

## Chapter - 5

# Delphi Technique for Decision Making and Problem Solving

---

The Delphi Technique initiated as a technique to predict the future. It was developed by the RAND Corporation during 1950s as a method to elicit opinion of experts, by Dr. Olaf Helmer in collaboration with Norman Dalkey. It was first started out for the US air force. The RAND Corporation is an American think-tank that was founded in 1946 by the US air force. A few years later, it became an independent non-profit. Originally, the Delphi Technique was aimed at predicting the impact of technology on warfare.

The initial application of Delphi was for technological forecasting based on intuitive judgement of experts. Subsequently this methodology has found application in different fields such as education, economics, medicine and business. In recent period the methodology is used to facilitate decision making, forecasting and problem solving. For this decision making method, a group of experts are asked to anonymously answer a survey and provide feedback on each other's answers. This process repeats itself. The aim is to come up with concrete solutions.

### **Definition**

Delphi technique may be defined as a systematic combination of individual judgments or opinions of experts in meaningful way to obtain a reasonable solution to a problem

## **Elements**

The Delphi Technique is part of the research technique that is also known as ‘interactive survey’, which involves dialogue with the public. It is based on an articulate research field, which in principle is capable of introducing the necessary expertise. It aims for a solution that consists of knowledge from the research field, rather than knowledge about it. Important elements within the Delphi method are:

It uses the opinions of a limited group of experts or people who have knowledge of the subject from their experience.

The subjects that an organisation wants to understand through the Delphi method are obtained by subjective means; the opinions of the group of experts are therefore very important.

The group of experts works towards a consensus, through step-by-step feedback of information, by repeating the question and providing feedback on each other’s answers.

## **Prerequisite for Delphi Technique**

Following prerequisite are utmost important for the technique-

### *Selection of a coordinator*

Delphi technique is a feedback mechanism; obtained information is recorded and reported to participants regularly, as part of a new attempt at information processing. A skilful professional coordinator is required to collect, process and communicate the needed information to the participants. The coordinator should be competent and well versed with the selected problem to be solved as well as efficient in collecting, processing and communication of information.

### *Selection of experts/ participants*

Since the Delphi technique relies upon the judgement of experts, it will be essential to select experts who are capable of giving sound judgements. The number of experts depends upon the type of problems to be solved as well as resource availability. However, a minimum 20 experts are essential for the purpose.

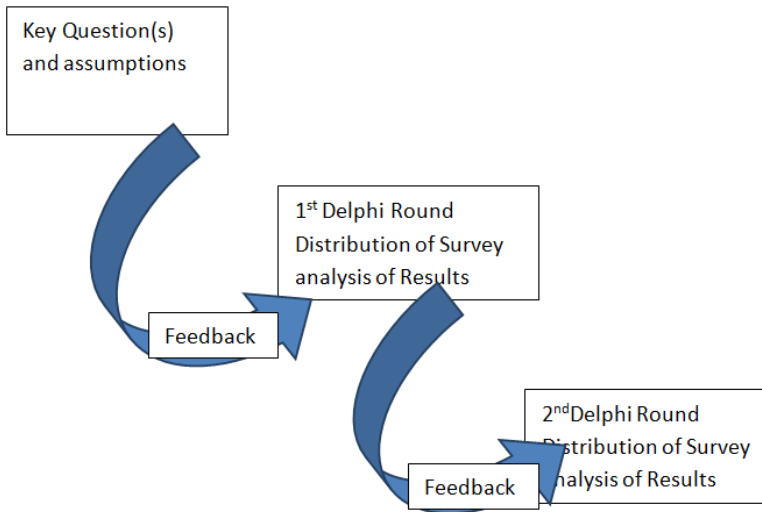
### *Selection of communication channel*

The Delphi Technique uses a carefully designed list of questions in a questionnaire that is administered to the experts who are capable of giving sound judgements. The questionnaire is administered to the experts who may live in different locations via mail. Thus there won't be any personal face to face communication among the experts as well as between the coordinator and experts. This may facilitate the experts to freely and frankly express their opinion that is developed and refined in several rounds. Sometimes, interviews are also used. The experts in question answer the questionnaire anonymously and are then confronted with each other's knowledge and views. Therefore, selection of effective communication channel for this purpose is essential. In recent years e-mail or different user friendly software/apps are increasingly used.

### **Approach**

The Delphi Technique uses a carefully designed list of questions that is developed and refined in several rounds. The experts answer the questionnaire anonymously and are then confronted with each other's knowledge and views. They do not know each other and do not know who else is in the panel of experts. There is a feedback mechanism; obtained information is recorded and reported to participants regularly, as part of a new attempt at information processing. The feedback is not just about the actual future expectations that are being expressed, but also the arguments and considerations that underpin these expectations. In this way, you can work towards a well-founded joint position. By confronting the participants with each other's ideas and insights in each new round, you can work towards a consensus. In this way, the Delphi Method asks experts for their recommendations. The number of participants is not relevant. However, there must be the assurance that different interests and problem definitions are addressed, so that a problem or topic is viewed from different perspectives and discussed, and all participants respect each other's contributions.

## Delphi Technique model -



### Steps in Delphi Technique

According to Helmer (1968) and Dunham (1998) the following steps are involved in working out the Delphi technique-

Step- A: Identification of problem

The problem which may be solved through Delphi method should be selected carefully as it can be solved through consensus of experts or participants. It is also an effective mechanism to stimulate and evaluate ideas for a given problem.

For example, the problem which may be solved through Delphi is- What are the skills needs of agricultural extension officers to improve their work performance?

Step- B: Preparation of Questionnaire

Here two methods may be followed. The first method is to prepare an exhaustive list of skill needs areas based on review of literature and experience which will be sent to the experts for ranking and evaluation. The second method is to have an open end questions as given below which will generate a number of responses

from the experts: “List out the areas of skill needed by agricultural extension officers (at Block/ district level)”

Step- C: Preparation of questionnaire- 2 and seeking responses from the experts

The questionnaire- 2 will consists of lists of Skills needs area prepared as mentioned above, plus space for giving comments for each area, in terms of why it is needed or why it is not needed. The purpose of the questionnaire is to enable the experts to refer the Skills needs Skills needs area listed out, along with providing comments about importance of training areas:

For example,

<b>Skills needs</b>	<b>Your comments (if any). Please indicate briefly why this area is important or unimportant</b>
Area/topic-1	
Area/topic-2	
Area/topic-3	
Area/topic-4	
Area/topic-n	

<b>New area/ topics</b>	<b>Comments (if any)</b>
Area/topic-1	
Area/topic-2	
Area/topic-3	

Step- D: Preparation of Questionnaire-3 and evaluation of identified Skills needs areas

The responses of questionnaire-2 will have to be analysed which will become the basis of questionnaire 3, which will be sent to the experts with a request to evaluate each Skills needsarea identified in terms of its importance on a five point continuum. Questionnaire-3 may look like as follows-

<b>Skills needs area/Topics</b>	<b>Your score of importance of areas</b>
Skills needs/ Topic-1	
Skills needs/ Topic-2	
Skills needs/ Topic-3	
Skills needs/ Topic-4	

---

Skills needs/ Topic-5	
Skills needs/ Topic-6	
Skills needs/ Topic-7	

\*Your score will be from 1 to 5. A score of 5 indicates that the area is important to a very great extent and a score of 1 indicates that it is important to very less extent.

#### Step-E: Preparation of questionnaire 4

The responses of questionnaire 3 are to be analysed to develop Questionnaire 4. We have to work out the median and Inter quartile range for each item of Skills needs area/topic, which have to be incorporated in questionnaire-4, which will look like as given below- the main purpose of the questionnaire is to help the participants to reconsider their responses based upon the value of mean and Interquartile range.

#### Questionnaire 4

“This is the fourth Questionnaire in our study on Skills needs of extension personnel to improve their work performance. The list of Skills needs that had been given in questionnaire-3, has been repeated below. You will also see information on mean and Inter quartile ranges of the responses for questionnaire-3. Please go through each Skills needs area and reconsider your previous score related to its importance. If you want to change it you may do so. If you do not want to change it, give the previous score. However, please state your reasons for your score if your score is below or above interquartile range. The interquartile range refers to the interval containing the middle 50% of the responses”.

<b>Skills needs Area/Topic</b>	<b>Median</b>	<b>Interquartile range</b>	<b>Your old score</b>	<b>Your new score</b>	<b>Reason if your answer is below or above the interquartile range</b>
Skills needs/ Topic-1					
Skills needs/ Topic-2					
Skills needs/ Topic-3					
Skills needs/ Topic-4					
Skills needs/ Topic-5					
Skills needs/ Topic-6					
Skills needs/ Topic-n					

**Step F:**

The responses of questionnaire-4 are analysed and the revised score for each Skills needs/topic is worked out. The Skills needs/areas/topics can be classified as most important, important and less importance based upon the score received.

**Application**

The possible applications of Delphi are endless. It is not only applicable for making forecasts or future forecasts, but it can also be useful for determining complicated policy decisions. In principle, the Delphi Technique can be properly applied for the following situations:

For an organisation, in which the formal and informal communication lines have become blocked or are lacking, it,s very difficult to study micro level variability.. The anonymous method prevents personal contact, which means that

stuck relationships do not get damaged any further and there is more room for new solutions and more respect for each other's opinions.

In the case of problems that can be solved mainly when multiple experts are confronted with each other's varying visions. Everyone's individual subjective opinion contributes, so that their shared thinking will lead to an effective approach.

In the case of solutions that are too subject to individual opinions and perceptions of those involved, it may help to work with an anonymous group who independently express their views on the problem.

In the absence of objective data, such as customer reviews and other audience reviews. When the opinion of all these groups is important in a specific problem solving, the Delphi Method works very well.

The great advantage of the Delphi Technique is the anonymity. It is not shared who the participants are or who provided the information. This prevents distortion that can sometimes occur when participants conform to the opinion of an expert who has very high prestige.

### **Delphi Technique example**

#### **Identify the problem**

- In what year the area under organic farming will reach above 60%?
- In what year the extension services in Indian will be privatized up to 50% level?

#### **Steps**

1. Prepare questionnaire and mail to experts
2. Request the participants to anticipate the likely years( >50% probability) of occurrence of listed events and to indicate the impact of event as major ,minor or nil



3. Requests them also to suggest events other than those mentioned in the questionnaire which may have large impacts
4. Analyze the response from first round questionnaire and give feed back to the participants along with second round questionnaire
5. Request the panelist to review the group response as the average pf the answers of round one and modify their previous response, if they so desired
6. Request the panelist to explicitly express reasons if any for being over optimistic or pessimistic compared to group average
7. For expected date of occurrence inter quartile range is calculated
8. Impact score of the group is given in terms of average value
9. Present the second round average and the reasons if any for being over optimistic or pessimistic compared to group average.
10. Using medians of the response from the second round questionnaire to draw conclusions based on discussions.
11. Continue the above steps till a convincing decision or solution is obtained for the problems taken for discussion.
12. In most cases summary of earlier discussion lead to reduction in differences among the group.
13. In exceptional cases, if no consensus has been arrived, ideas polarized around two distinct values. Two school of thoughts regarding a particular issue emerge.

### **Applications of Delphi Technique**

- To help in making budgetary decisions on the basis of cost benefit estimates.
- To determine the relative impacts of various decision taken.
- To forecast the developments in technology
- To forecast the socio-economic and technological changes in the society.

- Compare the forecast of Indian Delphi study with other Delphi forecasts to draw more generalized and valuable conclusions.

### **References**

1. Dalkey, N. C., Brown, B. B., & Cochran, S. (1969). *The Delphi method: An experimental study of group opinion* (Vol. 3). Santa Monica, CA: Rand Corporation.
2. Linstone, H. A., & Turoff, M. (Eds.). (1975). *The Delphi method: Techniques and applications* (Vol. 29). Reading, MA: Addison-Wesley.
3. Rowe, G., & Wright, G. (1999). The Delphi technique as a forecasting tool: issues and analysis. *International journal of forecasting*, 15(4), 353-375.