CHAPTER - 5

RESEARCH METHODOLOGY

5. Introduction:

“All progress is born of inquiry. Doubt is often better than overconfidence, for it leads to inquiry and inquiry leads to innovation”

(a famous Hudson Maxim)

In their book ‘The Romance of Research’, Redman L.V and Morey A.V.H (1923,p.10), defined research as a “systematized effort to gain knowledge”. Some consider research as a movement, a movement from the known to the unknown, and therefore a voyage of discovery. The anvil of Human resource Management rotates on the assumption that every individual possesses some potentials, one of such being the vital instinct of inquisitiveness for probing more to attain fuller understanding of the unknown. This inquisitiveness works in full swing when the individual confronts with an uncertain situation or as F.L.Ruch (1971) puts in ‘for defending self to win over others’. This inquisitiveness is the mother of all inventions and realization of knowledge, and in simple terms, it can be said that the methods being employed for obtaining the knowledge from unknown is ‘research’. The Advanced Learners’ Dictionary of Current English also lays down the meaning of research as “a careful investigation or inquiry specially through search for new facts in any branch of knowledge”. It therefore is a pursuit of truth with the help of study, observation, comparison and experimentation searching for knowledge
through objective and systematic method of finding solution to a problem or arriving at certain generalization for establishing theoretical framework.

5.1. Research Problem:

The research conducted through this study is on “Group creativity in brainstorming under conflict situations in the context of performance appraisal”.

The research problem starts with ascertaining group creativity in brainstorming under conflict situation. The term ‘Creativity’ is directly related to the ability of being ‘surprised’. The ability to be surprised can be related to problem solving activities in which explorations of problem spaces lead to the expansion of belief domains. On the basis of well-established beliefs, embodied minds operate in everyday, habitual, life with expectations that allow the anticipation of events. Fortunately, these expectations are fulfilled most of the time, but given the dynamic character of life, sometimes there is a conflict between well-established beliefs and the environment in which organisms exist. This conflict tends to produce a surprising effect in the mind.

Under the effect of a surprise, which confronts expectations produced by well-established beliefs, several doubts appear in the mind stimulating it to inquiry until the experience of surprise disappears. Given the nature of beliefs (understood as strong habits), doubts will not disappear easily. They will persist until a new set of beliefs arises, transforming the surprising situation into ‘a matter of course’. It is in this process of expansion or
abandoning of well-established beliefs, triggered by the experience of surprise that ‘creative thinking’ happens.

Many creative solutions evolved as the output of major controversies. In other words, controversies can generate creative or better solutions. Hence there is a possibility that if conflict or confrontation is induced in a group activity by allowing ‘criticism’, group might generate more creative ideas. Criticism of any activity by others in general will help a person introspect the pros and cons of his actions and activities and to understand himself. It acts like a mirror where the individual is able to identify the true self; and hence can take corrective actions. This process of introspection is the ultimate result of criticism, a controversial situation created by another person within the group, which, in turn, helps to take corrective action. In a confronting situation also one becomes more cautious to take the next step, by becoming vigilant created by a surprise.

One of the methods of generating creative ideas within a group is brainstorming technique. But, Traditional Brainstorming techniques developed by Osborn (1967) have specifically admonished people ‘not to criticize’ their own and others’ ideas. In contrast, the researcher believes that dissent, debate and competing views have positive value, stimulating divergent and creative thought process, as stated in the foregoing paragraph. Supporting research evidences in different context also proves this view. Inclusion of criticism in brainstorming not only helps to generate a number of new ideas but acts as an indicator in identifying the strengths and limitations of one self.

In fact, identifying the limitations and strength of a person causing his performance in a job is the major objective of any performance appraisal system. In any type of
performance appraisal system, the performance of a person is recorded or documented for a given period of time and at the end of the period, the same is evaluated against a pre-set standardized performance scale or target. Deviation from the standard is worked out to convert into numeric or percentage value and individuals are rated or graded based on this value. In the present scenario, many organisations find it difficult to assess the performance of employees with the usual so called objective methods. This is due to the interesting fact that, in the traditional performance appraisal system, the manager sets (or approves) the goals/ targets and in effect, becomes a judge rather than a coach. Objective performance appraisal is often subjected to estimation errors, which the individuals will not be ready to accept. The ultimate sufferer due to such estimation error is the organization itself.

The researcher believes that that confrontation, debate and competing views have positive value and criticism of any activity by others in general will not only forces a person to introspect the pros and cons of his actions and activities, but also motivates to initiate corrective actions in future. Since this method can be used to improve the performance of people in a small group, and that it takes no scale of measurement, this can be termed as a ‘ratingless mechanism for appraisal’ or a ‘ratingless appraisal’ by itself. Though subjectivity is included in this type of performance appraisal, it is researcher’s responsibility to properly address, how subjectivity dominates objectivity, many a time.

Yet another negative factor is that managers are not always the best person to provide feedback on employee’s day to day activities as they spend less time with the employees than their lateral peers. In the instances where peers and/or customers actually are asked
to provide input, their answers are always tampered or screened by the managers, thereby constraining the sources of feedback. According to the researcher, this problem can be eliminated if the performance appraisal is conducted within the workgroup itself, at frequent intervals as ratingless appraisals.

Another danger of formalizing the performance appraisals into a highly structured, tightly defined process using rigid criteria, tied to merit increases is due to the fact that in the actual work world, goals are a moving target. Goals are constantly changing to meet a changing, dynamic work environment and never seem to fit an appraisal period. This can make it difficult for managers to assign a specific value on employee contributions, particularly if they don't match the scale for allowable merit increases.

In order to counteract the impact of traditional performance appraisals, it is worth trying to obtain feedback from the employee's superiors, peers and subordinates (an open appraisal or known as 360 degree appraisal). Providing an opportunity for employees to provide feedback to the manager on the manager's performance can also improve the process. From a TQM perspective, it is recommended to merge planning and feedback into team meetings rather than one on one meeting. Appraisal periods should align with the timing of the work (i.e. provide feedback at the end of a major program or project rather than wait for an annual point in time). Team meetings should ask open ended, thought provoking questions. The idea here during a team meeting on performance is not to set goals, but to come up with ideas to improve performance. Once a way for improving performance is developed, goals can be set.
In this study, the researcher proposes changing the time-honoured brainstorming instructions that admonish people not to criticize. This research proposes that the encouragement of debate—even criticism or confrontation to create conflict—may permit generation of more creative ideas. These criticisms or debate, which are documented, but not rated or graded for performance evaluation are considered as “ratingless appraisals” of the individual performance, which act as functional conflict and positively improve the performance of employees in future.

To test the reliability of the findings, the study is conducted in two different context, i.e. manufacturing and service sector cultures both in Public and private sector organisations in Kerala. All the above discussions are leading to the fact that debate and criticisms will generate more creative ideas and lower concern about evaluation.

5.2. Scope and relevance of the Study:

Early conflict and groups theorists have focused on the negative effects of team conflict. Conflict has been suggested to interfere with team performance and reduce satisfaction because it produces tension, antagonism, and distracts team members from performing the task. Empirical evidence has supported the negative relationship between conflict and team productivity and satisfaction. Later on, researchers started recognizing the benefits associated with the conflict. When in conflict, people confront issues, learn to take different perspectives, and need to be creative. When conflict is absent, teams might not realize that inefficiencies exist.
Individuals when confronting a problem, tend to hold an initial position based on incomplete information, limited experience, and their own specific perception. They start out confident in their conclusions. At this point, such strong positions “freeze the epistemic process” take shape (Johnson et al., 2000, p. 68). Still, when they are challenged to present their conclusion and its rationale to others, these same participants engage in a cognitive rehearsal, which deepens their understanding of their own position. They are forced to employ various reasoning strategies on behalf of this endeavor. Next they confront differing conclusions, based on some one else’s information, experiences, and perspectives. Thus, they become uncertain about their own views resulting in conceptual conflict or disequilibrium. This experience of uncertainty tends to “unfreeze the epistemic process” (Johnson et al., 2000, p. 68), motivating curiosity and an active search, first, for more information and experiences thus increasing Constructive Conflict content, and second, to accomplish an adequate cognitive perspective and reasoning process, thus increasing validity and resolving uncertainty.

Conflict is multi-dimensional. ‘Cognitive conflict’ is task oriented, arises from differences in judgment while ‘affective conflict’ is personalized disagreement or individual disaffection. It is only the ‘task conflict’ which helps in increasing the group output whereas ‘affective conflict’ is detrimental to group performance. ‘Constructive conflict’, on the other hand, generate out of an uncertainty motivating to search actively to find out solutions using divergent thinking process.
Thus, Conflict can also be considered as a vital element in bringing creativity. In this study, the researcher has made an attempt to generate creativity by inducing conflict in group decision making process. For this, he has chosen the context of Brainstorming, the most popular tool in group decision making process to experiment. Brainstorming is a decision making technique, which was designed to get improvised solutions to the problems through group effort. If conflict is induced in the brainstorming, it will enhance the member’s involvement in thoroughly evaluating the alternatives. This may be because each group member brings unique perspectives and knowledge and discussion of these would help in questioning different assumptions and arrive at recommendations. Conflict-based groups analyze greater number of alternatives, discuss in depth and question the group member’s suggestions. More number of interactions and voting rounds are likely to occur with these groups. By analyzing from diverse perspectives, the group members can develop a better understanding of the task environment and be confident of their solution.

This research sees conflict as an important element of creativity. Breaking rules, doing the “forbidden,” stating one’s mind directly etc. may be more stimulating. There is value in competing ideas, debate, and intellectual conflict for creativity. Debates are authentic differences which stimulate thought and thus encourage the consideration of more information, more strategies and creative solutions. Thus researcher opines that, where differences exist, they should be expressed, confronted and explored for better solutions. The researcher also emphasizes that when compared to majority disagreement, minority dissent will bring more output. According to him, this is due to the fact that if majority
opposes, everyone will have a tendency to join them. They will not properly look into the matter and thus constrain the sources of creative idea generation.

The importance of this study lies in the fact that criticisms and conflict not only help in idea generation, but also act as a performance evaluation mechanism whereby participants can themselves identify their level of performance. They can identify their strength, weakness etc. and can take measures for further improvement.

This study is important when viewed through different angles. First is the capability of conflict in generating creative ideas in the group. Secondly, when we consider the traditional appraisal system being followed in several organizations, it is clear that appraisal systems measure performance on the basis of achieving targets. Organizations are not identifying the real performance of their employees with the objective of improving them. Hence defining a new appraisal system with the ultimate objective of improving the employees’ performance is a must. ‘Ratingless performance appraisal’ using the method of criticisms on the performance of employee in a group, to an extent satisfies the said need.

5.3. Objectives of the study:

Many researchers have emphasized the need for reducing conflict especially when it comes to evaluation or criticism. Evaluation apprehension has long been viewed as inhibiting creative thought and expression (Osborn, 1957; Paulus & Dzindolet, 1993;
Paulus et al., 1999), where as some other researchers emphasize the role of conflict for stimulating thought and creative solutions (Nemeth & Nemeth-Brown, 2002). Jehn, (1995), suggested that the conflict needs to be at the level of ideas, not personalities. However, this researcher hypothesizes that it is not necessary to remove evaluation or even criticism. In fact, it is assumed that permission to debate and giving encouragement to debate and create controversy in that situation may be superior to emphasizing on harmony, which is often at the expense of authentic differences. The efficacy of such an instructional focus would be in direct contrast to the mainstream literature that emphasizes harmony and cohesion and, especially, avoidance of criticism. What is hypothesized in this study is that the freedom or permission to critique, even criticize, can enhance and generate more number of ideas to solutions.

We could do this at two levels. One is at the level of permitting discourse that would be monitored. A second is at the level of stimulating additional thought through the expression of competing views. If what brainstorming attempts to achieve is quantity of ideas, without regard to their quality (Osborn, 1957), then the freedom to express thoughts without worrying whether they constitute a “criticism” of other’s ideas, may be well suited to idea generation. Given that criticism is often seen as undesirable and even impolite—and normal brainstorming instructions emphasize precisely that—the researcher hypothesizes that framing criticism in terms of its potential for group creativity would both liberate individuals to be relatively free of evaluation apprehension and stimulate them to express ideas more freely. Further, given the prior work on dissent and creativity, another hypothesis is that such an atmosphere might not only stimulate ideas at
the group level process alone, but may stimulate creativity subsequent to the interaction also. The latter point deserves attention.

Research on the brainstorming technique, has emphasized the fact that groups may be sub-optimal to individuals working ideas alone because of ‘production blocking’ (Diehl & Stroebe, 1987). People can’t talk at the same time and, as such, some ideas may not be expressed. It is suggested that these ideas can and should be captured and, moreover, there may be ideas stimulated by the discussion that occur subsequent to the interaction. Such a hypothesis is consistent with research showing that ideas presented in the group can frame subsequent ideas (Dugosh, Paulus, Roland, & Yang, 2000). It is also consistent with the literature on minority influence that repeatedly finds attitude change after the discussion (Moscovici, 1980; Mugny, 1982) or creative solutions subsequent to exposure to consistent minority views (Nemeth, et al., 2001).

In the present study, researcher proposes testing the potential value of permitting criticism and dissent rather than one emphasizing harmony and ban on criticism. Given that brainstorming instructions are very clear and admonish group members NOT to criticize each others’ ideas, this study will substitute that instruction with one encouraging debate and criticism. A Control condition will offer no instructions other than the task description. Further, it will be tested whether such instructions, compared to the control, achieve greater idea production in the group setting and whether they achieve more ideas subsequent to the discussion. For post-discussion ideas, researcher will explore those ideas considered but “Not Expressed” and those new ideas generated
“Now” after discussion. Finally, these hypotheses will be tested in two different organizational cultures: Manufacturing and Service Sectors, the primary interest being whether the direction of findings is similar in the two cultures.

The above mentioned assumptions will constitute the base of the major objectives of the study. The second aspect included in this study identifies as to whether the participants like or dislike criticisms and to the extent these criticisms help them to identify their strength and weakness, by using a new method of appraisal in a non apprehensive situation, (called as the rating less performance appraisal system), while evaluating the performance. Hence a new appraisal system is evolved with the unique objective of determining its capacity to evaluate employee performance in order to suggest new ways for improving it.

The objectives of this study can be summarized as follows:

1. To verify whether dissent, debate and conflict in group decision-making process will generate more ideas than those in traditional brainstorming and minimal instructions.
2. To verify whether a task conflict can be considered as a constructive conflict producing positive results in a group.
3. To verify the different parameters contributing to positive results in conflict situations under controlled condition in group work.
4. To construct a new model of performance appraisal for experimentation and further testing based on debate and confrontation in a group resulting in performance improvement, and to generate a new concept of rating less appraisal system.

5. To test whether there is any significant difference in the outcome of the new model in two different organizational cultures.

5.3 Research design:

Hypothesis testing research studies known as experimental studies where the researcher will test the hypothesis of causal relationship between variables which require procedure to reduce bias and increase the reliability, enabling to draw inferences about causality. In this study, the researcher would be using a formal experimental design known as randomized block (RB) design which offers relatively more control and use precise statistical procedure.

In the RB design, subjects are divided into groups known as blocks such that, within each group, the sample units are relatively homogeneous in respect to some selected variables. The main feature of the RB design is that each treatment appears the same number of times in each block. The RB design is analyzed by using appropriate statistical tools depending on the normality of data.
In the present study, each block (group) comprises of 6 subjects (individuals) and each block is subjected to three different types of treatments (minimal instructions, brainstorming and debate conditions) and each treatment appears the same number of times in each block.

The experiment has been conducted under controlled conditions in two different work cultures (manufacturing and service sectors) to assess the reliability and also to find out the significant difference between the results.

5.4 Sample design:

The study has been conducted in the State of Kerala amongst two groups, one manufacturing sector employees and other service sector employees, considered as universe. This includes large, medium, and small industrial organizations in both groups.

It is estimated that there are as many as 13356 manufacturing units (licensed) in Kerala as at the end of 2005 (Survey of Industries 2005 by The Hindu) and 8793 service sector organizations (inclusive of its branches) functioning in this State. The researcher limited his study in the following sectors and areas:

Table No.5.1: Sample organizations selected under public and private sector – manufacturing and service organizations:

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<tr>
<th>PUBLIC SECTOR</th>
<th>MANUFACTURING</th>
<th>SERVICE</th>
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<td></td>
<td>Chemical Industry</td>
<td>Telecom Industry</td>
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<tr>
<td></td>
<td>Oil and Petroleum Refineries</td>
<td>Insurance</td>
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<td></td>
<td>Strategic Industry</td>
<td>Banking and Allied Services</td>
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From the universe, the samples of 360 each from the manufacturing and service sector were selected. The samples were collected using stratified random sampling method. Different manufacturing and service institutions under Public and Private sector were taken as the strata and from these strata, the units were randomly selected.

5.5. Methods of data collection:

For this research, primary data alone is used for reaching at the conclusion and it was collected in the following manner.

1. Work situation experiments under three stipulated contexts were conducted under controlled conditions in two different work cultures for identifying the creative idea generation capability of group under conflict, traditional brainstorming and minimal instructions. Results have been collected by observation method and documentation.

2. Questionnaires were administered to the same experimental group to identify whether criticism acts as a ratingless performance appraisal mechanism. Results have been analyzed statistically.

3. In this research work, observation method played a very important role in identifying the member’s attitudes and behaviour towards other members of the
group. Hence observations of the researcher as well as the observations of the
group recorder were together taken into account based on the score reliability for
analysis.

4. Interviews were conducted in order to identify whether ideas have been
suppressed by members or not revealed at the time of the session and also any
new idea generated after the sessions by group members.

5. Interviews were conducted to understand the existing practices followed by the
organisation with regard to the performance appraisal system and its effect on
employees.

5.6 Hypotheses generated:

**Hypothesis 1:**

Subjects during the Debate condition will generate as many, if not more, ideas than those
in the traditional brainstorming condition. Both conditions will generate more ideas in the
groups than those produced under minimal instructions.

**Hypothesis 2:** Subjects in all conditions will generate ideas subsequent to the discussion,
both those considered but “Not Expressed” in the group setting and those generated
“Now,” after discussion.

**Hypothesis 3:** Subjects in the Debate condition will generate as many, if not more total
ideas (group plus post discussion) than those in the traditional Brainstorming condition.
Both conditions will generate more total ideas than those given under minimal instructions.

**Hypothesis 4:** There is no significant difference in quantum of idea generated in debate conditions in groups working in different manufacturing / service sector cultures.

**Hypothesis 5:** There exists no significant difference in the opinion of respondents with regard to performance appraisal mechanism as an output of group decision making process.

**Hypothesis 6:** There exists no significant difference between sample proportion (percentage of respondents’ level of emphasis given to the factors affecting performance) and population proportion.

**Hypothesis 7:** There exists no significant difference between the strength of factors affecting performance under three different conditions.

For the purpose of this study, the hypotheses formulated above are propositions set forth as an explanation for the occurrence of some specific group of phenomena either asserted as provisional conjecture to guide some investigation or accepted as highly probable in the light of the established facts. In Management and Social Science research, where direct knowledge of population parameters is rare, hypothesis testing is the often used strategy for deciding whether a sample data offer such support for a hypothesis based on
which a generalization can be made. Hypothesis testing therefore can make only a probability statement about population parameters, but in practice it is accepted, if it withstands a critical testing. Hence alternative hypotheses are not found necessary and justifiable, as long as the hypotheses set are formal questions that the researcher intends to resolve or probe into.

5.7 Procedure for experimental study:

In sample, subjects comprised of male and female graduates, under graduates, skilled and unskilled employees, who are familiar with their work and profession. There are altogether 720 employees, 360 each from Manufacturing and Service sectors, subdivided into representatives from each strata under these sectors. Subjects are run in groups of six individuals, mainly with equal status and position. The procedure will be identical in both work cultures.

Upon entry, subjects are seated around a table comfortably and asked not to speak until the exercise begins. They are given the topic “Evaluate the performance of other members on their jobs or that of the group or organization” as the case may be, (further explanation given under 5.7.1 below while experimental conditions are explained in detail) and given 30 minutes to come up with as many solutions as they could to improve the situation.
In each session, one subject was randomly assigned to be the recorder for the group. Instead of participating in the discussion, the recorder was instructed to write down every single idea the group generated. The brainstorming topic was repeated and they were reminded that they had thirty minutes to complete the task. In all conditions, they were told to “come up with as many solutions as they can to improve their performance/ or group performance or organizational performance.”, as the case may be.

As discussed earlier, the researcher conducted the experiments in three different conditions which are as detailed here under:

5.7.1 : Three experimental conditions in the study:

1. In the brainstorming condition, ( Refer Appendix –A), they are given the traditional elements of brainstorming as suggested by Osborn. They were told: “Most research and advice suggest that the best way to come up with good solutions is to come up with many solutions. Freewheeling is welcome; don’t be afraid to say anything that comes to mind. However, in addition, most studies suggest that you should rule out criticism. You should NOT criticize anyone else’s ideas or performance.”

The topic for the discussion was ‘Evaluate the performance of the work group and suggest ways and means to improve its performance further during the next one year’. Here the assigned task was to evaluate the performance of the homogenous work group in which the subjects are the members. The scope of discussion was broader in relation to
the work group performance and suggestions for its improvement during the next one year period. The degree of complexity of the topic therefore was higher than that of individual case analysis.

2. In the **debate condition**, (Refer Appendix –B), instead of ruling out criticism, they are encouraged to do just that. They are told, “Most research and advice suggest that the best way to come up with good solutions is to come up with many solutions. Freewheeling is welcome; don’t be afraid to say anything that comes to mind. However, in addition, most studies suggest that you SHOULD debate and even criticize each other’s ideas and performance.”

The topic for the discussion was ‘Evaluating the performance of their Organisation and suggest ways and means to improve its performance further, within the next one year’. Here the assigned task was to evaluate the performance of the organization as a whole in which the subjects are the members. The scope of discussion was much broader in comparison with the work group performance and suggestions sought for improvement of organizational performance during the next one year period. The degree of complexity of the topic therefore was much higher than that of other two cases, say, work group performance analysis and individual case analysis.

3. In the **minimal instruction condition**, (Refer Appendix –C), the groups were not given any additional instructions. The subjects were given the topic and asked to come out with solutions. Topic for discussion was ‘Evaluating the performance of each
employee in the group and how to improve their performance further during the next one year’.

Here the assigned task was to evaluate the performance of each of the members of the homogenous work group. The scope of discussion was concentrated on individual members of the group on their performance and suggestions for improvement during the next one year period. The degree of complexity of the topic therefore was very light than that of work group and organizational performance analysis.

After thirty minutes, the researcher collected the group solution sheet. Each member in the group was asked to write down any solution or point that they thought of during the group discussion but did not express. Also they are asked to write down any solution they might have, when the group discussion was over. On completion of the survey, the researcher distributed a questionnaire to each of the participants and given fifteen more minutes to answer those questions. This is to identify, the exact feeling when they were subjected to diverse conditions. The final session was the filling up and collection of questionnaires followed by a small interaction and debriefing.

The experiment was based on three conditions in which people were asked to generate as many ideas as possible. In the “Minimal Instruction” condition, there were no additional instructions given. In the “Brainstorming” condition, the usual “4” rules are given including an admonition NOT to criticize their own or others’ ideas. In the “Debate”
condition, the admonition NOT to criticize was replaced with encouragement TO debate and criticize.

In the traditional context, the instruction “Do not criticize” is often cited as the important instruction in brainstorming. The aim of not criticizing is to reduce or eliminate evaluation apprehension, often viewed as a major impediment to idea generation. Thus, even if the instruction is not completely successful in its attempt to eliminate criticism, most researchers of group creativity would argue that the premise is still correct. One should refrain from criticism. From this perspective, not only should debate instructions not stimulate more ideas than minimal instructions, it should do the reverse, namely, it should be detrimental to idea generation, resulting in fewer ideas than those in the minimal condition. In this research, the researcher is trying to show that groups encouraged to debate-even criticize (Debate condition) did not retard idea generation, as many would have predicted. In fact, such permission to criticize led to significantly more (rather than equal, if not lesser) ideas than did the minimal condition, both in the group and in the total production of ideas.

Such debate and open criticisms in this study have contributed to performance feedback thus leading to self evaluation by assuming the means of a ‘ratingless appraisal process’. This lead the individuals to rectify their performance constraints for improvement for future performance. Interestingly these post discussion ideas appeared to have been stimulated most by the debate instructions.
Relative to traditional brainstorming instructions, such permission to debate will be even more conducive to idea generation. If in the current study, especially in light of the fact that two distinct cultures are showing the same pattern of findings, it will raise the question as to whether evaluation apprehension is of major importance in reducing idea generation and even if so, if instructions against criticism actually reduce it, then why is Debate—an actual encouragement of criticism—even more effective in stimulating idea generation in groups, post-discussion and in total production?

5.7.2 Questionnaire design:

Two questionnaires were framed in order to study the research problem from various angles.

1. Questionnaire (shown in Appendix D) to measure the Attitude level of participants in Group Decision making and Performance appraisal mechanism. Here, questions were framed mainly to identify an individual’s attitude when he/she is exposed to certain situations. This includes questions such as “How a person feels or reacts when he/she is criticized by others, and how does it affects his/her performance?”

The questionnaire also included questions to identify the factors which contributes to as well as adversely affects the performance of individuals in group decision-making. Data drawn through the questionnaire have been analyzed using different statistical tools from SPSS.
2. Questionnaire (shown in Appendix E) was designed to measure the strength of each factor affecting performance when subjected to different conditions. Responses collected based on this questionnaire suggested the intensity of each factor, both negative and positive in the individuals, so as to measure the effects of the same in bringing variation in the standard output. The questionnaire is processed with the help of Friedman rank test.

5.8 Pilot study and pre-testing of questionnaire:

Before conducting the actual experiment, the significance of different tools used in the said process were checked in order to find their ability in bringing the required output. The pilot study was conducted at Indian Rare Earths Ltd. and 60 questionnaires were distributed to the employees of IRE Ltd to correct the discrepancies of the same in achieving the objectives of the study.

Reliability of the questionnaires, based on item difficulty and response consistency was also tested using Cronbach Alpha test. The alpha values were 0.89 and 0.81 respectively for questionnaire I and II, which are greater than 0.7, the required minimum for confirming the reliability and hence both the questionnaires were considered as reliable.

Cronbach's \( \alpha \) is defined as \( \alpha = \frac{N}{N-1} \left[ 1 - \sum_{i=1}^{N} \frac{\sigma y_i^2 N}{\sigma x^2} \right] \); where \( N \) is the number of components (items or testlets), \( \sigma x^2 \) is the variance of the observed total test scores, and \( \sigma y_i^2 \) is the variance of component \( i \).
5.9 Statistical tools used in the study:

Different statistical tools were used to process the data, which include the following:

(1) Box-plot test for normality
(2) Tests of Normality (Kolmogorov-Smirnov)
(3) Shapiro Wilk test for confirming normality
(4) Friedman Test
(5) Kruskal-Wallis test
(6) Binomial test

Explanation:

1. Friedman two way ANOVA test is used in this study in order to identify whether there is significant difference in the total idea generated in the Debate condition, traditional brainstorming condition and Minimal instructions, pertaining to the same respondents. This test is relatively very strong in analyzing the ordinal scale responses given to several attributes by ‘n’ number of individuals.

2. Kruskal Wallis test is used in this study in order to identify whether there is significant difference in the total idea generated in the Debate condition, traditional brainstorming condition and Minimal instructions, pertaining to the same respondents from different sectors and organizational cultures. (Public and private sectors)
The test statistic is $H$ for this test which is worked out as under:

$$H = \left[ \frac{12}{n} (n-1) \right] \sum \frac{R_i^2}{n_i} - 3(n+1)$$

Where $i=1, 2, 3, \ldots, k$, $n = n_1 + n_2 + n_3 + \ldots + n_k$ and $R_i$ being the sum of ranks assigned to $n_i$ observations in the $i^{th}$ sample.

3. In order to check the validity of the findings of the study, the study has been conducted in two different sectors and organizational cultures- Manufacturing and Service.

4. Kolgomorov-Smirnov two sample test was used for testing the differences of central tendency, dispersion, skewness, and kurtosis between two distributions and to verify the normality of the distribution. Shapiro Wilk test for confirming normality is also a similar test run together in SPSS software. Box plot test is a diagrammatic representation of the normality of the data distribution under each variable or item, where the extreme values of observations are also indicated.

5. Binominal test is used in this study to find out the significant difference between the observed and expected frequencies for different categories of a single variable based on the responses.

6. Limitations of the study:

The very new concept of ‘Ratingless performance appraisal’ itself was creating a suspicion in the mind of authorities involved about the outcome of this performance
appraisal process and its effectiveness. This was a major constraint in carrying out the study. The organization was unwilling to accept or consider this mechanism, as they were afraid of the negative consequences it could bring when peer group level employee critically evaluates their own performance. They feared that this will have negative impact on subsequent relationship.

Another limitation was the time required for organizing the sample groups from the work spots, briefing them and giving instructions and making them to undergo the entire process under three different conditions, and observing them as to whether each member is feeling positive or negative as regards the ratingless appraisal. Since it took about 3 to less than 4 hours for each group of 6 members to complete this experiment, it was practically difficult for the organizations to spare the sample subjects on a continuous basis.

Since the study is limited to two organizational sectors, namely manufacturing and service sector organizations results cannot be generalized beyond this limit as there may be chances of variation.

In management research, opinions of subjects play a vital role in arriving at decisions. The ordinal scale in measurement technique places the events (opinions) in order, but there is no attempt to make the intervals of the scale equal in terms of some rule. Rank orders represent ordinal scale and are frequently used in research relating to qualitative phenomena. Such scales permit only ranking of the items from highest to lowest and have
no absolute values, and hence the real difference between the adjacent ranks may not be equal. In this study, both the questionnaires were in ordinal scale and hence more precise comparison between the ranks of opinions of subjects on their attitude to performance appraisal and strength of the factors during appraisals could not be conducted.