Anitei 2013). As per while men are focused on the short-term need, women are more focused on building long-term personal connections or friendships. Based on that, all of the participants in the tested groups are newly formed teams, this could be a justification on why the results of the females for networking and coordination are higher.

Table 6 presents the results of the analysis of the variance in the subscales of CI between in all-female or all-male teams.

However, the gender differences persist only in the subscale "Coordination", and of course we have to take into account the small size of the teams and opportunities in the calculations. There is no significant difference in the other three subscales of CI. Table 7 presents the results of the analysis of the variance in the subscales of CI between female teams. No statistical significant

**Table 6.** Male vs. female team consistence differences in CI subscales

Subscale	Team consistence	Sample	Mean	SD	t; p
Coordination	Female only	9	23.33	2.83	2.002; .062
	Male only	12	20.92	2.61	
Networking	Female only	9	15.67	2.74	.649; .524
	Male only	12	14.83	3.13	
Diversity	Female only	9	16.44	1.94	-.559; .584
	Male only	12	16.92	1.88	
Independence	Female only	9	15.89	3.52	.094; .926
	Male only	12	15.75	3.14	

**Table 7.** Female team consistence differences in CI subscales

Subscale	Team consistence	Sample	Mean	SS	t; p
Coordination	Female only	9	23.33	2.83	1.552; .068
	Mostly female	18	21.39	3.50	
Networking	Female only	9	15.67	2.74	0.587; .283
	Mostly female	18	15.65	2.87	
Diversity	Female only	9	16.44	1.94	1.122; .141
	Mostly female	18	15.61	1.54	
Independence	Female only	9	15.89	3.52	0.137; .447
	Mostly female	18	15.72	1.32	



differences were found in the subscales when comparing all-female or mostly female teams.

In summary, we can assume that the comparison of dimensions of collective intelligence with different gender composition of teams in outsourcing organizations presents that women or teams composed only of women demonstrate higher scores mostly in the subscale “Coordination” and no differences in the other subscales. Dufwenberg and Gneezy (2005) are finding little difference between groups of men and groups of women, when it comes to their ability to avoid the least efficient equilibrium in a minimum effort game. The results show some differences in the initial stages of the game, but these differences disappear fast, and no difference is found in later stages. On average, women tend to put group attributes over personal egos (Miller, Karakowsky 2005), while men often engage in behaviours of self-promotion, individualism, and competitiveness (Eagly, Steffen 1984). Women may prefer more coordination because they may perceive integrated workflow as facilitating effective groups. In contrast, men may not like high coordination because of their preference for more independent activities.

## **Conclusion**

Individual skills, male to female ratio in a group, and group collaboration are all predictors of collective intelligence, the ability to work together and problem-solving attitude. It has been proven that both men and women are capable of achieving excellent results, regardless of their gender. However, the outcome of the research shows that the more women in a team, the smarter the team is. The results of the current research indicate some significant differences in the subscale “Coordination” when comparing man and women teams. Coordination is a process of bringing together, integrating, and synchronizing the actions of members of a group in order to achieve unity of action in the pursuit of common goals. This may be explained by differences in social sensitivity, which is related to collective intelligence. The expectation that female team members will foster more cohesion, cooperative learning, and participative communication, than male representatives rests on the argument that female are more likely to have a relational self-construal than males. A conception of the female groups as relatively interdependent, relational, and interconnected (Cross, Madson 1997; Markus, Kitayama 1991) which, research finds, fosters team cohesion and communal interaction norms such as cooperative learning and participative communication. Team social solidarity is a mechanism through which the proportion of women in work teams can facilitate team performance, especially when team leaders frequently interact with their team members. In applied terms, the results of this study testify to the importance of diversity in teams and the role of women in building networks and good relationships as a basis for better team results and organizational effectiveness.

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