Extending the Delphi Method to Expand Its Application and Unlock Hidden Knowledge

Donna S. Finley, MBA, PhD, CMC
Principal and Co-founder, Framework Partners Inc.
SSHRC Doctoral Fellow
2012 Symposium on Scholarship of Teaching and Learning
Mount Royal University
Banff Park Lodge
November 10, 2012
4:00 – 5:00 pm
Discussion Outline

- Overview of the Delphi Method
  - Methodology
  - Findings and Implications
  - Future Directions
The Delphi Method is a powerful tool for co-creating solutions for complex problems.

- Delphi is an iterative, primary research process that collects and distils the anonymous opinions of experts using a series of questionnaires.

- Well suited when:
  - “There is incomplete knowledge about a problem or phenomenon . . . It investigates what does not yet exist” [4]
  - The research goal is to develop forecasts or improve the understanding of issues, opportunities and/or solutions.
Delphi is flexible and versatile.

- Can be reasonably situated anywhere along the quantitative-qualitative research continuum
- *Does not limit the number or types of questions* that can be asked
- *Does not restrict the number of rounds* for a study (1 round [8, 9] – 11 rounds [10])
- *Does not restrict the number of panelists* (10 to 1685 [13])
- *New ideas can emerge at any time* in the process, which influence the direction of the results and/or impact the design of subsequent Delphi rounds
The method has increased in popularity over time.

<table>
<thead>
<tr>
<th>Date</th>
<th>Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>1950s</td>
<td>Military use and forecasting (RAND Corporation) [15]</td>
</tr>
<tr>
<td>1960s</td>
<td>Non-military use [7]:</td>
</tr>
<tr>
<td></td>
<td>• Planning developing economies</td>
</tr>
<tr>
<td></td>
<td>• Civil service sector</td>
</tr>
<tr>
<td></td>
<td>• Future studies of science and technology in Japan [16]</td>
</tr>
<tr>
<td></td>
<td>• Large-scale foresight studies in Europe</td>
</tr>
<tr>
<td></td>
<td>• Consultancy tool</td>
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<tr>
<td>1970s</td>
<td>670 known Delphi studies [17] of which 131 represented applications outside</td>
</tr>
<tr>
<td></td>
<td>of military and forecasting [7]</td>
</tr>
<tr>
<td>1980-</td>
<td>Increasing use of the method [2, 14]</td>
</tr>
<tr>
<td>2004</td>
<td></td>
</tr>
</tbody>
</table>

Four fundamental characteristics of Delphi have remained constant [5]:
- Anonymity
- Iteration
- Controlled feedback
- Statistical aggregation of group response
As Delphi gains popularity across broader sectors, researchers have evolved the traditional Delphi method to be more applicable to their situation, sector and/or research problem.

60 years

- Classical Delphi
- Decision-making Delphi
- Policy Delphi

- Introduced by Helmer in 1975 [21]
- Used for research outcomes where ‘judgmental information’ is required and the obligatory search for consensus is eliminated [9, 1]
- Gained popularity because it evolved traditional application beyond forecasting into the development of public policy and social change
Efforts to improve Delphi tend to focus on the research process, rather than the research outcome.

<table>
<thead>
<tr>
<th>Select Examples</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measuring the degree of consensus</td>
<td>Rayens and Hahn (2000) [18]</td>
</tr>
<tr>
<td>Use of two group process facilitators</td>
<td>Schnyer et al. (2005) [19]</td>
</tr>
<tr>
<td>Expanding the definition of ‘expert’</td>
<td>Gabb et al. (2006) [3]</td>
</tr>
</tbody>
</table>
Several evolving uses of Delphi provide evidence that a focus on research outcomes is emerging.

**Evolving Uses of Delphi:**

- *Learning instrument* to determine whether the method could help employees at a Dutch bank learn and understand technical information [22]

- *Construct key performance appraisal indicators* for the mobility of service industries [23, 8]

- *Establish priorities* in research subjects ranging from terrorist activities to construction projects to teaching behaviours [9, 24, 25]

- *Optimize curriculum design and delivery* in Turkey, Australia, and the USA on topics ranging from sexology education to teachers’ civic knowledge [7]

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Delphi was applied to conduct primary research about knowledge translation.

Primary research questions:

1. *How is knowledge created by Practitioners and Academics?*

2. *How is knowledge transferred from Practitioners to Academics and vice versa?*

Secondary research question:

3. *How can the Delphi Method be extended beyond its original purpose to enhance the transfer of organisational knowledge?*
From a review of 151 Delphi studies (1983-2009), eight distinct categories of Delphi application were hypothesized.

60 years

- Classical Delphi
- Decision-making Delphi
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Hypothesized Categories [7]

- **Forecast** (*Classical Delphi*) is used to articulate a future state scenario/situation.
- **Make Decisions** (*Decision-making Delphi*) is used to promote collaborative decision-making.
- **Generate Ideas** (*Policy Delphi*) serves to stimulate the generation of alternatives and ideas about a specific topic.
- **Articulate Core Concepts** *(new)* develops clarity and meaning for concepts that have not yet been defined.
- **Set Priorities** *(new)* serves to rank-order plausible alternatives.
- **Measure Performance** *(new)* articulates how organisational effectiveness can be defined, measured and optimized.
- **Build Capacity** *(new)* enables participants to co-create new concepts and solutions on a level, knowledge-based playing field.
- **Drive Change** *(new)* brings new solutions to the forefront and generates commitment amongst participants for action.
This Delphi study engaged Practitioners and Academics from different sectors, disciplines and geographies.

10 Practitioners
“Successful leaders in organizational effectiveness by virtue of their reputation for sustained organisational performance.”
- 5 business-sector leaders
- 5 non-profit sector leaders

10 Academics
“Well-known in the field of organizational effectiveness by virtue of their reputation.”
- 5 business faculty
- 5 non-profit faculty
The Delphi Feedback Questionnaire (DFQ) had three objectives.

1. To confirm the extent of the panelists’ previous experience with Delphi as a participant, researcher or facilitator.

2. To better understand the potential application and usefulness of the Delphi method in each panelist’s occupational area.

3. To introduce eight possible classifications of the Delphi method and receive feedback from Practitioners and Academics about the distinction of each classification.
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Few of the participants had previously used Delphi.

- 80% reported no previous experience as a Delphi participant.
- 95% of panelists reported no previous experience as a Delphi researcher, facilitator and/or moderator.
- Overall, Academics were more responsive to the DFQ than Practitioners by absolute count and in quantity and quality of verbiage.
Six definitions achieved consensus for ‘clarity’ by earning a Top 2 rating of 75% agreement or better.

<table>
<thead>
<tr>
<th>ref</th>
<th>Options</th>
<th>Top 2</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Forecast</td>
<td>65%</td>
<td>7</td>
</tr>
<tr>
<td>2</td>
<td>Make Decisions</td>
<td>80%</td>
<td>5</td>
</tr>
<tr>
<td>3</td>
<td>Generate Ideas</td>
<td>95%</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>Articulate Core Concepts</td>
<td>85%</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>Set Priorities</td>
<td>95%</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>Measure Performance</td>
<td>90%</td>
<td>3</td>
</tr>
<tr>
<td>7</td>
<td>Build Capacity</td>
<td>75%</td>
<td>6</td>
</tr>
<tr>
<td>8</td>
<td>Drive Change</td>
<td>65%</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td><strong>Average</strong></td>
<td><strong>80%</strong></td>
<td></td>
</tr>
</tbody>
</table>

*Measure is "Clarity" - Highest is 1 - Very Clear, lowest is 4 - Not Clear.*
Where overall consensus was reached, there was little variation (i.e., 5% or less) in the clarity of five of the definitions as perceived by Practitioners and Academics.
The wording for four Delphi classification definitions was revised based on suggestions made by the panelists and/or revisions in my thinking stimulated by the panelists’ input.

<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Forecast</strong> is used to establish facts about a situation or topic or articulate a future forecast.</td>
<td><strong>Forecast</strong> is used to articulate a future state scenario/situation (REVISED)</td>
</tr>
<tr>
<td><strong>2. Make Decisions</strong> is used to promote collaborative decision-making.</td>
<td><strong>Make Decisions</strong> is used to promote collaborative decision-making (NO CHANGE)</td>
</tr>
<tr>
<td><strong>3. Generate Ideas</strong> serves to stimulate the generation of alternatives and ideas about a specific topic.</td>
<td><strong>Generate Ideas</strong> serves to stimulate the generation of alternatives and ideas about a specific topic (NO CHANGE)</td>
</tr>
<tr>
<td><strong>4. Articulate Core Concepts</strong> serves to clarify terminology and give definition to complex concepts; providing clarity and meaning to concepts that have not yet been articulated.</td>
<td><strong>Articulate Core Concepts</strong> develops clarity and meaning for concepts that have not yet been defined (REVISED)</td>
</tr>
<tr>
<td><strong>5. Set Priorities</strong> serves to rank-order plausible alternatives.</td>
<td><strong>Set Priorities</strong> serves to rank-order plausible alternatives (NO CHANGE)</td>
</tr>
<tr>
<td><strong>6. Measure Performance</strong> clarifies and defines how performance improvements can be defined, measured and optimized.</td>
<td><strong>Measure Performance</strong> articulates how organisational effectiveness can be defined, measured and optimized (REVISED)</td>
</tr>
<tr>
<td><strong>7. Build Capacity</strong> is designed to co-create new knowledge, concepts and solutions as participants exchange ideas on a level knowledge playing field.</td>
<td><strong>Build Capacity</strong> enables participants to co-create new concepts and solutions on a level, knowledge-based playing field (REVISED)</td>
</tr>
<tr>
<td><strong>8. Drive Change</strong> brings new solutions to the forefront and generates commitment amongst participants for action.</td>
<td><strong>Drive Change</strong> brings new solutions to the forefront and generates commitment amongst participants for action (NO CHANGE)</td>
</tr>
</tbody>
</table>
The reclassification to eight categories enables future Delphi studies to benefit from specific consideration of the research design.

<table>
<thead>
<tr>
<th>Classification (Research Purpose)</th>
<th>Type of Expert</th>
<th>Questions: Quantitative vs. Qualitative</th>
<th>Rigor in Analysis</th>
<th>Consensus Requirement</th>
<th>Reporting of Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forecast</td>
<td>Professionals</td>
<td>Primarily quantitative</td>
<td>Mean scores and standard deviations</td>
<td>Desirable</td>
<td>A variety of scenarios with a possible recommendation</td>
</tr>
<tr>
<td>Make Decisions</td>
<td>Designated pool of Stakeholders and/or Professionals</td>
<td>Primarily quantitative</td>
<td>Cost-benefit analysis</td>
<td>Required</td>
<td>Decision(s) agreed to &amp; supported by rationale &amp; action plan(s)</td>
</tr>
<tr>
<td>Generate Ideas</td>
<td>Pool of experts &amp; non-experts</td>
<td>Primarily qualitative</td>
<td>Cluster like ideas and/or generate themes</td>
<td>Not required</td>
<td>List of all unique ideas, regardless of frequency of citation</td>
</tr>
<tr>
<td>Articulate Core Concepts</td>
<td>Pool of experts &amp; non-experts</td>
<td>Primarily qualitative</td>
<td>Clear, distinct, precise &amp; accurate wording</td>
<td>Required</td>
<td>Agreed to definitions</td>
</tr>
<tr>
<td>Set Priorities</td>
<td>Designated pool of Stakeholders and/or Professionals</td>
<td>Primarily quantitative</td>
<td>Absolute scores or percentages</td>
<td>Achieved by Default</td>
<td>Rank-order list</td>
</tr>
<tr>
<td>Measure Performance</td>
<td>Representative pool of experts</td>
<td>Balance of quantitative and qualitative</td>
<td>Mixture of scores &amp; percentages and testimony &amp; commentary</td>
<td>Desirable</td>
<td>Report card</td>
</tr>
<tr>
<td>Build Capacity</td>
<td>Pool of experts &amp; non-experts</td>
<td>Primarily qualitative</td>
<td>Scenarios analysis</td>
<td>Circumstantial</td>
<td>New skills, knowledge and attitude(s)</td>
</tr>
<tr>
<td>Drive Change</td>
<td>Representative pool of Stakeholders and designated Professionals</td>
<td>Primarily qualitative</td>
<td>Pros &amp; cons, and implications from change</td>
<td>Required</td>
<td>Behavioral change</td>
</tr>
</tbody>
</table>
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More categories increase the specificity of research purpose that cannot be adequately captured under the existing three classifications.

**Elements Impacted by classification:**

- Panel membership selection
- Questionnaire design
- Rigor in analysis
- Consensus requirements
- Reporting of results
This work has stimulated a whole new direction of thinking, research and application.

Publications
Finley, D.S. and M. Napier (2012). The Delphi 8: Expanded Categorization that Increases the Delphi Method’s Application and Effectiveness (under review by Technological Forecasting & Social Change).

Presentations
Acknowledgements:

- Financial support received to conduct this study from the Social Sciences and Humanities Research Council of Canada (SSHRC), Reference No. 752-2009-1541 05.
- The 20 Delphi panelists for their input.
- Members of my Ph.D. Supervisory Committee (University of Calgary), specifically Dr. Margaret (Peggy) Patterson, Dr. Gayla Rogers and Dr. Howard Yeager for their advice and encouragement.


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