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MODIFIED NOMINAL GROUP TECHNIQUE FOR GROUP DECISION-MAKING

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ABSTRACT

Nominal Group Technique is a useful tool to solve group decision-making problems. The technique generates and subsequently prioritizes a large number of ideas in a group setting. It has the following steps: (i) statement of the question pertaining to the issue; (ii) silent generation of ideas in writing; (iii) round-robin recording of ideas; (iv) serial discussion on the ideas; (v) voting to select the most important ideas, and vi. discussion on the selected ideas. In the fifth step, the participants need to find out and subsequently rank the five most important ideas. In the existing framework of the methodology, there is no guidance to select the best five ideas, rather they (the participants) have to do it by a holistic approach. By means of two experiments, this research proposes and substantiates the use of the Analytic Hierarchy Process to guide the participants to choose and rank the best five ideas. This is expected to give more rigor to the technique and continue to remain effective in solving group decision-making problems in diverse areas. The paper has further explored the issues related to Muslims that can be resolved through the proposed modified technique.

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1. INTRODUCTION

In today's highly competitive business world, both national and multinational companies are increasingly demanding their employees to find new and better ideas so that jobs are done in better ways. The most common way to generate ideas is to place the relevant people in a room and brainstorm. Each mind is filled with ideas that can be valuable to decision-making and problem-solving. Brainstorming is one way to access this information, experience, and judgment. The history of brainstorming dates back to 1954, when Osborn published his seminal work. With illustrative examples, he explained how brainstorming could be used to help groups generate ideas. Osborn's central theme was that a group can generate more ideas if their members concentrate on producing whatever ideas that come into their minds while avoiding evaluation of their own and others' ideas. However, it is to be remembered that simply bringing people together does not assure maximum participation and quality group decisions. Brainstorming sessions are often more storm than brain. It has been observed that the sessions are dominated by only a few individuals and they impose their ideas upon the majority. To overcome the difficulties in this traditional brainstorming technique, researchers have developed a number of structured variants of it including the Delphi technique (Linstone and Turoff, 1977) and the Nominal Group Technique (henceforth called NGT) (Delbecq et al., 1975). The NGT, which is the major topic of this paper, has alleviated many of the difficulties present in the traditional brainstorming technique. Before proceeding further, a brief description of the NGT is provided.

2. A BRIEF DESCRIPTION OF THE NGT

In business today, it is necessary to stimulate employees to generate fresh, creative, and productive ideas for the benefit of the organization. NGT is a management tool that is being increasingly used to generate a large number of ideas. The technique is helpful in identifying problems, exploring solutions and establishing priorities for the generated solutions. It structures group interactions in order to elicit the information and judgments of individual participants and to promote the development of a consensus among all group members. The technique has the following steps:

a. Enunciation of the statement of the question pertaining to the issue (the question should be well understood by all and the participants are expected to be knowledgeable on the issue),
b. Silent generation of ideas in writing,
c. Round-robin recording of ideas,
d. Serial discussion on the ideas,
e. Voting to select the most important ideas, and
f. Discussion and reaching consensus on the selected ideas.

For a successful nominal group session, the following rules should be observed:

- No criticism of any idea during the session,
- The more unusual and original the idea, the better,
- While generating ideas, quantity not quality is the primary objective,
- Dissecting, modifying and commingling of ideas is desirable,
- Anonymity of input,
- Defer in-depth evaluation until all the inputs are displayed.

If all the rules and guidelines are followed, then hopefully, a highly successful session will be conducted. In the following, we list the advantages of a successful nominal group session:

- A large number of ideas are generated,
- Separate stages of idea generation and evaluation,
- Equal and balanced participation from all the people participating in the session,
- Virtually every meeting is dominated by somebody, but in the NGT, we find no domination by anybody,
- The technique overcomes the 'bond' among a group of participants and it also nullifies somebody's loyalty to another,
- Since the decision is through consensus, there is very little chance of facing resistance while implementing the decision,
- Costs (both time and money) of conducting NG sessions are quite low,
- Quality of selected ideas,
- Overall sense of accomplishment.

To conduct a successful NG session having all the foregoing advantages, the role of the facilitator should not be overlooked. In fact,

much of the success of the session depends upon the capabilities of the facilitator. Before the beginning of the session, he/she should clearly state the problem concerning the issue and briefly explain the various steps of the NGT. Needless to say, if he/she follows all the previously stated rules of the NGT, then no one can dominate the session. It is a good idea to conduct a pilot test of the question before conducting the actual session. The ideal number of participants in a NG session is 10-12 and the facilitator should be able to conclude the session within 90 minutes.

3. APPLICATIONS OF THE NGT

Since the development of NGT by Delbecq et al. in 1968, the technique has been applied to solve a wide variety of problems. A few areas of applications are: change management (Lane, 1992; and Tribus, 1992), consumer research (Claxton et al., 1980), education (Debra et al., 1998), health management (Hofemeister, 1991), information system design and planning (Couger, 1990; and Lederer and Mendelow, 1986), job evaluation (Benson, 1991; and Hornsby, 1994), management training (Taffinder and Viedge, 1987; and Scott and Deadrick, 1982), organizational development (Mendelow and Liebowitz, 1989), productivity measurement (Damachi et al., 1984; and Gregerman, 1981), strategic planning (Sink, 1985), and total quality management (Roth et al., 1995). In addition to the above, the technique has been applied to solve various types of social problems (Moore, 1987).

4. PREVIOUS MODIFICATIONS OF THE NGT

Since the introduction of NGT, a number of modifications of the technique have been proposed. Fox (1989) proposed to use 3×5-inch cards to provide all the ideas by one person at one time instead of round-robin recording of ideas. Though it ensures anonymity of the participants, the shortcoming of this proposed modification is that one cannot get stimulated by other's ideas. To increase group member participation, Bartunek and Murninghan (1984) suggested one of the two possible voting procedures: (i) vote for an idea at one time with a minimum number of votes for selection, or (ii) vote as described in (i)

but eliminate the ideas with only few votes prior to the additional voting. In addition to the above, NGT has been combined with other methodologies. Some of the integrated methods are: NGT and Multi-attribute utility theory (Thomas et al., 1989); and NGT and Multi-dimensional scaling (Frankel, 1987). Also in numerous studies, NGT has been compared with the Delphi technique.

In the following section, we have provided a brief description of the Analytic Hierarchy Process, a popular multi-criteria decision-making tool, which will be applied to modify the NGT in a subsequent section. The revised technique has been called the Modified Nominal Group Technique (MNGT).

5. A BRIEF DESCRIPTION OF THE ANALYTIC HIERARCHY PROCESS (AHP)

The AHP (Saaty, 1990a; and Islam et al., 1997) is a technique to derive ranking of a finite number of alternatives (or ideas or solutions) based upon a finite number of objectives (or criteria). To derive ranking with respect to some specific objective, all the alternatives are compared in a pairwise fashion. The typical form of a pairwise comparison matrix (PCM) is as follows:

$\mathbf{A}$ =

Obj. 'O'	A_1	A_2	…	A_n
A_1	a_{11}	a_{12}	…	a_{1n}
A_2	a_{21}	a_{22}	…	a_{2n}
…	…	…	…	…
A_n	a_{n1}	a_{n2}	…	a_{nn}

where $a_{ij} = \frac{w_i}{w_j}$ (for $i, j = 1,2, \ldots, n$) represents the strength of preference of the alternative A_i over A_j with respect to the objective 'O', $a_{ji} = \frac{1}{a_{ij}}$ and $a_{ii} = 1$ for all i, j. w_i, $i = 1,2,\ldots,n$ are the priority weights (to be determined) of the alternatives. The entries, a_{ij}'s, are normally taken from the 1-9 ratio-scale (Saaty, 1990a). The semantic interpretation of the numbers is provided in Table 1.

According to the scale, if alternative A_1 is moderately preferred over A_2, then $a_{12} = \frac{w_1}{w_2} = 3$. From the reciprocity rule, $a_{21} = \frac{w_2}{w_1} = \frac{1}{3}$. The priority weights of all the alternatives can be derived by using the

TABLE 1
Semantic Interpretation of the Ratios in the Comparison Matrices

Verbal Judgment of Preference	Numerical Rating
Extremely preferred	9
Very strongly to extremely preferred	8
Very strongly preferred	7
Strongly to very strongly preferred	6
Strongly preferred	5
Moderately to strongly preferred	4
Moderately preferred	3
Equally to moderately preferred	2
Equally preferred	1

Note: If alternative A_i has preference strength as any of the above non- zero numbers compared to A_j, then A_j has the reciprocal value when compared with A_i, i.e., $a_{ji} = 1/a_{ij}$.

following simple geometric mean formula (Crawford, 1987):

$$w_i = \left(\prod_{j=1}^{n} a_{ij} \right)^{1/n}, \quad i = 1,2,...,n.$$

However, to extract the weights from a PCM, a mathematically more rigorous method is to find out the largest eigenvalue of the matrix **A** and then compute the corresponding normalized eigenvector. The components of this normalized eigenvector will give the weights of the alternatives (Saaty, 1990b). In practice, it was shown that the weights obtained by the geometric mean rule and eigenvector method are quite close to each other. In this paper, we have followed the geometric mean rule, because in a nominal group session, it is much easier to apply compared to the eigenvector method.

6. PROPOSED MODIFICATION OF THE NGT

In the fifth step of NGT, the participants need to find out and rank the five most important ideas. In the existing framework of the methodology, there is no specific guidance to rank the best five ideas rather they (the participants) have to do it by a holistic approach. The objective of this paper is to show how the Analytic Hierarchy Process (AHP) can be integrated with the NGT to alleviate the above drawback. The second objective is to show the advantages of the integration of the AHP with

NGT. To show the working, we have conducted two experiments. Of these the first one is the following:

Teaching is an essential part in any academic institution. The quality of outgoing students depends largely on the quality of teaching in the classroom. The problem of improving quality in teaching inside a classroom is long-standing (Johnson and Golomski, 1999; Martens and Prosser, 1998; and Pennington and O'Neil, 1994). The topic has drawn considerable interest from many researchers. With the development of newer technologies, research will continue on the topic. Staying on the same issue, we conducted a nominal group session. Thirteen students (final year) from the author's undergraduate class on Quality Management and two Masters of Management students took part in the session. In the following, all the steps plus the proposed modification have been described.

Step 1: As the facilitator of the session, I (the author) posed the following question at the start of the session, "what factors contribute to quality teaching in a university classroom?"

Step 2: The participants were given 10 minutes to generate ideas on the issue.

Step 3: The whole session lasted about 85 minutes. Due to time constraints, I conducted only 3 rounds of round-robin recording of ideas. The ideas are shown in Table 2.

Step 4: Serial discussion on the ideas.
A few ideas in the table were clarified, so that all the participants had proper understanding about them. The purposes of this step are: (i) to ensure that all the participants have proper understanding about all the ideas, and (ii) to make sure that the meaning of a particular idea is the same to all (i.e., no idea should be visualized differently). In particular, it was agreed that the idea "efficient and effective delivery of knowledge" did not include "effective communication skills". "Avoid bias" (no. 2) means the lecturer should be fair in dealing with all the students. The idea in serial number 11 means that the lecturer should be humorous.

Step 5: In this step (where modification is proposed), each participant

TABLE 2

Ideas Generated from All the Participants

No.	Idea	NGT Weights	NGT Ranking	MNGT Weights	MNGT Ranking
1.	Study materials and lecture should be well coordinated	2		.061	
2.	Avoid bias	1		0.035	
3.	Lecturer should be a responsible person	5	10	0.398	8
4.	Lecturer should have relevant and in-depth knowledge	5+5+3+5+5 +5+4+5+5=42	1	0.559+0.567+0.191+0.579+0.567 +0.495+0.352+0.355+0.461 =4.126	1
5.	Use relevant and clear visual aids	1+2+4+2=9	7	0.032+0.055+0.174+0.053 =0.314	10
6.	Equipment provided and used				
7.	2-way communication	5+4+4+3+3 =19	3	0.541+0.239+0.288+0.133+ 0.106=1.307	4
8.	Create conducive environment	3		0.083	
9.	Use of teaching aids, e.g. PowerPoint slides with OHP				
10.	Lecturer should make class interesting	1+4+2+1+1=9	7	0.044+0.249+0.063+0.057+0.047 =0.460	7
11.	Fun learning environment				
12.	Lecture should be delivered in such a manner that students can understand	2+1+3=6	9	0.092+0.045+0.139=0.276	12
13.	Encourage creativity and openness	3+3=6	9	0.079+0.101=0.180	15

TABLE 2 (Continued)

No.	Idea	NGT Weights	NGT Ranking	MNGT Weights	MNGT Ranking
14.	Attitude of the students	4		0.205	13
15.	Smaller number of students	2+1=3		0.048+0.041=0.089	
16.	Respect each other	1		0.038	
17.	Flexibility of the lecturer				
18.	Encourage students to participate	2+2+1=5	10	0.062+0.067+0.066=0.195	14
19.	Time management	3+1+1+2=7	8	0.145+0.048+0.037+0.085 =0.315	10
20.	Efficient and effective delivery of knowledge	4+5+2+3+4 =18	4	0.297+0.477+0.106+ 0.221+0.380=1.481	3
21.	Use simple examples	3		0.146	
22.	Relate subject to practical problems	2		0.079	
23.	Lecturer should gauge students' proficiency level				
24.	Lecturer should be able to recognize all the students in the class.	1		0.047	
25.	Lecturer should have proper control over the class				
26.	Proper planning on the lecturer's part	4+2+4=10	6	0.205+0.079+0.235=0.519	6
27.	Reasonable duration of the class				
28.	Lecturer should be able to convince the students by his ideas				
29.	Give some group work				
30.	Lecturer should ask thought–provoking, interesting questions				

TABLE 2 (Continued)

No.	Idea	NGT Weights	NGT Ranking	MNGT Weights	MNGT Ranking
31.	Effective communication skills	5+5+5+4+5+4=28	2	0.438+0.556+0.447 +0.311+0.439+0.313=2.504	2
32.	Proper choice of time slot	1+3=4		0.038+0.062=0.100	
33.	Lecturer should be aware of students' proficiency level	3		0.124	
34.	Personality of the lecturer	5	10	0.393	9
35.	Lecturer is well prepared	1+3+3+4=11	5	0.061+0.216+0.166+0.269 =0.712	5
36.	Student-centered approach in teaching	2+4=6	9	0.084+0.218=0.302	11
37.	Lecturer should discuss the answers of the mid-term and quiz question papers				
38.	Comfortable classroom	2		0.060	
39.	Variety of teaching methods	3+2+4=9	7	0.121+0.102+0.175=0.398	9
40.	Deliver lecture at a reasonable voice and speed				
41.	No interruption during the lecture				

is required to select the best five ideas and rank them in order of importance. Usually, the 1-5 scale is adopted to perform the task. The most important idea is assigned a rating of 5 and the least important as 1. The intermediate three ideas receive 4, 3, and 2, respectively. Instead of doing so, the task can be performed in two stages, namely: (i) out of the 41 ideas on the board (visible to all), the five most important ideas are chosen but not ranked as above, (ii) using the Saaty 1-9 ratio scale (Table 1), these five ideas are compared in a pairwise fashion. Following the geometric mean rule in the AHP, the relative weights of the ideas can be calculated. In the following, we provide one participant's pairwise comparison matrix and the weights of the five ideas:

'O'	A	B	C	D	E	Weights
A	1	5	7	6	8	0.559
B	1/5	1	5	4	6	0.239
C	1/7	1/5	1	1/2	2	0.062
D	1/6	¼	2	1	4	0.102
E	1/8	1/6	1/2	1/4	1	0.038

Legend: A = Lecturer should have relevant and in-depth knowledge, B = 2-way communication, C = Choice of proper time slot, D = Variety of teaching methods, E = Respect each other, 'O' = quality teaching.

Cards from all the fifteen participants were collected and the weights of the ideas were calculated on an individual basis. The weights were written on the board. The overall weight of an idea was calculated by adding the individual weights obtained from the participants. For example, the overall weight for '2-way communication' is 1.307 (0.541 + 0.239 + 0.288 + 0.133 + 0.106). The selected most important ideas are shown in Table 4. It is to be noted that each participant is required to select only five best ideas and compare them using the AHP, irrespective of the total number of ideas in the master list.

Step 6: A few minutes were spent to discuss the selected ideas.

Remark: While constructing pairwise comparison matrices, the participants need to be careful so that the matrices do not incorporate a larger amount of inconsistency. According to the eigenvector method, one surrogate measure of inconsistency is the Consistency Ratio (CR)

which is defined as $\frac{\lambda_{\max} - n}{n-1}$ ($\lambda_{\max}$ being the largest eigenvalue of **A**), divided by a similar index obtained from randomly generated reciprocal matrices (Saaty, 1990a). As a rule of thumb, if CR exceeds 0.10, then revision of the matrix is required. In the present experiment, the CRs for all the matrices are less than 0.10; in fact the maximum CR has been observed to be 0.08.

7. A COMPARATIVE STUDY OF THE NGT AND THE MNGT

As mentioned in the previous section, after collecting the cards from all the participants, the weights were calculated by using the AHP. For example, the weights of the five ideas for the participant whose PCM was shown before are 0.559, 0.239, 0.062, 0.102, and 0.038. If we intend to apply the NGT, then we may assign weights to these five ideas as 5, 4, 2, 3, and 1, respectively. After assigning weights in this manner, we can derive the ranking of all the ideas. The weights and rankings have been shown in Table 2 (the ranks are provided for those ideas which receive overall weight of 5 and above). The top 10 ranked ideas, their absolute and relative weights are shown in Table 3.

Similarly, the top 10 ranked ideas obtained by the MNGT are shown in Table 4. This table also shows the absolute and relative weights.

A number of observations can be made from Tables 3 and 4. Some of these are the following:

a. In both the methods, the top five ranked ideas are the same. However, the ideas "two-way communication" and "efficient and effective delivery of knowledge" have interchanged their ranks.
b. As anticipated, in the NGT, there have been a number of ideas occupying the same rank (refer to ranks 7 and 9, Table 3), whereas in the MNGT this possibility is minimal due to the usage of cardinal weights.
c. Considering the ten ideas in Table 4 and their corresponding ranks in the MNGT as well as in the NGT, we compute the Spearman's rank correlation coefficient (r.c.c.), which is 0.947. However, in the present case, the r.c.c. does not reveal the actual relationship among the ranks owing to the fact that a number of ideas occupy the same rank, especially in the NGT.
d. It is to be noted that the major focus of this paper is not to identify

TABLE 3
Top 10 Ranked Ideas Obtained by the NGT

No.	Idea	Absolute Weight	Relative Weight	Requirement in Percentage	Rank
1.	Lecturer should have relevant and in-depth knowledge	42	0.271	27.1	1
2.	Effective communication skill	28	0.181	18.1	2
3.	2-way communication	19	0.123	12.3	3
4.	Efficient and effective delivery of knowledge	18	0.116	11.6	4
5.	Lecturer is well prepared	11	0.071	07.1	5
6.	Proper planning on the lecturer's part	10	0.064	06.4	6
7.	i. Lecturer should make class interesting ii. Use relevant and clear visual aids iii. Variety of teaching methods	9	0.058	05.8	7
8.	Time management	7	0.045	04.5	8
9.	i. Lecture should be delivered in such a manner that students can understand ii. Encourage creativity and openness iii. Student-centered approach in teaching	6	0.039	03.9	9
10.	i. Lecturer should be responsible ii. Personality of the lecturer	5	0.032	03.2	10
	Total	155	1.000	100	

TABLE 4
Top 10 Ranked Ideas Obtained by the MNGT

No.	Idea	Absolute Weight	Relative Weight	Requirement in Percentage	Rank
1.	Lecturer should have relevant and in-depth knowledge	4.126	0.338	33.8	1
2.	Effective communication skill	2.504	0.205	20.5	2
3.	Efficient and effective delivery of knowledge	1.481	0.121	12.1	3
4.	2-way communication	1.307	0.107	10.7	4
5.	Lecturer is well prepared	0.712	0.058	05.8	5
6.	Proper planning on the lecturer's part	0.519	0.042	04.2	6
7.	Lecturer should make class interesting	0.460	0.038	03.8	7
8.	i. Lecturer should be responsible ii. Variety of teaching methods	0.398	0.033	03.3	8
9.	Personality of the lecturer	0.393	0.032	03.2	9
10.	Time management	0.315	0.026	02.6	10
	Total	12.215	1.000	100	

the factors that constitute quality teaching. The topic has been extensively studied elsewhere, as mentioned before. The only purpose of conducting this experiment is to show the working procedure and validity of the proposed modified method.

According to the present study, for quality teaching, the most important requirements which have clear superiority over others are: (i) the lecturer should have relevant and in-depth knowledge, and (ii) effective communication skill. Together it accounts for 54.3 percent (MNGT). The next two most important requirements which have superiority over the remaining ones are (i) efficient and effective delivery of knowledge, and (ii) 2-way communication. Together it accounts for 22.8 percent. A few other important requirements are: (i) the lecturer is well prepared, (ii) proper planning on the lecturer's part, (iii) the lecturer should make class interesting, etc.

8. SECOND EXPERIMENT FOR FURTHER VALIDATION OF THE MNGT

To consolidate the findings of the above first experiment, another experiment of a similar kind was conducted. This is described below. The details are omitted as they have already been provided for the first experiment. The second experiment is as follows:

We have embarked upon the new millennium. It is predicted that all mankind will face a number of challenges in this new millennium. Research is needed to find out the major challenges; and further research is required to address these challenges successfully. Staying on this issue, a nominal group session was conducted in which nine students (from the author's class) took part.

One requirement of the NGT is that the participants are able to contribute to the issue concerned and the number of ideas generated becomes moderately large. The above is a very general issue (finding major challenges in the new millennium) and many ideas can be generated. Further, the students were enthusiastic about contributing to this topic. As mentioned in the paper, this example has been considered only to show the working of the MNGT. If we were serious about finding the 'real' major challenges in the new millennium, then our sample must be different.

Specifically, the question posed at the beginning of the session was "what are the major challenges to mankind in the new millennium?"

TABLE 4
Top 10 Ranked Ideas Obtained by the MNGT

No.	Idea	Absolute Weight	Relative Weight	Requirement in Percentage	Rank
1.	Lecturer should have relevant and in-depth knowledge	4.126	0.338	33.8	1
2.	Effective communication skill	2.504	0.205	20.5	2
3.	Efficient and effective delivery of knowledge	1.481	0.121	12.1	3
4.	2-way communication	1.307	0.107	10.7	4
5.	Lecturer is well prepared	0.712	0.058	05.8	5
6.	Proper planning on the lecturer's part	0.519	0.042	04.2	6
7.	Lecturer should make class interesting	0.460	0.038	03.8	7
8.	i. Lecturer should be responsible ii. Variety of teaching methods	0.398	0.033	03.3	8
9.	Personality of the lecturer	0.393	0.032	03.2	9
10.	Time management	0.315	0.026	02.6	10
	Total	12.215	1.000	100	

TABLE 5
Forty-two Challenges Generated by All the Participants

No.	Challenges	NGT Weights	NGT Ranking	MNGT Weights	MNGT Ranking
1.	Rapid changes in technology	2+5+4+3 = 14	3	0.089+0.538+0.319+ 0.100 = 1.046	3
2.	Globalization	5+5+5+4+5=24	1	0.479+0.470+0.504+ 0.236+0.446 = 2.135	1
3.	Cultural diversity	1		0.035	
4.	Increasing world population	2+3+2 = 7	5	0.074+0.137+0.052= 0.259	10
5.	Increasing competition in life				
6.	Emergence of artificial intelligence				
7.	Power of money	4	8	0.294	9
8.	Social problems	4+3+4+5 = 16	2	0.354+0.196+0.278+ 0.565 = 1.393	2
9.	Increasing computer crime				
10.	Deterioration of environmental conditions	3+5 = 8	4	0.127+0.475 = 0.602	4
11.	Depletion of energy resources	2	10	0.062	
12.	World economic reform				
13.	New diseases	1+1+4=7	6	0.091+0.034+0.185= 0.31	8
14.	Information age			0.223+0.031 = 0.254	10

TABLE 5 (continued)

No.	Challenges	NGT Weights	NGT Ranking	MNGT Weights	MNGT Ranking
15.	Confrontation among leaders				
16.	Sex discrimination	1		0.025	
17.	Industrialization				
18.	Imperialism	2	10	0.053	
19.	Meteoric collision	5	7	0.383	7
20.	Social trends	3	9	0.122	
21.	Homosexual problems	1		0.090	
22.	Security problem				
23.	Greenhouse effect	3+1+4 = 8	4	0.110+0.046+0.258=0.412	6
24.	Plagiarism				
25.	Generation gap				
26.	Political reform	1+3 = 4	8	0.067+0.133 =0.200	
27.	Hectic lifestyle				
28.	Depression	2	10	0.068	
29.	Awareness of religious affairs	5+1 = 6	6	0.480+0.044 =524	
30.	Satanic movement				

TABLE 5 (continued)

No.	Challenges	NGT Weights	NGT Ranking	MNGT Weights	MNGT Ranking
31.	Increasing radiation				
32.	Lack of professionals in certain areas	4	8	0.254	10
33.	Increasing immigration				
34.	Increasing standard of living	2+3 = 5	7	0.114+0.130 = 244	10
35.	Excessive use of chemicals in consumer products				
36.	Terrorism	3	9	0.116	
37.	Clone technology				
38.	Internet	1		0.045	
39.	Information overflow				
40.	Illiteracy				
41.	Merger	2	10	0.069	
42.	Corruption				

TABLE 6
Top 10 Ranked Challenges Obtained by the NGT

No.	Challenges	Absolute Weight	Relative Weight	In Percentage	Rank
1.	Globalization	24	0.270	27.0	1
2.	Social problems	16	0.180	18.0	2
3.	Rapid changes in technologies	14	0.157	15.7	3
4.	i. Deterioration of environmental conditions ii. Greenhouse effect	8	0.090	09.0	4
5.	Increasing world population	7	0.079	07.9	5
6.	i. New diseases ii. Awareness of religious affairs	6	0.067	06.7	6
7.	i. Information age ii. Meteoric collision iii. Increasing standard of living	5	0.056	05.6	7
8.	i. Power of money ii. Political reform iii. Lack of professionals in certain areas	4	0.045	04.5	8
9.	i. Social trends ii. Terrorism	3	0.034	03.4	9
10.	i. Depletion of energy resources ii. Imperialism iii. Depression iv. Merger	2	0.022	02.2	10
	Total	89	1.000	100	

TABLE 7
Top 10 Ranked Challenges Obtained by the MNGT

No.	Challenges	Absolute Weight	Relative Weight	In Percentage	Rank
1.	Globalization	2.135	0.290	29.0	1
2.	Social problems	1.393	0.189	18.9	2
3.	Rapid changes in technologies	1.046	0.142	14.2	3
4.	Deterioration of environmental conditions	0.602	0.082	8.2	4
5.	Awareness of religious affairs	0.524	0.071	7.1	5
6.	Greenhouse effect	0.412	0.056	5.6	6
7.	Meteoric collision	0.385	0.052	5.2	7
8.	New diseases	0.310	0.042	4.2	8
9.	Power of money	0.294	0.040	4.0	9
10.	Increasing world population	0.259	0.035	3.5	10
	Total	7.36	1.000	100	

Altogether 42 ideas (challenges) were generated. These are shown in Table 5. The top 10 ranked ideas obtained by the NGT and the MNGT are shown in Tables 6 and 7, respectively. Upon comparing these tables, one can easily find that, in the case of the NGT, there are a number of ideas occupying the same rank. In fact, starting from rank 4 onwards (except rank 5), there have been multiple ideas in every rank. On the other hand, in the MNGT, each rank has a distinct idea. This is the most notable advantage of the MNGT, as mentioned earlier.

9. ADVANTAGES OF APPLYING THE AHP IN STEP 5 OF THE NGT

a. In the traditional NGT, the five most important ideas are selected by using the 1-5 ordinal scale. In this procedure, merit or superiority of one idea is not judged with respect to all other four ideas separately. Consequently, relative weights are not obtained. On the other hand, in the AHP ideas are compared in a pairwise fashion; i.e., one idea is compared with all other ideas separately. This increases the accuracy of the results and gives the relative superiority of one idea over another.
b. In the traditional NGT, the important ideas are assigned 5, 4, 3, 2, and 1, leaving no room for equal weights. But in the MNGT, if the participants feel that two ideas are equally important, then they can enter 1 in the appropriate cell of the PCM.
c. In the traditional NGT, two distinct ideas can receive the same weight as (2+1+1+1) (from four persons) and 5 (from a single person). In this case, none is regarded superior over another. In the MNGT, chances of having a tie are minimal due to the usage of cardinal weights.
d. In the NGT, there is a very high chance that a large number of ideas will receive the same overall weight, whereas in the MNGT this chance is minimal.
e. Following the NGT, let us assume that the ranking made by two participants for the five ideas A, B, C, D, and E are respectively (5, 4, 3, 2, 1) and (4 ,5, 3, 2, 1). It is to be noted that exactly the same ranking has been assigned to the idea D. Following the MNGT, the weights of the ideas for the same participants could be (0.53, 0.23, 0.15, 0.05, 0.04) and (0.28, 0.35, 0.16, 0.09, 0.07). So, for the second participant, idea E has received more weightage than the weightage assigned to D by the first participant. So, ultimately, 'E' may emerge

superior than 'D'. But in the NGT, 'E' will remain inferior as compared to D.

f. In the NGT, the weights of the five most important ideas are 5, 4, 3, 2, and 1. Therefore, the relative weights are 0.333, 0.267, 0.2, 0.133, and 0.067. In all situations, this relative standing remains constant for all the best five ideas selected by all the participants. This fact is contrary to human perception about relative weights of two different entities. The MNGT overcomes this difficulty.

In addition to the foregoing advantages, there are some limitations of the MNGT. Two limitations are the following:

- Compared to the NGT, the MNGT requires more time (10 to 15 minutes) to finish the brainstorming session.
- The facilitator must be familiar with the Analytic Hierarchy Process.

10. RESOLVING MUSLIM RELATED ISSUES THROUGH THE MNGT

Moore (1987) has described a number of applications of the traditional NGT to solve social problems. The proposed MNGT is expected to entail further rigor to the NGT in addressing community-related problems. Here is a brief, non-exhaustive list of issues related to Muslims, where the MNGT can be an impressive aid in the course of their resolutions.

- How to solve the problem that a large percentage of Muslims are not following the *Qur'Œn* and *Sunnah*.
- How to overcome the problem of disunity among Muslims or Muslim nations?
- How to overcome the problem of 'leadership crisis' in the Muslim world?
- How to remove deep-rooted misconceptions in the minds of a large number of non-Muslims about Islam?
- How to remove poverty among Muslims in a certain area?
- How to improve the performance of the Islamic banking system?
- How to increase the awareness of Muslims towards Islamic banking?
- How to make the best use of information and communication technology for the upliftment of the Muslim Ummah?
- How to make proper utilization of *zakŒt* in the Muslim world?

- How to strengthen the Islamic family institutions?

Note that in each of the above cases, a group of relevant people can generate a large number of ideas. The MNGT will help to prioritize these ideas. The ideas which receive higher priorities are to be implemented.

11. SUMMARY AND CONCLUSION

In organizations, decisions are quite often made in groups. Nominal Group Technique has been proven to be extremely useful in solving various kinds of group decision-making problems. The technique involves six steps. In the fifth step, the participants are required to find out and subsequently rank the most important five ideas. However, in the existing framework of the methodology, there is no specific guideline to select and rank the best five ideas. In this paper, we have modified the fifth step by applying the Analytic Hierarchy Process. In the modified methodology, though the participants need to spend a bit more time, they will feel more comfortable in selecting and subsequently ranking the important ideas – an assertion which has been tested in two nominal group sessions discussed in this paper. The topics (quality teaching requirements and major challenges in the new millennium) for both the experiments are considered to show the working of the proposed modification of the NGT. The modified method alleviates several deficiencies of the traditional method. It is expected that, compared to the traditional method, the modified method will become more powerful in addressing and solving various kinds of group decision-making problems. The paper concludes by citing several issues related to Muslims which can be resolved by using the proposed technique.

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