A SOCIOMETRIC ANALYSIS FOR THE CREATION OF AN INTEGRATED MULTICULTURAL WORK TEAM

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ABSTRACT: *This research applied the sociometric theory to develop methodologies focused to enhance the performance and integration of multicultural work teams, as part of one the authors' master dissertation. Sociometric tests were administered in a purposive sample of N=26 students from twelve countries, in four different scenarios: (i) work team, (ii) leadership, (iii) trip (leisure time) and (iv) personal problem. Two additional questions were asked about: (v) how they felt when they answered the survey and (vi) which question(s) was/were difficult to answer and why. The focus on these two questions was to understand the emotional state of the respondents when they answered the survey and related this emotional state to the Sociometric Theory. The results were organized on sociometric matrices, through MS Excel. Data were analyzed for each scenario presented. Furthermore, the software Kumu was used as a tool to further analyze the connections between the people in the selected group using three metrics: (a) size, (b) degree centrality and (c) indegree. Also Kumu was used to draw the sociometric maps. Finally, a methodology on how studying relationships inside companies, to design teams and to identify the best work team based on the interrelationship between the people as well as the lack of communication among the team members, project team or inside the company as a whole. Discussion and future research recommendations complete the present work.*

KEYWORDS: Sociometry, social interaction, network, multicultural and teamwork

INTRODUCTION

Human beings are social creatures and interact each other. According to Moreno (1941), such interactions may be represented as (a) attractions, (b) repulsions or (c) rejections. Attraction, repulsion and rejection are connected to many social, biological, and psychological factors. As well as having close or distant effects over the immediate participants of the relationship, they may also affect the overall society.

The interpersonal connections of individuals and groups of all sizes is studied under Sociometry, according to Moreno (1941), aiming at improving human relationships within a social group. Moreno created his sociometric method by studying the behavior of refugees in Austria and the relationship among the girls from the Hudson School for (Delinquent) Girls (Smith, 1950).

Sociometry is hereby defined as "the measurement of friendship or, in a broader sense, the measurement of interpersonal relationships" (Smith, 1950, p.211). However, for Moreno, "sociometry is, first of all, a theory and then a method" (Moreno, 1942, p. 6). According to Moreno (1934), humanity can be considered an organic social unit. As a unit, tension appears between and within the different parts. This leads to these parts of society separating or

attracting as happens in physics. Tension between the parts could be beneficial for the part and harmful to the whole; or advantageous for one part and disadvantageous for the other.

Since social groups also interact in the workplace, the relationship amongst team members could be somehow affected. In particular, multicultural team's performances' could be jeopardized, due to their cultural differences interfering in the group performance. These issues, since companies are spreading their operations overseas, and thus employing people from different countries, have impacted countries, societies, families, institutions and companies around the world because people have stopped talking (communicating) to, and relating to each other, which have affected society, as a whole.

Sociometry is hereafter applied to select the best team among a group of people from different cultures, who work together, considering the level of relationships within this group, as well as finding the leader for the selected team, using the team preferences for a leader. Therefore, the present research investigated the application of the Sociometric research methodology to a small and select group of international executives, who have never worked together in a company. The objective is to analyze the level of emotional relationships in a multicultural social group.

In the particular case of companies, these problems in relationships have affected the success of new businesses, projects, departments, and teams as well as their leadership. Sometimes executives invest time and resources in the restructuring of their companies, thinking over and rethinking the organizational Tables; however, they fail in this process. This happens because some of the real work in a company happens despite formal organization. Krackhardt and Hanson (1993) wrote about these problems and studied informal networks. These informal networks could be explained as relationship networks that employees from inside their organizations, which can be created across functions, departments, and divisions. Therefore, this study is relevant to many field research areas including psychology, psychiatry, sports, sales, management, and human resources, mainly for group leaders in all settings.

Past studies support Sociometrics: Hale (2009), Moreno (1941), Moreno (1955), Northway (1946), Remer (2002), Smith (1950), Tagiuri and Kogan (1957) used the theory to study human relationships, psychodrama, and social relationship problems. Also, this theory has been used for studies involving human resources (Blumberg, 1999; Colarelli & Boos, 1992; Criswell, 1949; Gardner, 1956; Lucius & Kuhnert, 1997; Massarik, Tannenbaum, Kahane & Weschler, 1953), leadership (Beck, Eng & Brusa, 1989; Burke, 1971; Gibb, 1950; Jennings, 1947; Marak Jr., 1964; Read, 1974), sports behavior (Vierimaa, 2013), pedagogy (Buckridan, 1975; Daugherty, 2003; Mciver, 1948;) and for military studies.

Moreover, there is a new generation of researchers who have used the theory of Moreno (1934) by another name. This is the case of researchers Krackhardt and Hanson (1993) and prof. Pentland (2012). Both of them use sociometry as a base to analyze human beings relationships. A good example of the application of the theory is MIT's Human Dynamics Laboratory, which has identified work group dynamics (Pentland, 2012). Sociograms could also be tested on different scenarios, or even businesses, not limited to: Cooperatives (Dias & Teles, 2018; Dias, Murillo de Oliveira; Krein, Jeferson; Streh, Eder; Vilhena, João B., 2018; Dias & Ramos, 2018; Dias, 2018b); Public services in general, such as public transportation (Dias, 2018); craft beer industries and industries in general (Dias & Falconi, 2018); Limestone and other agricultural, or mining business 9Dias & Davila, 2018); aeronautical companies (Dias, Teles & Duzert,

2018); fashion business (Dias et al., 2015); automotive companies (Dias & Navarro, 2012; Dias et al. 2013, Dias,2016); public projects (Dias, 2016), for instance.

The Sociogram was a unique map used to do a structural analysis of the community. However, recently, researchers have developed another concept called Informal Networks, using the sociometric bases. (Daugherty, 2003; Krackhardt & Hanson, 1993; Pentland, 2012).   Open Source Software has also been created for exploring and manipulating Networks, which could analyze people networks (Bastian, Heymann & Jacony, 2009). For mapping the sociogram and analyzing the social network the software called *Kumu*, employed here.

The criteria selected for the group were: (a) teamwork, (b) leadership, (c) leisure time and (d) personal problems (confidence). Thus, two of the criteria presented to the respondents are linked to operational and two to affective. The aim of choosing these four criteria was to conduct a comparison between the professional and personal criteria and see if there was a pattern of choices between them as well as if there was some pattern in the choices related to attractions, rejections and indifference (neutrality).

Each of the individuals at the moment of selecting their personal group took into account the criteria presented by the questionnaire and different values; objectives, patterns and rules influenced these individuals in their preferences selection. Therefore, the different combinations of influences of each of the individuals in their choices, will affect the group creation for each criterion (Smith, 1950). Because of this, if there enters a new individual into a group, all the dynamics of the group maybe changed.

Sociometric leader

Based on all of the information obtained through the sociometric questionnaire and through the analysis performed by using the Sociogram, the Sociometric Score of each individual will be set and the Sociometric Leader will be chosen who could be (1) a popular leader, (2) a powerful leader or (3) an isolated leader.

Additionally, in the questionnaire one question will be administered about leadership, which has the objective of analyzing if the respondent answer matches with his or her chosen leader in relation to their relationships with the members of the group analyzed. Figure 1 depicts a popular leader's sociogram:
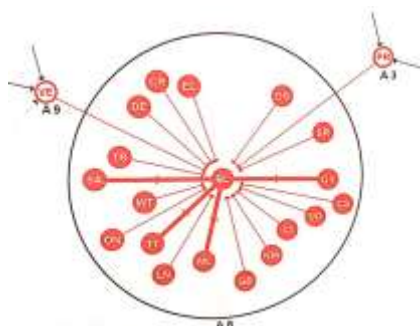

Figure 1 Structure of Leadership – Popular Leader. (Moreno, 1934, p.257)

On the other hand, a leader that knows the sociometric profile of his or her team can create a good working environment, because he or she knows the interrelation connections. With this important information the leader can, for instance, choose the right team for a project, increase productivity, and can improve the communication and efficiency of the team. (Berkowitz, 1956; Burke, 1976; Beck, Eng & Brusa, 1989; Krackhardt & Hanson, 1993; Pentland, 2012).

Work project team

The marketplace dynamism in a global world has demanded that companies should be more agile and flexible in order to maintain competitiveness. Nowadays the customers' expectations regarding the quality of a product or a service have increased. A customer does not accept products or services, which do not satisfy their requirements. "Due to the fact that companies have changed their structure and way of working" (Zahra, Nazir, Khalid, Raana & Majeed, 2014, p.40).

According to Flannes (2015), the most difficult task of the project manager is to select people by their soft skills required for a specific project. On the other hand, selecting people based on their hard skills is not so hard, because these skills are more tangible in terms of a project. Marando (2012) concluded in her research that the project managers fail to direct their projects in the right way just because the lack of management skills which are usually known as 'soft skills'. Soft skills are mainly elusive, a solid output or any deliverable is not demanded and they commonly work without any pattern and tools.

Thus, the problem of handling soft skills is not only a problem experienced by project managers related to their team, but regarding themselves. In addition to these problems of managing soft skills, managers have to face complex projects. This complexity is caused by the projects being complex systems, not only due to the technical issues but also due to the wider organizational factors that are usually beyond a project manager's control (Whitty & Maylor, 2009).

Azim (2010) expressed that projects are very dependent on the participation, reactions and interactions of people, thus making these interdependencies hard to model and unpredictable to some extent. However, as it is described in this dissertation, the utilization of sociometry could decrease the factor of failure related to the personal relationships within projects.

METHODOLOGY

The purposive, convenient sample, gathered in this study N=26 students, colleagues from Corporate International Master (2014-2015), developed by Georgetown University's McDonough School of Business, Corporate Master of Business Administration from ESADE Business School and FGV/EBAPE. This group was selected because of its multicultural characteristics and the level of hard and soft skills of its participants.

The small group of students was chosen because of the time granted for the development of research and dissertation. The entire master course had duration of 14 months, and only 11

months to do the research and write the dissertation. Because of this a small group was chosen in order to do an oriented research.

The research was conducted using online forms, via the tool "Form" provided by Survey Monkey Inc. (www.surveymonkey.com), once the questions were listed, a link was provided in order to forward to all the participants. The response tax was 100 percent. The questionnaire was assigned from August to September 2015.The questionnaire that was applied to the participants was a Sociometric Questionnaire (Sociometric Test). Besides the Sociometric questionnaire, additional questions regarding personal information (question number 1) as well as qualitative questions about the feelings and the difficulties that the respondent found in answering the Sociometric questionnaire (questions number 14 and 15).

RESULTS

The group selected to take the Sociometric Test was the N=26 convenient sample. This group was composed of 66 percent Male and 34 percent Female, from twelve different countries, 14 different languages spoken and ten countries of residence.

They had an average of twelve years of work experience and more than 200 employees under their supervision. The total of eleven percent are executives, 35 percent occupy top-level management positions, 46 percent middle-level management positions and only eight percent, low-level positions.

The profile of the group is important because it has an influence over the results of the Sociometric Test and shows the cultural diversity and experience of the respondents.

This selected group studied together for one year and they had four international modules in Washington - USA, Rio de Janeiro - Brazil, Barcelona - Spain and Shanghai - China. During these modules they participated in many group projects and they had some leisure time together. Between the international modules, they had virtual modules where they exchanged a lot of information via email and Skype. So, during one year the group had constant contact.

It is worth mentioning that the researcher is part of the CIM 2 and he who applied the research. This may have influenced the choices of respondents, since the choices are based on the personal relationship level of each individual. Besides this, the fact that the respondent's choices would be kept secret was guaranteed. However, the only case that would not be guaranteed complete confidentiality was related to the researcher who had access to all the research results and he would know who rejected him. For the same reason, the individuals could choose him, because he would know who chose him positively (attraction).

ANALYSIS

All sociometric symbols and typical internal structures of the sociogram are described in Appendix B - Sociometric Symbols and Internal Structures. The colors used in the cell to represent the negative, positive and neutral choices were blue for positive (attraction), red for negative (rejection), green for neutrality (neutral). At the end of the spreadsheet, the numbers of positive, negative and neutral choices of the selected group were summarized as well as the number of positive, negative and neutral mutuality and the incongruences. The incongruences were represented with black arrows in a Sociometric Matrix.

In addition, using the results of positive, negative and neutral choices in each Table (spreadsheet) below and for each scenario, it is possible to define the stars (largest number of positive choices), rejects (largest number of negative choices) and isolates (largest number of neutral choices).

Also, the number of incongruences shows, in some cases, the conflicts and frustration that can be generated in a person who chooses someone who rejects them. Thus, most of the conflicts and frustration created in a group are caused by the mutuality and incongruences.

Another negative impact in a group, generated by the negative mutuality and serious incongruences (incompatible relationship, attractions x rejections) is the lack of communication inside a group. So, this lack of communication can affect the success of a project or the operation of two or more areas on a company, or, in the worst case, on the whole company (Krackhardt & Hanson, 1993; Pentland, 2012).

The software Kumu was used to plot the Sociograms (maps) as well as to develop some analyses using the metrics brought by this software. For running the metrics, the database obtained by the sociometric test applied to the selected group was used, as depicted in Figure 2, as follows:
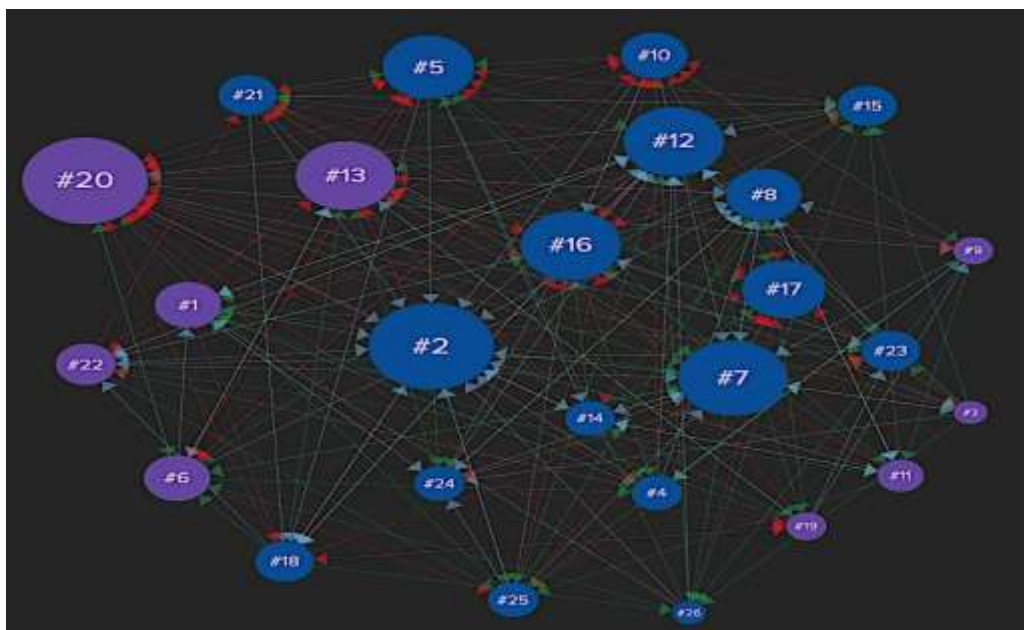
Figure 2 Sociogram of Work Team

This sociometric analysis is about the scenario teamwork (criterion) addressed to the selected group.

For this analysis the Sociogram as shown in Figure 2 – Sociogram of Work Team and the Sociometric Matrix was used.

The aim of this part of this dissertation was to identify the sociometric stars, rejects and isolates. Another point checked was the level of cohesion of the selected group, based on the mutuality and incongruences, and how this cohesion can impact the efficiency and communication process on the whole group.

Table 1 – Sociometric Matrix of Work Team, shows that the individuals with the biggest number of positive (attraction) choices of the group are #2, #12, #7 and #8 as well as the fact that these individuals did not receive any kind of negative choices from the selected group. Naturally, it is possible to create four different work teams led by each member (#2, #12, #7 and #8). Moreover, it is also possible to create one or another work team with the intersection of these groups. This formation of one or more groups is addressed in Hypothetical Integrated Multicultural Team below.

In terms of the individuals who had received more positive choices, this research found #2 as the sociometric star of this scenario (sociometric criteria), but the individuals #7, #12, #8 and #1 also received many positive choices of the group. Another consideration is that these individuals did not receive negative choices from the selected group.

Table 1 - Sociometric Matrix of Work Team

Sociometric Matrix of Work Team Question

The metrics size and degree as Table 2 – Metrics of Positive and Neutral choices show the same result. So, different tools of the analysis show the same results for the people who received the most choices in the group. For the construction of Table 2 only the Positive (blue arrows) and Neutral (green arrows) connection, were considered when applying the metrics of size and degree.

Table 2 - Metric of Positive and Neutral choices

RANK	SIZE	DEGREE
#1	#2	#2
#2	#12	#12
#3	#7	#7
#4	#8	#8
#5	#23	#1

According the Sociometric Matrix of Work in Team – Table 2, the individual who had been rejected the most by the group was #20, followed by #10, #16, #17 and #5. These people who were rejected in a group where one or more of the individuals who had rejected them needs to interact with them could cause a lack of communication and generate inefficiency within this hypothetical group. For Table 3 only the Negative connections of the selected group were considered and applied to the metrics of size and degree.

Table 3 - Metric of Negative choices

RANK	SIZE	DEGREE
#1	**#20**	#20
#2	**#16**	#10
#3	**#10**	#16
#4	**#17**	#5
#5	**#21**	#17

Regarding neutrality, there was a spread of the choices, without concentration in four individuals, which had happened with the choices of attraction and rejection. In the point of view of this researcher, this neutrality did not impact any work groups, as long as there hadn't any incongruences regarding the choices. Neutrality does not cause a problem for coexistence because the individual is indifferent to the relationship. Relationship problems only occur if there is a neutral choice on the part of an individual and the rejection by the other.

The types of incongruences that can affect teamwork are neutral choices with negative choices, as represented in Table 4 Analysis of Mutualities and Incongruences from Work Team Scenario, in the orange column, as well as negative choices with positive choices, represented by yellow column.

Table 4 - Analysis of Mutualities and Incongruences from Work Team Scenario

Sociometric Matrix - Work Team Question

Mutualities +		Mutualities -		Mutualities+/-					Incongruence				
#1	#12	#4	#20	#1	#4		#2 +	#25+/-	#3+/-	#20 -		#2 +	#20 -
#2	#14	#6	#10	#6	#20		#4+	#9+/-	#5-	#21+/-		#10 -	#16 +
#2	#18	#10	#20				#15+/-	#21+/-	#7+/-	#20 -		#12+	#16 -
#3	#7	#13	#16				#13+	#19+/-	#9-	#10+/-		#8+	#13-
#7	#14	#18	#19						#16 -	#24+/-			
#8	#11	#5	#20						#16 -	#25+/-			
#8	#24								#23 -	#24+/-			
#11	#14												
#12	#18												
#6	#13												
#22	#12												

In the total of 312 possible choices (1 scenario X 4 questions X 3 choices X 26 respondents), 38 mutualities were found (12,18 percent of the total), of which 22 were positives, 12 were negatives and 4 neutrals. Also, there were 30 incongruences, where 8 were positive with neutral and which does not generate big issues for these individuals and for a group that they belong to, 14 were neutral with negative choices and 8 were negative with positive choices. The most difficult situation to manage is the negative with positive choices, because there is a total incompatibility between this people, and this relation will generate high frustration levels in the respondent who chose someone who had rejected him/her.

The expectation from one relationship to another is always opposite, and according to Moreno (1934); MCpherson, Smith-Levin and Brashears (2006); and MCiver (1948): the rejected individual creates a dependency when relating to someone who had rejected them. This relation can seriously affect the rejected person, who can suffer for not being chosen by their choice.

Analysis of Leadership Sociometric Test

The scenario analyzed was the Leadership (Criterion) and to do the analyzes a Sociogram and Sociometric Matrix were used. The objectives of this scenario were to identify the leaders of the selected group as well as to compare this result with the leaders elected in the Work Team scenario.
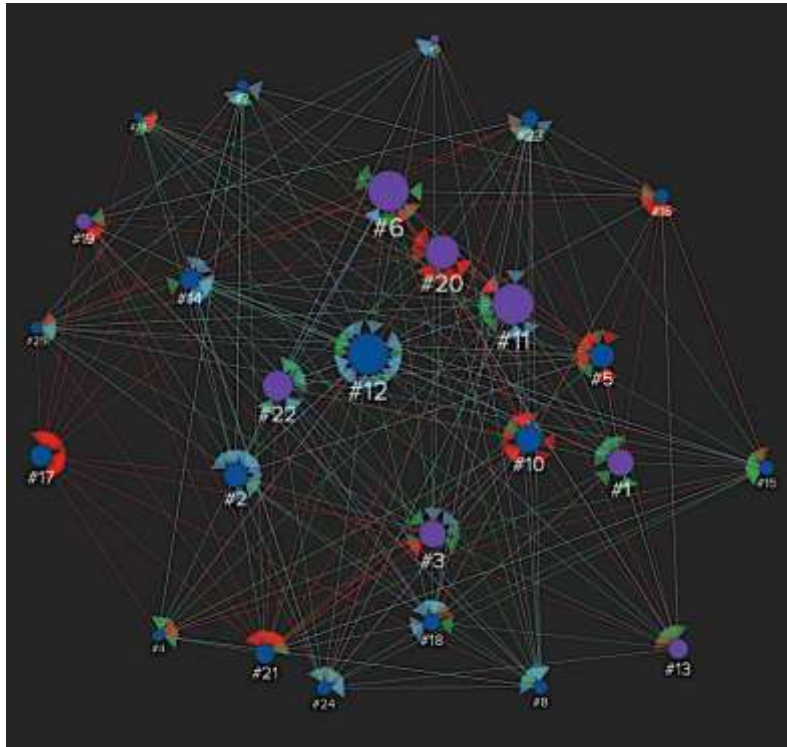
Figure 3 Sociogram of Leadership

According to Moreno (1934), the leaders for each criterion were the people who had received more positive choices from the selected group (popular leader) or the person who has influence over the person who received more choices in the group. This last case is called an isolated leader.

So, Figure 10 – Sociogram of Leadership and Table 5 – Sociometric Matrix of Leadership shows that the individuals who received more positive choices to be leaders of the group were #12, #2 and #14, each one with a total of 17, 12 and 11 choices respectively.

However, the Sociogram and the indegree metric provided by the Kumu Software stated that individuals #12, #2, #6 and #11 were the leaders. The difference between both analyses was that the first one used the number of choices (Matrix Analysis) and the second one considered the number of incoming connections of each person (indegree metric).

Thus, the researched #12 and #2 were the people who received more choices from the group as well as not receiving any rejections, both of them in Scenario Work team and Leadership. However, the sociometric star in this case was individual #12. Because of this, he/she was the leader of the selected group, using the sociometric matrix as the tool of analysis.

Table 5 - Sociometric Matrix of Leadership

Sociometric Matrix of Leadership Question
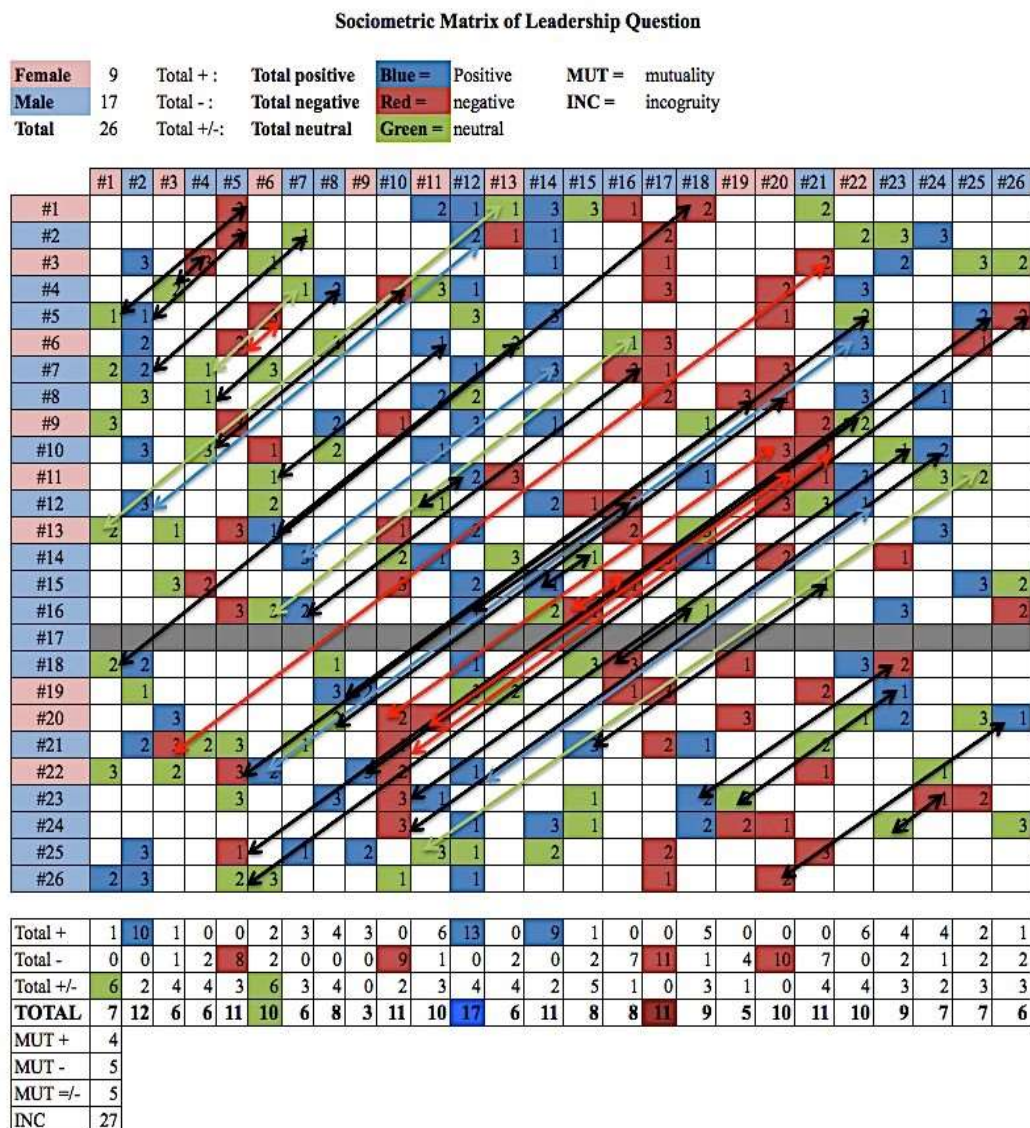
Furthermore, has to be considered that individuals #12 and #2 are popular leaders, because separately, each one positively influenced 17 and 12 participants of the selected group respectively.

Also, respondent #2 chose #12 as his/her leader. Both of them were chosen by individuals #5, #7, #12, #18, #19 and #26. In this way, 6 individuals recognized them as leaders. Additionally, #3, #6, #8, #10, #21, #25 chose respondent #2 as their leader. Taking that into account, as individual #2 chose respondent #12 as his or her leader, this person could use researched #2 to lead the people who had chosen only individual #2 as a leader. #12 can exercise his or her leadership influence over individual #2.

The leaders could exercise this indirect influence in many ways inside a specific group. The only thing that the leaders have to do is to identify the other leaders, mainly if they are powerful leaders. The sociometric test can help the leader to do this identification.

Table 6 - Analyses of Mutualities and Incongruences from Leadership

Sociometric Matrix - Leadership Question

Mutualities +		Mutualities -		Mutualities +/-		Incongruence					
#12	#2	#2	#21	#13	#1	#2+	#7 +/-	#1+/-	#5-	#2+	#5 -
#6	#22	#20	#10	#7	#4	#4+/-	#8+	#1+/-	#18 -	#3+	#4-
#7	#14	#21	#10	#6	#5	#6+/-	#11 +	#4+/-	#10 -	#5-	#25 +
#22	#12	#20	#11	#16	#6	#6+	#13+/-	#5-	#22 +/-	#7+	#16-
		#15	#16	#25	#11	#9+	#22+/-	#5+/-	#26 -	#8+	#19 -
						#11+/-	#12+	#8+/-	#20 -	#10-	#24+
						#14+	#15+/-	#10-	#23+/-	#12 +	#16-
						#15+	#21+/-	#16-	#18 +/-	#18+	#23 -
						#19+/-	#23+	#23+/-	#24-	#20-	#26+

In the total of 312 possible choices (1 scenario X 4 questions X 3 choices X 26 respondents), 28 mutualities were found (9 percent of the total), of which 8 were positives, 10 were negatives and 10 neutrals. Also, there were 27 incongruences (17.3 percent of the total), of which 18 were positive with neutral and which does not generate big issues for these individuals and for a group that they belong to, 18 were neutral with negative choices and 18 were negative with positive choices.

A problem that could occur from this incompatibility is the frustration of the person who was rejected by another. This frustration may reflect directly the accomplishment of daily tasks in a work team and in a project, inside a department, between departments or in a whole company, depending on the size of the companies and teams.

Analysis of Trip and Personal Problem's Sociometric Tests

This scenario was created to compare the results of the Teamwork scenario and Leadership scenario. The researcher wanted to verify if there was a pattern in the choices of the respondents in different scenarios, mainly when comparing professional choices to personal choices. Because of this, two personal scenarios were created to establish a base of comparison with the other two professional scenarios addressed to the selected group.

Table 7 – Sociometric Matrix of a Trip and Table 8 – Sociometric Matrix of Personal Problem and Figures 4 and 5, demonstrated a pattern of rejection between them and with Table 1 – Sociometric Matrix of Work Team and Table 5 – Sociometric Matrix of Leadership. In all of them, individuals #5, #10, #16, #17 and #20 were among the top five rejections.
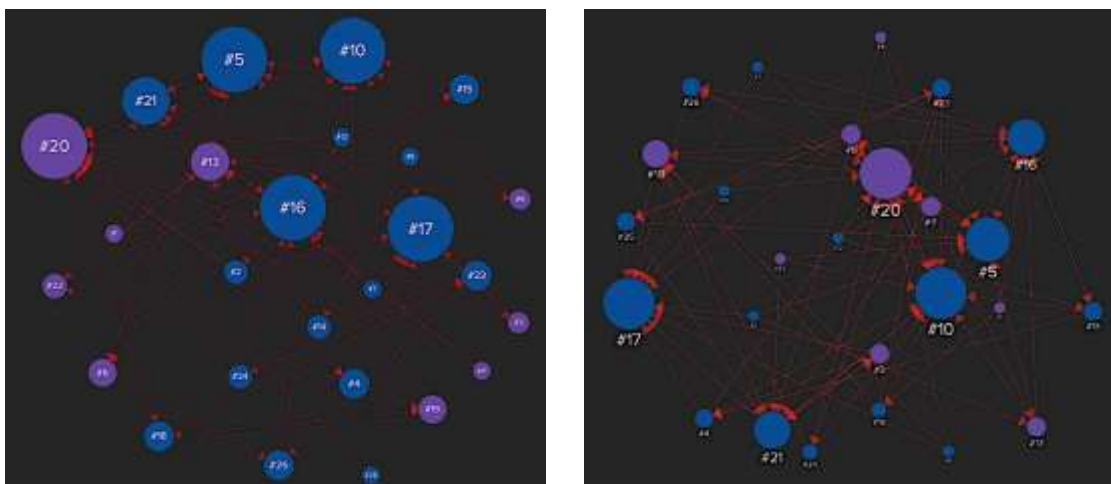
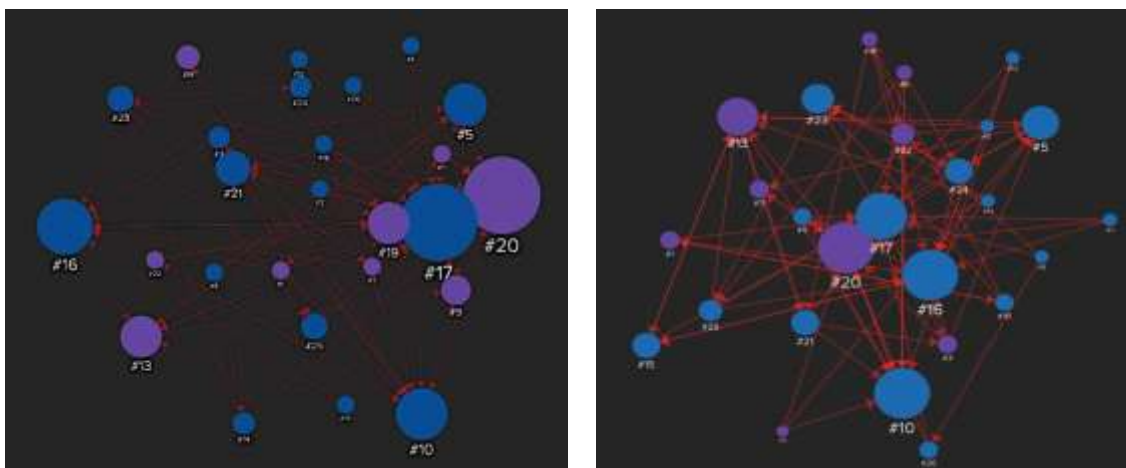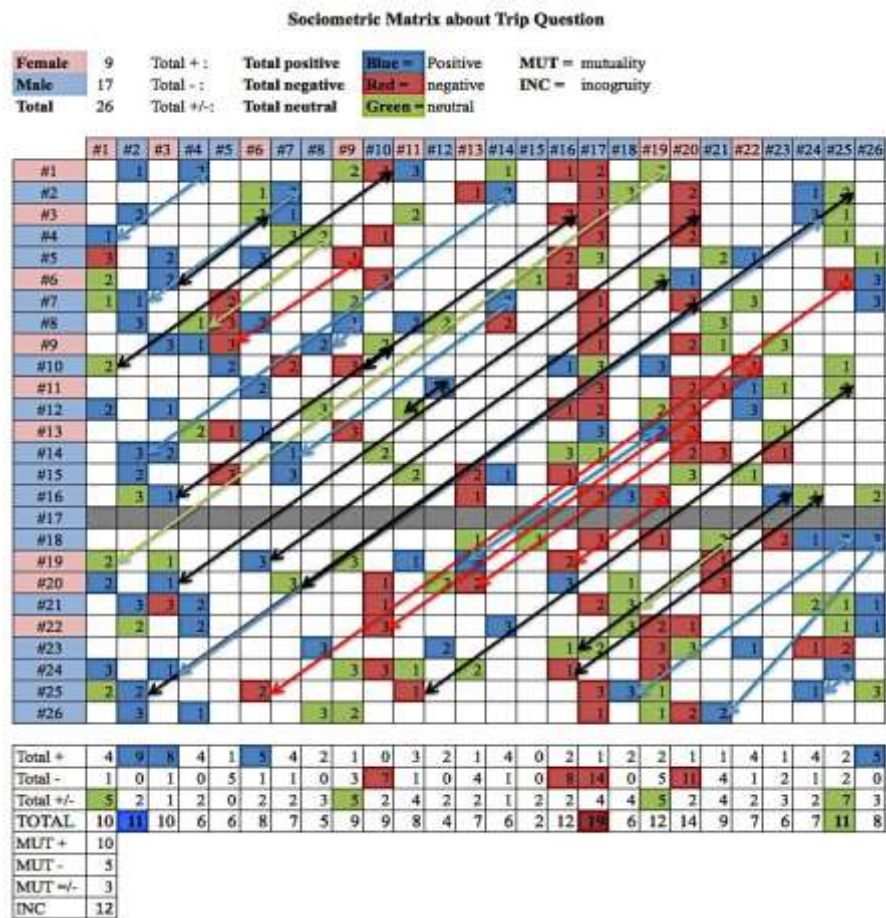**Figure 4 Negative choices of work Team (left), and Leadership (right)**

**Figure 5 Negative Choices of Trip(left), and Personal Problems (right)**

Thus, it is clearly plausible to identify a pattern of rejection in the sample studied in all of the presented criteria.

Table 7 - Sociometric Matrix of Trip

Sociometric Matrix about Trip Question

Regarding the positive and neutral choices, when all matrices were compared, it was possible to see that a choices spreading had occurred, and only three individuals, in both cases, had appeared more than two times.

Table 8 - Sociometric Matrix of Personal Problem

Sociometric Matrix about Personal Problem Question
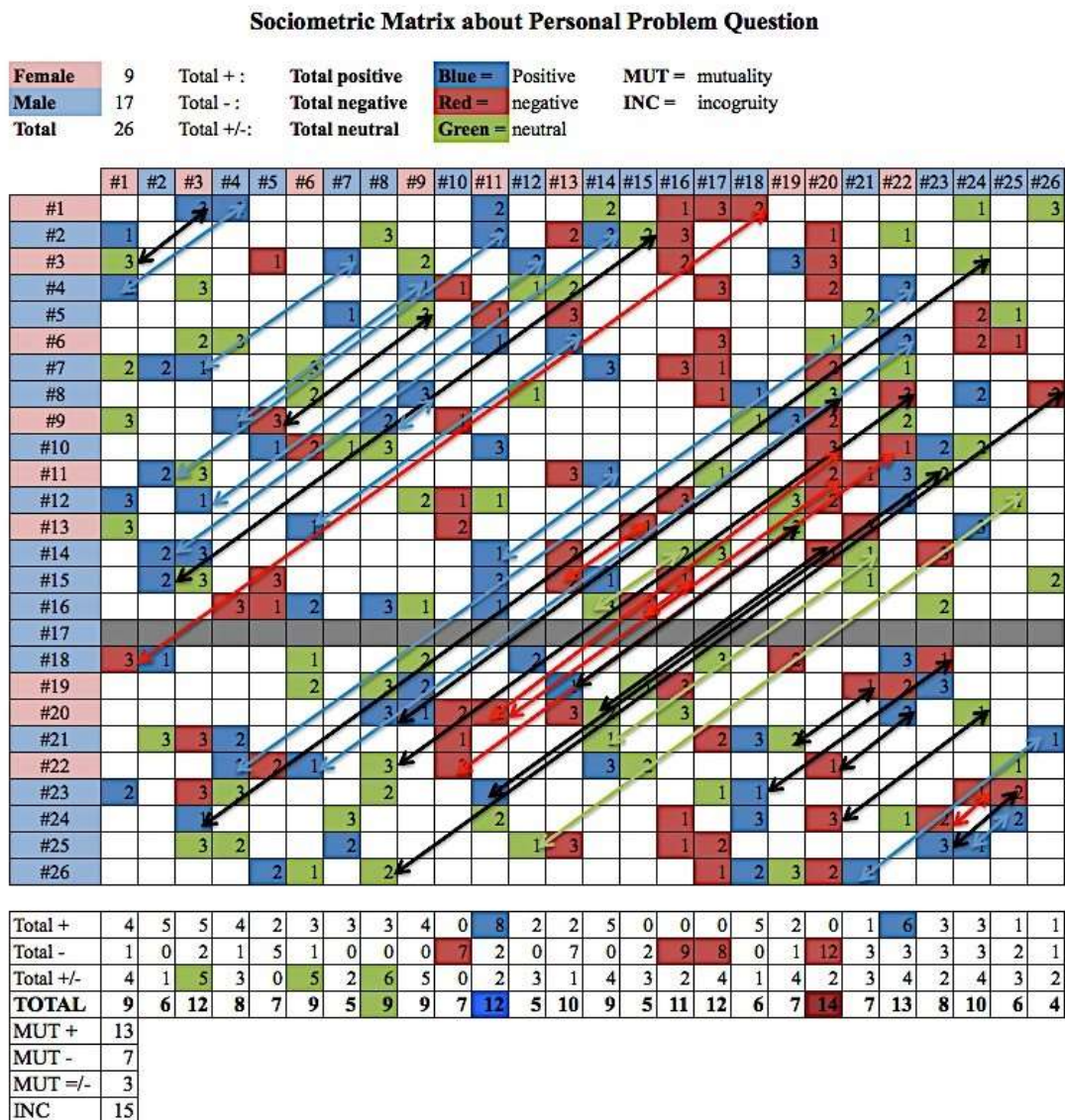
When comparing the mutualities and incongruences of Table 9 – Trip - analysis of mutualities and incongruences and Table 10 – Personal Problem - analysis of mutualities and incongruences, both of them have high numbers of positive mutuality, mainly when the Personal Problem mutualities were analyzed. In this case, the number was high because the people who choose another had already talked about a personal problem during the time that they spent together in the Master's Degree as well as stating that they had the opportunity to make a trip together.

So, the people were more assertive in choosing someone to talk about something more personal with because they had this experience and created a trust relationship between each other.

Table 9 - Analysis of Mutualities and Incongruences from Trip Scenario

Sociometric Matrix - Trip Question

Mutualities +		Mutualities -		Mutualities +/-		Incongruence					
#1	#4	#5	#9	#1	#19	#2 +	#25+/-	#1+/-	#10 -	#3+	#16-
#2	#7	#6	#25	#4	#8	#3+	#6+/-	#7+/-	#20-	#3+	#20-
#2	#14	#10	#22	#18	#21	#6+	#19+/-	#9-	#10+/-		
#3	#24	#13	#20			#11+/-	#12+	#11-	#25+/-		
#7	#14	#16	#19			#16+/-	#23+	#16-	#24+/-		
#8	#9										
#13	#19										
#18	#25										
#21	#26										
#24	#25										

It is important to note that regarding the personal problem incongruences, the people who choose someone who rejected them will probably suffer high levels of frustration, more than the frustration felt in the professional criteria. This could happen because when people are involved in a personal problem, emotion is more responsible for the choice. So, when people have an emotional choice, the tendency is to have more suffering when there isn`t a reciprocity of feelings. Thus, respondents #20, #23 and 25 made the "wrong" choices in terms of reciprocity.

Table 10 - Analysis of Mutualities and Incongruences from Personal Problem

Sociometric Matrix - Personal Problem Question

Mutualities +		Mutualities -		Mutualities +/-		Incongruence					
#1	#4	#1	#18	#12	#25	#1+/-	#3+	#5-	#9+/-	#8+/-	#22-
#2	#11	#10	#20	#14	#16	#2 +	#15+/-	#8+/-	#26-	#18+	#23-
#2	#14	#10	#22	#14	#21	#3+	#24+/-	#14+/-	#20-	#20-	#22+
#3	#7	#11	#20			#8 +	#20+/-	#19+/-	#21-	#23+	#25-
#3	#12	#13	#15			#11+	#23+/-	#20-	#24+/-		
#4	#9	#15	#16			#13+	#19+/-				
#4	#22	#23	#24								
#6	#13										
#6	#22										
#8	#9										
#11	#14										
#21	#26										
#24	#25										

DISCUSSION

To do the final analysis, a filter and a metric from the Kumu Software were used. For the filter all Positive (blue arrows) and Neutral (green arrows) connections were considered and all Rejections or negative connections (red arrows) were excluded. After the application of this filter the metric "indregree" was applied and the result was that the individuals #2, #7, #12, #8 and #1 were among the Top 5 leaders/influencers. In this way, it was possible to measure the number of incoming connections for each individual, considering only the positive and neutral choices. As a result, the map shown in Figure 6– Work Team – Positive and Neutral Choices was created.
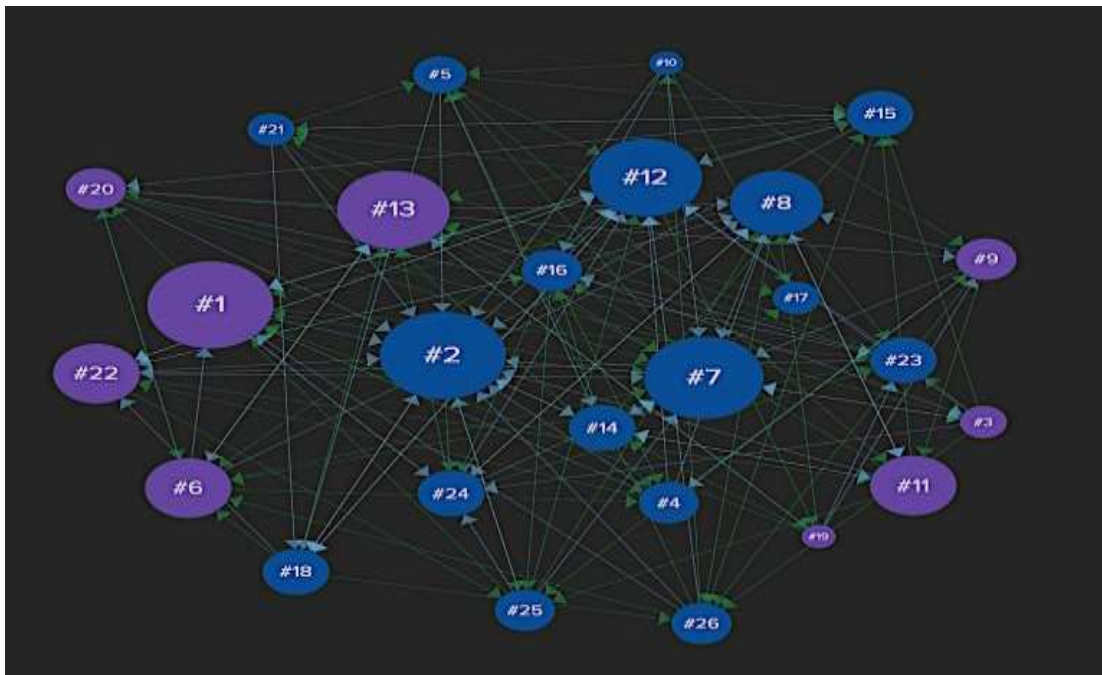

Figure 6 Work Team - Positive and Neutral Choices

The big circles represent individuals who received the most number of positive and neutral choices. Revisiting Discussion in this dissertation, where the Sociometric Matrix, was analyzed, these individuals were those who received the most choices and were classified as leaders or influencers.

In the sequence, the connections of each of individuals were analyzed who chose or were chosen by the top 5 leaders/influencers as well as all the negative connections among the group. The individuals who received any negative connections were separated from the hypothetical multicultural work team.

Table 12 - Integrated multicultural Work Team

Top1	Top2	Top3	Top4	Top5
Leader #2	**Leader #7**	**Leader #12**	**Leader #8**	**Leader #1**
#1	#1	#1	#1	#1
#4	#2	#2	#4	#2
#7	#3	#3	#6	#4
#12	#6	#4	#7	#6
#14	#8	#6	#9	#7
#18	#9	#18	#11	#8
#22	#14	#22	#23	#12
#24	#22	#24	#24	#24
#25	#24	#26	#26	#26
#26				
Rejections	Rejections	Rejections	Rejections	Rejections
#5	#5	#5	#13	#15
#10	#10	#15	#14	#19
#13	#13	#16	#16	#23
#15	#16	#19	#17	
#17	#17	#20	#19	
#20	#20	#21	#25	
#21	#21	#23		
	#25	#25		

REJECTIONS:
#5
#10
#13
#14
#15
#16
#17
#19
#20
#21
#23
#25

INTEGRATED TEAM

Leader	Respondent	Country	Gender
Top 5	#1	UAE	Female
Top 1	#2	Brazil	Male
	#3	USA	Female
	#4	USA	Male
	#6	USA	Female
Top 2	#7	Germany	Male
Top 4	#8	Italy	Male
	#9	USA	Female
	#11	USA	Female
Top 3	#12	USA	Male
	#14	Brazil	Male
	#18	Colombia	Male
	#22	USA	Female
	#23	Chile	Male
	#24	Colombia	Male
	#25	Colombia	Male
	#26	South Africa	Male

The rejection perceived in all scenarios (criteria) happened because people naturally reject whom they have no affinity with or have not developed a good personal relationship with during the CIM 2 course. Thus, the conclusion of this research was that the rejection became a pattern in all scenarios.

In contrast, there were greater variations among the individuals for positive and neutral because the people had been chosen excluding the negative options.

Another point is that the people took into account other variables when choosing the people for the scenario work team and leadership. These variables were connected to hard skills and soft skills (communication, leadership and inter-relationship).

The suggested actions to be implemented with the people who were rejected by the group in all scenarios are: (a) working with a coach to understand and treat the behaviors that had caused the negative choices of the group or (b) appoint a psychologist to better understand the reasons that had generated the behavior of these individuals. Another possibility is the indication of an in-group dynamics specialist to try to improve the relationships of the rejected people inside the group.

In the case that the rejected people are not accepted by the group, the leader or human resources needs to remove the rejected person from the group or replace this person with another who will be accepted by the group.

Thus, it is possible to create an integrated multicultural work team with the joining of the 5 top leaders groups, as shown in Table 12 – Integrated Multicultural Work Team.

This multicultural group was made considering the relationship choices of each individual inside CIM 2 and the result was 17 individuals from 8 countries, including 6 female and 11 males, with different levels of professional experience as well as having several hard skills.

The Sociometric Questionnaire (sociometric test), with its analysis using a sociometric matrix and software to draw and analyze the connections, proves to be a simple and practical tool to identify the inter-relationships among the people from a group and create a multicultural team for a company. Also, companies can analyze their actual team, analyze the level of influence of their leader, identify new leaders and build new teams for a specific purpose using this methodology.

RECOMMENDATION

One important recommendation is the possibility of applying the methodology used in this dissertation in a real company, which has a project running, and develops a study in order to analyze their teams per area and department involved in the project, and then, identify the relationship level among each group member.

Another recommendation is to apply the methodology and consequent research by a person who is not part of the group that will be studied. As already mentioned in this dissertation, the presence of the researcher in the group can influence the outcome of the research, especially regarding the positive choices and can, for example, lead to wrong conclusions about the group's leadership.

Additionally, it is possible to find a possible lack of communications between the individuals or departments inside specific projects.
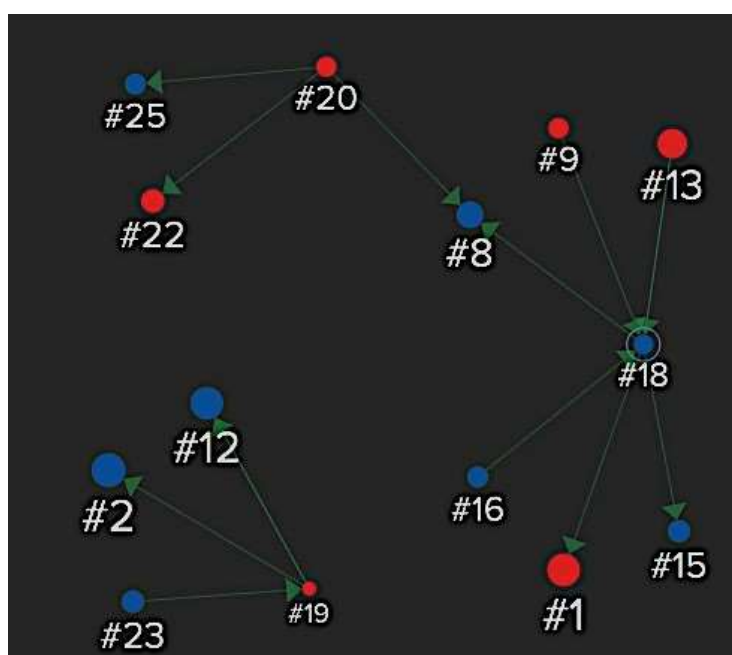
Figure 7 Isolated groups

Figure 7 shows three groups, one group consisting of individuals # 18, # 9, # 13, # 15, # 1, # 16 and # 8, a second group formed by individuals # 20, # 22 and # 25 and the third and the last group consisting of individuals # 19, # 2, # 12 and # 23. Considering that these three groups are part of a project and must work together to implement the project.

This sociogram represented by Figure 7 shows that individual # 8, is an important source of information exchange between the two groups, so, he or she binds the first two groups. The third group has no individual with a relationship with the first two groups. Thus we have the three groups isolated within the project. This will certainly cause problems in execution of the project, causing delays, cost increases, buybacks, communication problems and so on.

However, the sociometric test developed by Moreno (1934) together with modern analytical tools of informal networks can be used to improve the selection of people by the companies to work in an area, department or specific project, since one of the hardest things is to select people based on soft skills because it is difficult to measure.

Thus, the Sociometric Theory developed a method to measure the soft skills based on the relationships between people, as well as identifying the relationships effect inside a group. These effects could be considered as recognized leadership, influencers and connectors who can improve the communication process, improve teamwork, decrease internal conflicts, decrease effort with insider trading, better manage human resources, improve behavior within the project groups and efficiency in carrying out the projects.

However, sociometry applied to the multicultural workgroups selection or temporary project group, multicultural or not, can increase the efficiency of these groups based on the interpersonal relationship level.

The application of sociometric tools in selecting a project team with people who have worked together is more productive than applying the same tools in a new team, because these people are not yet familiar with each other and therefore have not established an interpersonal relationship.

The last recommendation is to apply this methodology in a work team or a project team from time to time in order to identify and map the changes in the relationships of individuals within the group or project.

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APPENDIX

APPENDIX A: EXAMPLE OF MORENO'S SOCIOMETRIC MATRIX (Hollander, 2015,p.09).

	1	2	3	4	5	6	7	+	−	Total
1 Joel		+		−	+			2	1	3
2 Sue	+		−	−				1	2	3
3 Diane	+	−		−		−		1	3	4
4 Mark	+	+	+		−			3	1	4
5 Bob	+	−	+	−				2	2	4
6 Cynthia	+	−						1	1	2
7 Lynn	+			+				2		2
Positive	6	2	2	1	1	0		12		12
Negative	0	3	1	4	1	1			10	10
Total	6	5	3	5	2	1				22

APPENDIX B: SOCIOMETRIC SYMBOLS AND INTERNAL STRUTUCRES

Symbols and meanings used in a Sociometric Matrix

(Based on Moreno theory, 1934)

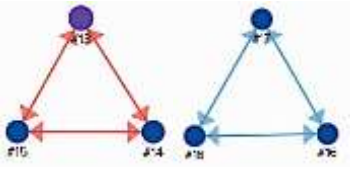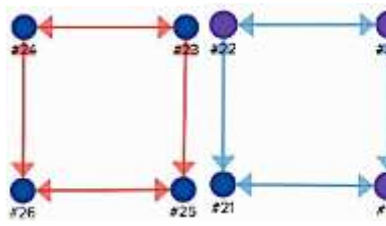|	
	• Blue line with two arrows represents a bilateral relationship of attraction (+)
	• Red line with two arrows represents a bilateral relationship of rejection (-)
	• Green line with two arrows represents a bilateral relationship of neutrality (+/-).
	• Green line with two arrows represents incongruence.
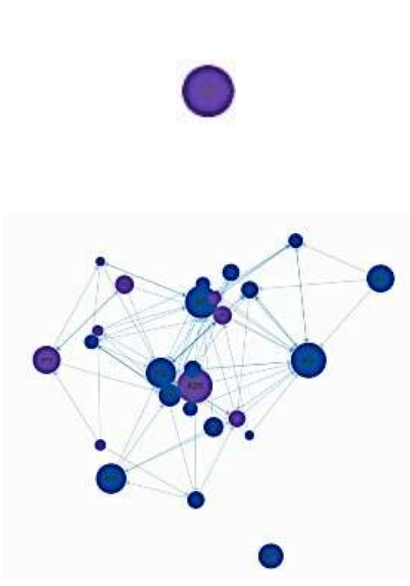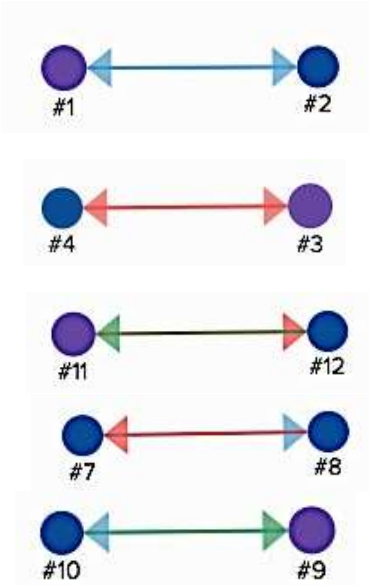
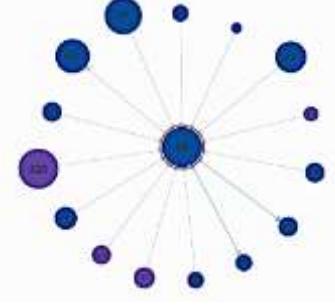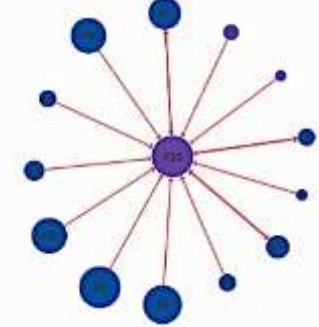### Sociometric Symbols

(Based on Moreno theory, 1934)

	• Blue line represents attraction (+) • Blue line with two arrows represents bilateral relationship of attraction
	• Red line represents rejection (-) • Red line with two arrows represents bilateral relationship of rejection.
	• Green line represents neutrality (-) • Green line with two arrows represents bilateral relationship of neutrality.

Typical Internal structures in the groups

(Based on Moreno Theory, 1934 and constructed the maps using the software Kumu)

	Total isolation • No line of attraction or rejection (repulsion) connects the subject with another individual.
	Attraction and rejection takes the form of a
	pair; • Mutual attraction (blue pair); • Mutual rejection (red pair); • Neutrality (indifference) x rejection; • Attraction x rejection; • Neutrality (indifference) x attraction.

	Mutual rejection and attraction takes the form of a triangle; • Triangle of mutual rejection; • Triangle of mutual attraction;
	Mutual rejection and attraction takes the form of a square; • Square of mutual rejection; • Square of mutual attraction;
	Mutual attractions take the form of a center (star)
	Mutual rejection take the form of a center (star)