Group decision making through nominal group technique: an empirical study

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Abstract: As a decision making tool in a group setting, the nominal group technique (NGT) has been widely applied by policy makers in numerous organisations. Many researchers have also conducted experimental studies on NGT to explore its various features that make the technique distinguishable from other related techniques including traditional interactive group and Delphi techniques. The purpose of the present research is to empirically investigate the outputs generated from various uniform nominal group sessions on a common issue. Conducting eight nominal group sessions that consist of 244 undergraduate students in Business Administration, Accounting and Engineering across several academic sessions, we find that most of the important inputs on the issue appear in every list of top ten inputs obtained from the sessions. The implication of this finding is that, once the outcomes of a nominal group session are known, should there a need arise in future for a different nominal group session but the issue is the same, if the session is conducted, major outcomes of this session will be the same as the previously conducted nominal group session. Therefore, the results of this research are expected to save a considerable amount of time in making decisions using nominal groups.

Keywords: group decision making; nominal group technique; NGT; operations management; Islamic perspective.

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1 Introduction

Organisational decision-makers function under increasingly uncertain conditions as organisational environments have become more dynamic and complex (Pringle and Neeley, 1983). This dynamicity coupled with complexity has necessitated the importance of making decisions in a group. The straight forward reason for using groups in making decisions is that a group of knowledgeable individuals with diverse managerial and technical expertise is more likely to make effective decisions than a lone individual. In general, groups are superior to individuals in making decisions when the issue is relatively complex, since members of a group can generate more creative solutions than one individual working alone (Blanchard, 1992).

Groups are used to formulate vision and mission statements, develop specific goals, identify and propose solutions to problems, determine how to measure the performance of the organisation as it strives towards continuous improvement (Roth et al., 1995). Groups are also used to create fresh and innovative ideas from the employees for the purpose of continuous improvement in various systems of organisations. Marx (1995, p.16) states:

> "Everything mankind has and will have in the future is and will be the result of people's ideas. …Some of the more progressive companies in the history of modern management realized the potential value of their employees' ideas for the improvements in the general functioning of their organisations. They have realized that 'idea power is the most tremendous human force in the world.'"

Employees also feel enthusiastic and consider themselves valued when they are made a part in the group decision making process. The majority of the decision making groups use the traditional interactive group approach (also known as focus group) in which the members, under the direction of a chairperson, communicate with one another in a relatively unstructured manner. However, a number of weaknesses are inherent in this approach (Pringle and Neeley, 1983). To overcome these weaknesses, a number of structured group decision making techniques have been developed of which the three main are brainstorming, Delphi technique and nominal group technique (NGT) (Anderson, 1990).

Osborn (1957) proposed brainstorming as a technique for improving productivity and making quality decisions using groups. The technique stands on four principles:

1 state as many ideas as possible

2 the wilder and more creative the ideas the better

3 improve or combine ideas

4 accept all the ideas without any criticism.

Brainstorming as a group idea generation technique has been in use over the last half century. Its principles are easy to understand and many participants experience the kind of synergy that is regarded as the technique's main plus point. That is, some people do hear ideas that prompt them to think of other ideas of which they might not have otherwise thought. As a result, brainstorming has strong appeal as a way for groups to generate ideas (Gallupe et al., 1992). However, in many practical brainstorming sessions, it has been observed that the aggressive participants take control of the whole session whereas lesser aggressive participants' views are almost unheard. That is, brainstorming

technique suffers from the absence of egalitarian participation (Miles, 1983). Conlin (1989, p.32) writes:

> "Business people, searching for new creative ideas, try to help the process along in a brainstorming session. They gather five or six people in a room. Two or three end up dominating the conversation. Participants criticize each other's ideas, then compromise on a solution, and everyone leaves the meeting unsure that the group even came up with the best answer. It probably didn't."

To ensure egalitarian participation in a typical brainstorming session, Andrew Delbecq and Van de Ven developed NGT in 1968. It is actually a structured brainstorming technique that ensures balanced participation among the group members and it is used to gather a large amount of subjective information pertaining to some issue. Fredrick B. Kraft, Robert H. Hoiss, and Joseph G. Paolillo (cited in Roth et al., 1995) proposed NGT as an alternative to traditional focus group sessions and they proved that in group problem solving situations, focus groups have produced a smaller number of problem solving dimensions, fewer high quality suggestions, and smaller number of different kinds of solutions than groups in which members were constrained from interaction (as in NGT) during the generation of solutions. In the words of Frankel (1987, p.543):

> "Recent works in literature reflect the view that structured techniques are needed to ensure quality solutions to problems. The nominal group technique (NGT), which provides multiple high-ranking alternative solutions representing important information, is considered one of the best structured techniques available."

Since the main subject of this paper is experimentation with NGT, its brief description is provided below.

2 Nominal group technique

NGT is a structured brainstorming technique that is used to produce a large number of ideas pertaining to an issue while ensuring that all the group members have equal participation in the development of ideas (Delbecq et al., 1975). NGT is not only used to generate a large number of ideas, but also to prioritise those ideas and consequently the ideas which receive majority of the votes can be selected. NGT is usually applied to identify problems and generate solutions to these problems. The technique is particularly useful for groups that are not used to interact, groups in which tension levels are often high, or groups in which status difference among members might inhibit open discussion.

Some amount of preparation is required for application of NGT. First of all, a group should be formed comprising seven to ten persons who are expected to be knowledgeable about the issue for which the session is convened. It is better to have participants having diverse background. A room should be prepared which should have preferably a U-shaped table. A marker board, marker pen and some sheets of paper should also be available. A facilitator should be chosen who is expected to have prior experience in conducting or at least participating at a number of nominal group (NG) sessions. The facilitator is also expected to be an unbiased person and he/she is not supposed to direct the group at reaching a particular decision. Much of the success of a NG session depends upon the ability of the facilitator.

Following are the six steps of NGT:

1 opening the session

2 silent generation of ideas in writing

3 round-robin recording of ideas

4 serial discussions on the ideas

5 voting to select the most important ideas

6 discussion on the selected ideas.

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

1 no criticism about anybody's ideas

2 no evaluation about anybody's ideas

3 generate as many ideas as possible

4 modifying and combining ideas

5 anonymity of input.

As its name suggests, the NGT is only 'nominal' a group, since no interaction takes place among group members and ranking of the ideas is generated on an individual basis. Some of the benefits of the technique are:

1 balanced participation among members

2 generation of more creative ideas than interactive groups

3 generation of larger number of ideas than do traditional interactive groups

4 selection of the best ideas through prioritisation procedure

5 minimisation of problems that are common in face-to-face meetings

6 on the part of the participants, greater sense of accomplishment (Dunham, 1998).

The technique has been extensively applied in education, business, health, social services and governmental organisations (Moore, 1987). A few specific areas of application are change management (Lane, 1992; Tribus, 1992), consumer research (Claxton et al., 1980), education (Davis et al., 1998; Montano et al., 2005), information systems (Rosemann and Vessey, 2008), health (Hofemeister, 1991), meeting management (Blanchard, 1992; Finlay, 1992), organisational development (Mendelow and Liebowitz, 1989), performance evaluation (Yiu et al., 2005), project management (Rustom and Amer, 2006), social issues (Pissarra and Jesuino, 2005; Welling et al., 2006).

As it has been mentioned in the abstract of the paper, the main purpose of this paper is to empirically investigate and qualitatively analyse the outputs generated from various uniform NG sessions on a common issue. The investigation has been carried out through participation of 244 undergraduate students. In the literature, a number of similar studies have been conducted involving academia, especially students. We provide a brief review of the relevant works on NGT involving academia.

3 Previous experiments on NGT involving academia

In order to determine the mental health and personal development needs of students, faculty members, and staff members of Appalachian State University (ASU), Skibbe (1986) formed two NGs, one composed of six second semester freshmen (general psychology course) and the other composed of five graduating seniors (recruited from various classes). Freshmen group was more concerned with faculty support, involvement in the campus community, and academic and campus information. On the other hand, seniors were more interested in time management, priority setting, and career counselling.

Gallupe et al. (1992) conducted two experiments to investigate the effects of computer-mediated technology and group size on the productivity of brainstorming groups. At Queen's University Decision Lab in Kingston, Ontario, 120 undergraduates participated in three group sizes (two, four, and six members). At the Park Student Center Lab at the University of Arizona in Tucson, 144 undergraduates participated in two group sizes (six and 12 members). Groups used both electronic and non-electronic, i.e., usual brainstorming techniques. The larger groups in both experiments generated more unique ideas and more high-quality ideas, and members were more satisfied when they used electronic brainstorming than when they used usual verbal brainstorming.

In order to further enhance the effectiveness of NGT, Frankel (1987) combined the technique with multidimensional scaling, a prominent multivariate statistical technique. The author tested the combined technique with three groups of graduate students and faculty in an educational program and the results indicated that the method provides a useful technique for defining complex problems while preserving and capturing its participants' sources of perception and meaning. Hazard (1983) designed an experiment to determine whether techniques for achieving group consensus are superior to the more traditional group decision making techniques. Six groups of five members each, randomly selected from an undergraduate management class, were assigned the problem of recommending a system of teacher evaluation to a board of education for a fictitious school district. Each group was given four tasks:

1 selecting goals of a teacher evaluation system

2 determining general criteria for assessing teacher performance

3 deciding who should select and apply the assessment system

4 identifying the main data sources to be used.

Three groups were assigned traditional technique and three groups were instructed to use NGT. Each group was judged on its effectiveness according to relevancy, reliability, and validity. In each of the experiments, the groups employing the NGT achieved higher scores in overall effectiveness and in each of the structured criteria except validity.

Davis et al. (1998) described an application of NGT in identifying the areas that needed improvement in the undergraduate nursing curriculum of University of South Alabama College of Nursing. Approximately 40 faculty members participated in the exercise. The revised curriculum which resulted from the NGT exercise has had full and enthusiastic support of the faculty. Bristol and Fern (2003) investigated through the involvement of students from a university of South-Eastern University in US, whether consumer attitudes change in focus group and NGT. They found that interaction and

discussion among focus group members changed their attitudes, where as this shift among NGT participants are minimal. The authors cautioned the researchers in using focus groups in consumer research and recommended using NGT instead.

As a partial fulfilment of the course Organisational Communication, Kolb (1999) instructed her students to form small groups of four to six and choose an organisation and then select a decision making or problem solving situation that people in this organisation might realistically face. Students were given a handout that provides information on varieties of group decision making techniques, namely, brainstorming, interactive process, ideal solution, Kepner/Tregoe method, NGT, single question, and standard agenda (a brief description of each of these can be found in author's paper) and they were instructed to choose an appropriate technique for the decision making/problem solving situation.

Hornsby et al. (1994) investigated the impact of three group decision making techniques, namely, traditional interactive, NGT, and Delphi on job evaluation outcomes. The authors formed 21 groups of students that consisted of 105 second-semester seniors majoring in Business Administration at a medium sized Midwestern University. Evaluation data were collected on three consecutive nights, each night employing a different decision making technique. The authors found that there were no change between initial and group evaluation for the Delphi technique and that is congruent with the fact that this method allows the greatest degree of evaluation decision anonymity. On the other hand, the findings that both the NGT and the traditional technique result in a significant shift from initial evaluations and that are due to comparatively decreased confidentiality.

Kramer et al. (1997) involved 200 students who enrolled in a multi-section basic communication course, to investigate the outcomes of untrained, brainstorming, and NGs. The authors found no difference in the decision quality of these three groups. However, brainstorming and NG members were more satisfied, felt their groups used a more effective process, and communicated more effectively than untrained groups.

Mahler (1987) points out that though NGT has been increasingly used for public planning, budget setting, and policy making, but NGT's assumptions about group processes and about politics are not thoroughly researched. In particular, the author searches answer of three questions:

1 What do actors perceive about their level of participation in the NGT process?

2 To what degree do they accept and feel committed to the outcome of the process?

3 To what degree do they feel that the process produces consensus?

The author conducted several group exercises in organisation theory classes for political science and public administration majors at the masters and upper-division undergraduate levels. One hundred and one students in five classes over three semesters participated in the exercises. Half of the groups were instructed to use traditional group technique and the remaining half NGT and in each case the issue assigned was: determine how to improve county high school education amidst the report of declining quality of secondary education. At the end of every session, each group was given a questionnaire to fill in and the purpose was to know their feedback about the participation level and acceptability of the results. The author found that though NGT generates larger number (on the average 16.83 compared to merely 5.25 from interactive groups) ideas compared to interactive

groups, the members in the interactive groups felt greater sense of participation than NGT groups. However, no significant difference was found in acceptability of the results.

4 Methodology

Department of Business Administration of the Faculty of Economics and Management Sciences of International Islamic University Malaysia (IIUM) consists of about 600 students at the undergraduate level. After entering into the Department, the students need to register for the Departmental required courses followed by the Departmental elective courses. One of the elective courses is OM (MGT 4010) and this is also offered for the Bachelor of Accounting and Bachelor in Manufacturing Engineering students as an elective course. But majority (about 80%) of the students register for the course come from Department of Business Administration.

International Islamic University's mission is Islamisation of knowledge. In particular, wherever suitable, the lecturers are required to discuss the course that they are teaching from an Islamic perspective. For the course Operations Management (OM), one full lecture (80 minutes) is allocated to discuss Islamic inputs in the course. As the instructor of the course, instead of giving inputs from the author's side, he takes inputs from students using NGT. It is to be noted that the students of IIUM regardless of their faculty affiliation, possess the basic knowledge in Islam. For example, the students before entering into the Business Administration Department, are required to take the courses: The Islamic Worldview (UNGS 2030), Islam and Knowledge (UNGS 2040), Ethics and Fiqh for Everyday Life (UNGS 2050), Studies of Religion I (RKUD 3220), Foundation of Islamic Economics (ECON 1710), Fiqh for Economist I (ECON 3510) and Fiqh for Economist II (ECON 3511). Furthermore, before taking the OM course, some students also take the course Management from an Islamic Perspective (MGT 4820), because it is an elective course. Therefore, the students are in a position to provide inputs on OM from an Islamic perspective.

Ever since (2002–2003 onwards) the author started teaching the course OM, he has been conducting NG sessions in the class to collect inputs from Islamic perspective. Though the main objective of conducting the sessions in the author's class is to collect inputs on the issue from the students, but it is also an objective to demonstrate the working of NGT as a structured brainstorming technique.

Average class size of a typical class in the faculty is 35. However, NGT requires much lesser number of participants. As it has been mentioned above, apart from discussing OM from an Islamic perspective, it was also the objective to give a demo on NGT before the students. In a NG session comprising about ten participants, normally we go about three rounds in the step of round-robin recording of ideas. But in our case, due to the larger size of the participants, we were able to go only one round and then the session was kept open and the students were asked to provide any input which was not written on the board. Altogether, eight sessions were conducted spanning from 2002–2003 session until the 2005–2006 session. In each academic session, two NG sessions[1] were conducted in two different sections. It is to be noted that the course (having two sections) is offered in only one semester in an academic year. The students are in third or fourth year of their respective bachelor program. Therefore, it can be reasonably assumed that across the NG exercises conducted over the years, the participants, i.e., the students had uniform background.

5 Data analysis and analysis

A large number of inputs are collected from each NG exercise starting from 2002–2003 session until the 2005–2006 academic session. The number of students participated and the number of inputs obtained from each exercise are shown in Table 1.

Table 1 Number of inputs and students participated in various NG exercises

Academic session	*No. of participants*	*No. of inputs obtained*
2002–2003, Section 1	31	46
2002–2003, Section 2	37	54
2003–2004, Section 1	24	46
2003–2004, Section 2	38	45
2004–2005, Section 1	35	38
2004–2005, Section 2	25	31
2005–2006, Section 1	23	23
2005–2006, Section 2	31	27

The list of inputs, their corresponding weights obtained in NG exercise conducted in Section 1, 2002–2003 session are shown in Table 2. Due to space limitation, we are not able to provide the lists generated in all other exercises.

Table 2 Results of NG exercise conducted in Section 1 of 2002–2003 session

No.	*Inputs*	*Individual wts.*	*Total wt.*
1	Fair allocation of work among employees	3, 3, 3	9
2	Employee should promote *Ukhuwah* among team members	5, 3, 2, 1, 3	14
3	Use resources wisely	1, 4, 1	6
4	Do not waste	3, 1	4
5	Treat every work as *amanah*	3, 5, 3, 1, 3, 3, 1, 3, 1, 4, 5, 4, 1, 5	42
6	Payment should be fair for the employees and on time	5, 2, 3, 2, 2	14
7	Provide product/service which benefit people	3, 5	8
8	Train Muslims to become good employees	1, 5	6
9	Implement s*hura* in decision making	4, 3, 4, 5, 5, 3, 5, 3, 3, 3, 4, 2	44
10	Have a place for *solat*/prayer	4, 1, 5, 4, 5	19
11	Ensure safety for the employees	4	4
12	Deliver the product on time	2, 2	4
13	Strengthen the spirit of teamwork	2	2
14	Ensure and enhance honesty and truthfulness in all business activities	3, 4, 4, 3, 5, 5, 5, 2, 2	33
15	While maximizing profit, do not ignore the interest of society	2, 2, 4, 2, 4	14

Table 2 Results of NG exercise conducted in Section 1 of 2002–2003 session (continued)

No.	*Inputs*	*Individual wts.*	*Total wt.*
16	Work with sincerity	1	1
17	Provide only *halal* product/service	2	2
18	Avoid any form of *riba*	5	5
19	Be careful about not polluting environment		
20	Give accurate measurement	3	3
21	Manager should be role model	5, 2, 4, 4	15
22	Business should be carried out following *Shariah* principles	1, 1, 1, 1, 5, 3, 5, 5, 4, 3, 5, 4, 5, 5, 4, 1	53
23	Uphold justice in the organization	3, 1	4
24	Ensure quality in product/services	4, 4, 2, 4, 5, 5,	24
25	Provide prayer time	4	4
26	Take care the welfare of the employees	1, 4	5
27	Do not use low quality raw materials	2, 2	4
28	Select suppliers who do *halal* business	1	1
29	Assign task according to employee's ability	2	2
30	Always seek knowledge to improve ourselves	5, 5, 2, 4, 1, 3, 4	24
31	Keep promise in every dealing	2	2
32	Manager should not only seek profit but also the blessings of Allah (swt)	4, 2, 5, 1	12
33	Be tolerant and flexible with suppliers		
34	Have good documentation and revise data for further improvement (SPC)	4, 1, 1, 1	7
35	No backbiting		
36	Provide suggestion box	2	2
37	Promote healthy competition	5, 1, 1, 2	9
38	No discrimination among nationalities		
39	Promote continues improvement culture so that tomorrow becomes better than today	5, 2, 2	9
40	Manager should provide good working condition	3	3
41	Promote Islamic environment in the working place, e.g., salam, mutual respect	3, 1, 5, 2, 3, 2, 3, 4, 1	24
42	Have a good work schedule		
43	No cheating in labelling		
44	Listen to customers feedback	2, 1	3
45	Employees should be rewarded according to performance	3, 1	4
46	Have a proper layout so that *purdah* is preserved	1	1

From the overall weights, we can easily identify the top ten inputs (the input that receives highest total weight is assigned rank 1 from every NG exercise across academic sessions. The compilation of the top ten inputs across academic sessions are provided in Appendix 1. As it is usually observed in a typical NG exercise, in some cases, more than one input possess the same rank. For example, in session 2002–2003, Section 1, three inputs (ensure quality in product/services, always seek knowledge to improve ourselves, promote Islamic environment in the working place) received the same 5th rank, because of the equality in their total weights. Notice also the widely different total weights for rank 1 holder inputs across various sessions (vide Appendix 1). This is due to the fact that the number of students participated in various exercises are not the same. In some exercise, only 23 students participated, where as in another exercise, the total number of students participated was 38.

In the next phase, we look into the content of the top ten inputs obtained in various sessions and identify the similar items. The details are shown in Table 3.

It is observed that most of the perceived important inputs appear in almost every NG exercise. For example, 'Implement *shura*[2] in decision making' appear in all the top ten lists except the last exercise. Similarly, 'Business should involve only *halal*[3] products' featuring in seven out of eight top ten lists. The last column shows the frequency of appearance of the items in the top ten lists for all the 8 exercises. The items whose frequencies are in the range 4–7 are cited below:

- implement *shura* in decision making
- business should involve only *halal* products
- promote Islamic environment in the working place, e.g., salam, mutual respect
- business should be carried out following *Shariah*[4] principles
- leaders should be knowledgeable and pious
- ensure quality in product/services
- payment should be fair for the employees and on time
- fair treatment for all the employees
- be concerned of employees' welfare

It is interesting to note that 'Business should be carried out following *Shariah* principles, has retained number one slot in all its 5 out of 8 appearances. Similarly, 'Implement *shura* in decision making' and 'Business should involve only *halal* products' have competed for the second and third positions after 'Business should be carried out following *Shariah* principles.' In fact, both of them have been ranked as first or second or third in a number of exercises. On the basis of average ranks, the three most important inputs on OM from an Islamic perspective have been the following:

- business should be carried out following *Shariah* principles
- business should involve only *halal* products
- implement *shura* in decision making.

Table 3 Similar items in the top ten lists across various NG exercises

No.	*Input*	*0203(1)*	*0203(2)*	*0304(1)*	*0304(2)*	*0405(1)*	*0405(2)*	*0506(1)*	*0506(2)*	*Frequency*
1	Business should be carried out following *Shariah* principles.	√ (1)*			√ (1)	√ (1)	√ (1)	√ (1)		5
2	Implement *shura* in decision making.	√(2)	√ (1)	√ (3)	√ (2)	√ (9)	√ (7)	√ (5)		7
3	Treat every work as *amanah*.	√ (3)	√ (5)		√ (6)					3
4	Ensure and enhance honesty and truthfulness in all business activities.	√ (4)								1
5	Ensure quality in product/services.	√ (5)		√ (3)				√ (9)	√ (4)	4
	Promote Islamic environment in the working place, e.g., salam, mutual respect.	√ (5)	√ (4)	√ (2)	√ (9)	√ (4)		√ (3)		6
6	Have a place for *solat*/prayer.	√ (6)					√ (5)			2
7	Manager should be role model.	√ (7)	√ (2)							2
8	Payment should be fair for the employees and on time.	√ (8)			√ (8)		√ (10)	√ (6)		4
	While maximizing profit, do not ignore the interest of society.	√ (8)			√ (7)		√ (4)			3
9	Manager should not only seek profit but also the blessings of Allah.	√ (9)		√ (1)		√ (3)				3
10	Fair treatment for all the employees.	√ (10)			√ (4)	√ (5)	√ (2)			4
11	Promote continues improvement culture so that tomorrow becomes better than today.	√ (10)	√ (10)							2
12	Promote healthy competition.	√ (9)						√ (8)	√ (9)	3
13	Business should involve only *halal* products.		√ (3)	√ (8)	√ (5)	√ (2)	√ (3)	√ (2)	√ (1)	7

Note: * '√' sign indicates that the corresponding input appears in that particular exercise within the top ten list and the number in inside the parenthesis shows the rank of its appearance in the list.

Table 3 Similar items in the top ten lists across various NG exercises (continued)

No.	*Input*	*0203(1)*	*0203(2)*	*0304(1)*	*0304(2)*	*0405(1)*	*0405(2)*	*0506(1)*	*0506(2)*	*Frequency*
14	Uphold justice for all the employees.		√ (6)							1
15	No *haram* activity in any part of the supply-chain.		√ (7)						√ (2)	2
16	Leaders should be knowledgeable and pious.		√ (8)		√ (8)	√ (7)	√ (1)		√ (3)	5
17	Be concerned of employees' welfare.		√ (9)				√ (9)	√ (4)	√ (5)	4
18	Use time efficiently.			√ (4)			√ (6)		√ (4)	3
19	Promote moral and ethical values.			√ (5)	√ (3)					2
20	Be more creative and innovative.			√ (6)						1
21	Avoid bribery and corruption.			√ (7)		√ (6)				2
22	Build good relationship with customers.			√ (8)			√ (9)			2
23	Have sound planning before the work.			√ (9)						1
24	Have good communication between employees and employer.			√ (10)						1
25	Deliver the product on time and according to specifications.				√ (10)					1
26	Do not waste in utilisation of resources					√ (10)	√ (8)		√ (8)	3
27	Promote teamwork.					√ (2)			√ (6)	2
28	Respect employees' ideas.						√ (9)			1
29	Do not force employees to do which is beyond his/her ability.							√ (7)		1
30	Expired goods should not be sold.							√ (10)		1
31	Charge reasonable price for the product/service.								√ (7)	1

Note: * '√' sign indicates that the corresponding input appears in that particular exercise within the top ten list and the number in inside the parenthesis shows the rank of its appearance in the list.

Apart from the above, the following items possess immediate lower and equal frequency (i.e., frequency = 3):

- treat every work as *amanah*
- while maximising profit, do not ignore the interest of society
- manager should not only seek profit but also the blessings of Allah
- promote healthy competition
- use time efficiently
- do not waste in utilisation of resources.

The following items have featured only twice in various NG exercises:

- have a place for solat/prayer
- manager should be role model
- promote continuous improvement culture so that tomorrow becomes better than today
- no *haram* activity in any part of the supply-chain
- promote moral and ethical issues
- avoid bribery and corruption
- build good relationship with customers
- promote teamwork.

It is also observed that, as expected, not exactly same wordings are used for a particular item across various exercises. For example, for 'Business should be carried out following *Shariah* principles' [as in 0203 (1)] has been stated in other exercises in the following way:

- operations must follow *Shariah* principles [0304 (2)]
- business ethics should be based on Islamic principles [0405 (1)]
- conduct business according to Islamic way [0405 (2)]
- Islamic ethics should be followed all the time [0506 (1)].

Same goes for most of the items cited in Table 3. As for another example, 'Implement *shura* in decision making', we noted the following wordings:

- practise *shura* in solving problems [0203 (1)]
- formulate strategy/solution using *shura* [0304 (1)]
- make decision using *shura* [0304 (2)]
- all decisions are to be made upon mutual consultation [0405 (1)]
- implement *shura* concept [0405 (2)]
- implementation of *shura* system in problem solving [0506 (1)]

Number of common inputs within the top 10 lists in all possible pairs of exercises across all the academic sessions are also identified and shown in Table 4. We observe that in two pairs of exercises [0203(1) and 0304(2)], [0304(2) and 0405(2)], the number of common inputs is as high as 7.

In exercise [0203(1) and 0405(2)], [0203(1) and 0506(1)], [0304(2) and 0405(1)], [0405(1) and 0405(2)], the number of common inputs is 6. The least number of common inputs has been observed in 0203(1) and 0506(2). The average number of common inputs across all the exercises (computed pairwise as shown in Table 4 and then taken average) is 4.46.

Not only a large number of elements are common in various exercises, in many instances, the common inputs have been observed to preserve their ranks as well, e.g., rank correlation coefficients for the common inputs in [0405(2) and 0506(1)], [0405(2) and 0506(2)], [0203(2) and 0304(2)] are found to be 0.900, 0.800, and 0.700, respectively.

From the frequencies of all the items in the top ten lists and their number of common occurrences in the lists, we can conclude that, given the uniformity in the background and level of the NG participants, important items pertaining to one particular issue will be captured by the participants and they will appear in the top ten lists across the NG exercises. Therefore, the facilitator of a NG session should have confidence that even if he/she repeats the exercise another time involving participants having similar background and for the same issue, no significantly different results will be obtained.

Table 4 Number of common inputs across various NG exercises

	0203(1)	*0203(2)*	*0304(1)*	*0304(2)*	*0405(1)*	*0405(2)*	*0506(1)*	*0506(2)*
0203(1)	-	5	4	7	5	6	6	1
0203(2)		-	3	5	4	4	4	4
0304(1)			-	4	5	4	4	3
0304(2)				-	6	7	5	2
0405(1)					-	6	4	4
0405(2)						-	5	5
0506(1)							-	4
0506(2)								-

7 Conclusions

The strength of NGT is not only its ability of generating a large number of ideas but it can also prioritise those ideas. The technique has been used widely in Social Science research, especially in terms of policy making pertaining to varieties of social issues. The present research through students' participation investigates the nature of prioritised outputs generated from a number of NG exercises where participants' backgrounds are fairly uniform. We conclude that given the uniformity in the background of the participants, the perceived important ideas will feature in the top ten lists from various NG exercises conducted on a common issue. Therefore, the facilitator (in social or business or political context) will have sufficient confidence that even if he/she replicates

the exercise at some other time involving the same type of participants, the output of the exercise will be almost the same.

The limitation of the research is that it has been carried out for only student's population and only one issue, i.e., OM from Islamic Perspective. Therefore, as for future research, the findings may be verified for other type of populations and adopting a number of issues.

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Notes

1 To avoid confusion, henceforth, we will use the word 'session' in referring to academic session and the word 'exercise' when we refer to nominal group session.

2 Shura is an Arabic word for 'consultation'.

3 permissible

4 Islamic principles of jurisprudence.

Appendix 1 Top ten lists obtained across various NG exercises

Session/section	*Rank*	*Inputs*	*Total wt.*
2002–2003/Section 1	1	Business should be carried out following *Shariah* principles.	53
	2	Implement *shura* in decision making.	44
	3	Treat every work as *amanah*.	42
	4	Ensure and enhance honesty and truthfulness in all business activities.	33
	5	• Ensure quality in product/services.	24
		• Always seek knowledge to improve.	24
		• Promote Islamic environment in the working place, e.g., salam, mutual respect.	24
	6	Have a place for *solat*/prayer.	19
	7	Manager should be role model.	15
	8	• Employee should promote *ukhuwah* among team members.	14
		• Payment should be fair for the employees and on time.	14
		• While maximising profit, do not ignore the interest of society.	14
	9	Manager should not only seek profit but also the blessings of Allah (swt).	12
	10	• Fair treatment for all the employees.	9
		• Promote healthy competition.	9
		• Promote continues improvement culture so that tomorrow becomes better than today.	9
2002–2003/Section 2	1	Practise *shura* in solving problems.	64
	2	Managers should adhere to Islamic principles.	56
	3	Business should involve only *halal* products.	51
	4	Promote Islamic practice in the workplace.	38
	5	Consider the job as *amanah*.	34
	6	Uphold justice for all the employees.	26
	7	No *haram* activity in any part of the supply-chain.	24
	8	Leader should be knowledgeable and pious.	21
	9	Have concern on employees' welfare.	19
	10	Promote continuous improvement.	16
2003–2004/Section 1	1	Do the job for the sake of Allah.	45
	2	Create Islamic work environment.	34
	3	• Formulate strategy/solution using *shura.*	23
		• Provide best quality products/services.	23
	4	Use time efficiently.	21
	5	Promote moral and ethical values.	15

Appendix 1 Top ten lists obtained across various NG exercises (continued)

Session/section	*Rank*	*Inputs*	*Total wt.*
2003–2004/Section 1	6	Be more creative and innovative.	13
	7	Avoid bribery and corruption.	12
	8	• Build good relationship with customers.	10
		• Use *halal* resources for your business.	10
	9	Have sound planning before the work.	9
	10	Have good communication between employees and employer.	8
2003–2004/Section 2	1	Operations must follow *Shariah* principles.	90
	2	Make decision using *shura.*	50
	3	Promote ethics in the business organisation	45
	4	Respect and treat the employees equally irrespective of their positions.	36
	5	Produce *halal* products.	31
	6	Treat your job as *amanah.*	21
	7	Contribute to the society/*ummah.*	19
	8	• Pay salaries on time.	18
		• Have a good leader.	18
	9	• Promote concept of brotherhood/sisterhood.	17
		• Deliver the product on time and according to specification.	17
	10	Use the right policies in the organisation.	16
2004–2005/Section 1	1	Business ethics should be based on Islamic principles.	43
	2	Produce and sell lawful products.	37
	3	Objectives should be based upon this world and hereafter.	32
	4	Create Islamic environment in the organisation.	30
	5	Fair treatment and compensation.	29
	6	Avoid practising *ribah.*	26
	7	Have good manager/leader.	25
	8	Do not discriminate among people.	21
	9	• Manager should be just.	19
		• All decisions to be made upon mutual consultation.	19
	10	• Do not waste in utilisation of resources.	16
		• Do not involve in corruption.	16
2004–2005/Section 2	1	• Managers should possess Islamic values and ethics	36
		• Conduct business according to Islamic way.	36

Appendix 1 Top ten lists obtained across various NG exercises (continued)

Session/section	*Rank*	*Inputs*	*Total wt.*
2004–2005/Section 2	2	• Managers should be fair and honest.	26
		• Promote teamwork.	26
	3	Raw materials should be *halal* and from lawful sources.	23
	4	Strategy should benefit the society.	22
	5	Management should be concerned for *solat* place in the layout.	18
	6	Manage time, resources efficiently.	17
	7	Implement *shura* concept.	15
	8	Reduce waste.	14
	9	• Refrain from fraud in developing relationship between customers and suppliers.	13
		• Care for people's need.	13
		• Be responsible.	13
		• Respect employee's ideas.	13
	10	Give fair compensation to the employees.	12
2005–2006/Section 1	1	Avoid purchasing/producing *haram*/unlawful materials.	88
	2	Avoid fraud in supply-chain.	43
	3	Leaders must be responsible for their decisions.	33
	4	• Time management is important for decisions to be successful.	29
		• Quality should be assured throughout the manufacturing process.	29
	5	Consider welfare of the employees while improving productivity.	22
	6	Instill teamwork in workplace.	21
	7	Charge reasonable price for the product/service.	20
	8	Minimise your waste.	18
	9	Compete in healthy manner.	17
	10	Produce product/service maintaining reasonable level of quality.	16
2005–2006/Section 2	1	Islamic ethics should be followed all the time.	53
	2	Process should not involve producing harmful/*haram* products.	47
	3	Provide safe and good working environment.	38
	4	The management should look for the welfare of the employee.	26
	5	Implementation of *shura* system in problem solving.	24

Appendix 1 Top ten lists obtained across various NG exercises (continued)

Session/section	*Rank*	*Inputs*	*Total wt.*
2005–2006/Section 2	6	Reward and recognition should be as per the contribution and should be paid on time.	22
	7	Do not force employee to do which is beyond his/her ability	21
	8	Do not practise unlawful competition.	18
	9	Maintain good quality products all the time.	16
	10	Expired goods should not be sold.	15