

Delphi Method: A Comprehensive Literature Review

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Abstract

The Delphi method, originally conceived in the 1950s by Dalkey and Helmer, has emerged as a robust and versatile technique for eliciting expert opinions to tackle complex and multifaceted problems. It was first implemented in a study conducted by the Rand Corporation, aimed at forecasting the impact of technology on warfare. Over the years, its framework has been systematically refined and adapted by numerous researchers, leading to its establishment as a reliable and standard research tool across a broad spectrum of disciplines. Linstone and Turoff, notable contributors to the evolution of this method, describe it as a structured communication process designed to achieve group consensus through iterative rounds of feedback while preserving the anonymity of participants. This critical feature ensures that individual opinions are uninfluenced by group dynamics or hierarchical pressures, fostering a more egalitarian and unbiased exchange of ideas. Subsequent refinements to the method have further emphasized its utility in gathering informed judgments from experts using structured questionnaires, enabling a systematic exploration of diverse perspectives. The iterative nature of the process allows for the gradual refinement of opinions, with participants revisiting their responses in light of feedback from the group. This approach not only facilitates consensus but also enhances the depth and precision of insights generated. The Delphi method has gained particular acclaim for its effectiveness in addressing long-term forecasting and strategic decision-making challenges. It excels in distilling intricate and often tacit knowledge into coherent, actionable insights, making it invaluable in areas where direct empirical data may be limited or unavailable. This paper aims to provide a comprehensive exploration of the Delphi method, beginning with its historical development and foundational principles. It will examine the method's inherent advantages, such as its ability to harness collective intelligence while minimizing biases, alongside its limitations, including potential challenges in expert selection and response attrition. Furthermore, the paper will delve into the various adaptations of the method, such as the Real-Time Delphi, Policy Delphi, and Decision Delphi, each tailored to specific research contexts. Finally, it will analyze the diverse applications of the Delphi method across disciplines, ranging from healthcare and education to technology forecasting and public policy, underscoring its enduring relevance as a powerful tool for structured problem-solving and collaborative inquiry.

Keywords: Delphi Method, Structuring, Collecting Experts' Opinions.

1. INTRODUCTION

The development of the Delphi method is back to 1950s, and it was experimentally applied by Dalkey and Helmer (Dalkey & Helmer, 1963) in an Air Force-sponsored Rand Corporation study held in Santa Monica, California. Since that time, it has become a popular methodology of collecting experts' opinions, and its way of work and purpose have been extensively modified by researchers over the (Gupta & Clarke, 1996). Thus, further studies have been published through the years in which they have assumed the supreme control over the Delphi method and make it as a standard research tool (Buckley, 1995).

Linstone and Turoff (Linstone & Turoff, 2002), in their book, provide the following definition of the Delphi method, "Delphi may be characterized as a method for structuring a group communication

process so that the process is effective in allowing a group of individuals, as a whole, to deal with a complex problem. To accomplish this 'structured communication' there is provided: some feedback of individual contributions of information and knowledge; some assessment of the group judgment or view; some opportunity for individuals to revise views; and some degree of anonymity for the individual responses". Whereas, the Delphi method is de-fined as "a method for an organized request and collection of judgments on a specific issue using a set of well-designed questionnaires interspersed with summarized information and feedback of opinions derived from earlier responses" (Okoli & Pawlowski, 2004). In addition, Yousuf (Yousuf, 2007) defines the Delphi method as "a group process involving an interaction between the re-searcher and a group of identified experts on a specified topic, usually through a series of questionnaires". Also, it is defined as "a research approach used to gain consensus through a series of rounds of questionnaire surveys, usually two or three, where information and results are fed back to panel members between each round" (Hanafin & Brooks, 2005).

Additionally, the Delphi method was described by O'Neill, Scott, and Conboy (O'Neill, Scott, & Conboy, 2009) as a methodology and technique for collecting experts' opinions to overcome the weaknesses of using a single point of view. Furthermore, Parente and Anderson-Parente (Parente & Anderson-Parente, 2011) state that "the Delphi technology involves extracting a consensus opinion from a panel of experts regarding the likelihood of future scenarios, probability judgments, or for developing likely scenarios. Consensus, in the form of decreased variability of panelists' responses, usually increases with iterative polling over two or more rounds; it is assumed that decreased variability of the panelists' predictions with iteration increases the accuracy of the group forecasts on the later rounds". Besides, Roy and Garai (Roy & Garai, 2012) state that "the Delphi method is a relatively strongly structured group communication process, in which matters, on which naturally unsure and incomplete knowledge is available, are judged upon by experts". Also, Hanafin (Hanafin, 2004) defines the Delphi method as "a research approach used to gain consensus through a series of rounds of questionnaire surveys, usually two or three, where information and results are fed back to panel members between each round. We are proposing to adopt this technique to facilitate the development of a national set of child well-being indicators".

The Delphi method uses a panel of experts to predict, assist in decision making, and solve complex problems. Objectively, the researchers and practitioners when applying the Delphi method will explore creative ideas and produce valuable information (Stitt-Gohdes & Crews, 2004). Furthermore, the Delphi Method as a research technique uses a structured communication process to address complex problems. Therefore, the Knowledge gathered using a Delphi method is produced by the responses to questionnaires which are collected on site, and then, these responses can be directly reviewed and summarized. Moreover, the Delphi method is a systematic, intuitive, and forecasting procedure which is based on the experts' judgments gained through a sequence of questionnaires (Bazzani & Canavari, 2013).

The Delphi method is primarily employed for assessing long-term issues. As a process for identifying statements related to the future, it condenses tacit and complex knowledge into a single, actionable statement, enabling informed judgment (Cuhls, 2003).

The rest of this report is organized as follows: Section 2 provides a general overview of the Delphi method. Section 3 presents the advantages and disadvantages of the Delphi method. In section 4, the different types of Delphi method will be discussed. Section 5 explains how the Delphi method has been applied to various disciplines. Finally, section 6 summarizes and concludes the paper and presents future research directions.

2. DELPHI METHOD: A GENERAL OVERVIEW

The Delphi method consists of a series of sequential questionnaires which are combined with controlled feed-back to gain the most trustworthy consensus of opinion of a group of experts (Linstone & Turoff, 2002). However, it is a very useful method when individual opinions need to

be combined and tapped to address a lack of agreement with others. Therefore, the Delphi is a valued method since it has the ability to structure and organize group communication (Powell, 2003).

In the literature, the researchers describe the Delphi, which is a research methodology, as a method, technique, survey, study, or procedure (Mullen, 2003). Regardless of these various descriptions of the Delphi, it is still be a powerful re-search tool. In this report, the Delphi will be referred to as a method, and thus, it will be called Delphi method.

Theoretically, the Delphi method might be infinitely iterated until the determined consensus is set to be achieved (Hsu & Sandford, 2007). However, many researchers identified that, in most cases, three iterations are enough to collect the needed information and to reach a general consensus (Balasubramanian & Agarwal, 2012; Baumann et al., 2001; Custer, Scarcella, & Stewart, 1999; Ludwig, 1997; Shah & Tillman, 2011, 2012; Tiwary et al., 1983).

The Delphi method as a process consists of the following steps in which they are need to be performed in order to get the consensus of the expert's opinions (see Figure 1 for more details):

1. define the problem;
2. determine the expertise required;
3. select a sample size of the experts;
4. prepare questionnaire(s);
5. distribute questionnaire(s);
6. analyze questionnaire(s) responses; and
7. compile final responses and disseminate results in a final report.

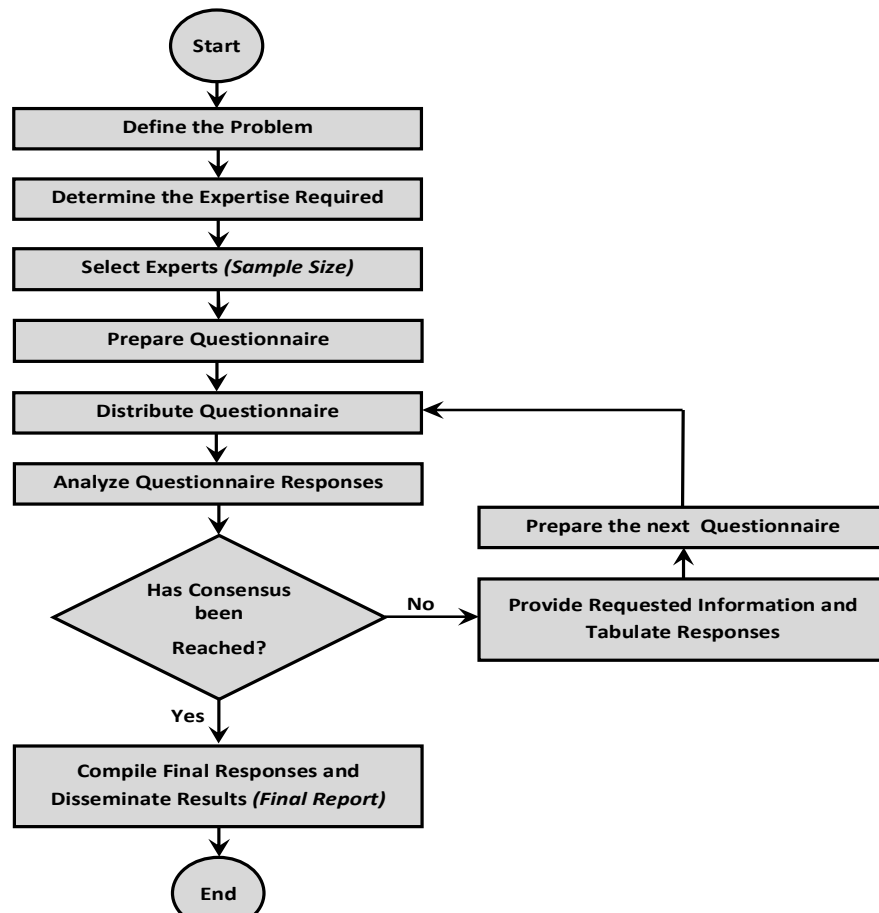


FIGURE 1: Flowchart of the Typical Delphi Method Process (Riggs, 1983).

Hsu and Lin (Hsu & Lin, 2013) adapted the Delphi method to design a model for selecting brand names based on enterprise perceptions. The process involves the following steps:

1. Selecting the experts;
2. Conducting the first round of surveys;
3. Conducting the second round of surveys;
4. Conducting the third round of surveys; and
5. Synthesizing expert opinions to achieve a consensus.

One of the most important features of the Delphi method is being an iterative model, see Figure 2. However, it means that the experts may be asked many times to provide their responses.

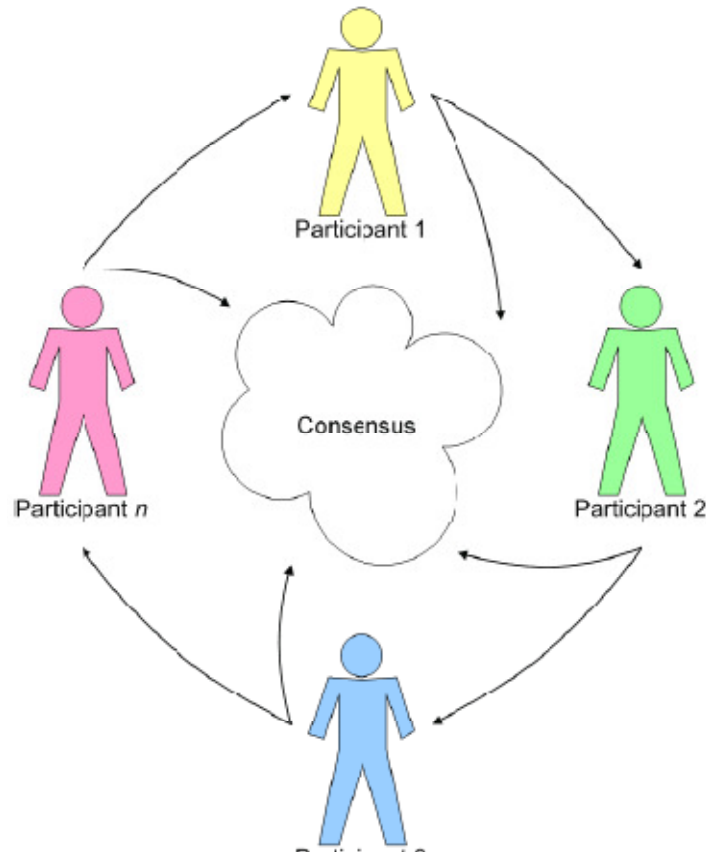


FIGURE 2: The Delphi Method as an Iterative Model (Paul, 2008).

An initial taxonomy of design variations in the Delphi method highlights that its applications can be categorized based on the following factors (Day & Bobeva, 2005):

- Purpose of the study: building, exploration, testing, or evaluation.
- Number of rounds: ranging from two to ten.
- Participants: homogeneous or heterogeneous groups.
- Mode: face-to-face discussion or remote interaction.
- Anonymity: fully anonymous or partially anonymous.
- Media: paper-based, telephone/fax communication, or computerized platforms.
- Concurrency: traditional sequential rounds or real-time online conferencing.

Based on an analysis of the related literature, a generic Delphi method model consists of the following three stages (Day & Bobeva, 2005):

- Exploration: This stage involves a fluid and unstructured investigation of the issues, limitations, challenges, and problems that influence or are influenced by the elements within the study domain.
- Distillation: This stage involves repeated efforts to gather opinions and analyze them to determine whether the Delphi process has reached a critical point to conclude the study.
- Utilization: This stage involves summarizing the findings of the Delphi study, applying the results, and reflecting on the insights gained from the process.

With the use of the Delphi method, the selection of re-search participants (experts) must be done carefully since the bad-selection may lead to unwanted results (O'Halloran et al., 1999).

3. ADVANTAGES AND DISADVANTAGES OF EMPLOYING THE DELPHI METHOD

Using a wide range of literature, the Delphi method, when applied, has the following advantages:

- The Delphi method reduces the range of assessment uncertainty while avoiding errors associated with face-to-face interactions (Di Zio & Pacinelli, 2011).
- Delphi method encourages opinions to be free of influences from others and is therefore more likely to be true (Czinkota & Ronkainen, 1997; Snyder-Halpern, 2001).
- The Delphi method, being questionnaire-based, is capable of capturing a broad spectrum of interrelated variables and multidimensional characteristics (Gupta & Clarke, 1996).
- The Delphi method enables geographically dispersed experts to share their opinions (Rogers & Lopez, 2002).
- As an iterative data collection approach, the Delphi method leverages the collective intelligence of expert groups (Linstone & Turoff, 2002).
- The Delphi method serves as an alternative to traditional meetings, addressing challenges such as dominant personalities, group pressure, and status effects (Mullen, 2003).
- The Delphi method allows for the involvement of a larger number of experts than is typically feasible with the committee-based approach (Mullen, 2003).
- Delphi method allows powerful interaction with the respondents by means of feedback and justifications (Mullen, 2003).
- The consensus is able to be obtained without bias, influence or pressure towards or from anyone (Minghat, Yasin, & Udin, 2012).
- The expert panel is able to provide consistent opinions relevant to their specialty (Minghat, Yasin, & Udin, 2012).
- The Delphi method is suitable for the use of predicting future needs (Minghat, Yasin, & Udin, 2012).
- The Delphi method is an effective tool for gathering a broader range of opinions on complex issues (Minghat, Yasin, & Udin, 2012).

As any other method or technique, the Delphi method suffers from the following disadvantages and/or limitations:

- The consensus achieved in the Delphi method may not be a true; it may be a result of sample or manipulated consensus (Yousuf, 2007).
- The Delphi method is a powerful tool for collecting a wide variety of opinions on complex issues (Minghat, Yasin, & Udin, 2012).
- The performance of the interacting group can be inhibited by many factors, for example, by group pressures for conformity, by dominant personalities (Riggs, 1983).
- Delphi method may suffer from its hybrid epistemological status (Gupta & Clarke, 1996).
- The consensus generated by the Delphi method can result in a blended version of the best opinions, meaning the outcome reflects the lowest common denominator (Powell, 2003).
- When comparing the Delphi method to the other similar methods, the Delphi method often gives very little information (Mullen, 2003).

4. THE TYPES OF DELPHI METHOD

From the literature, we found that the following types of the Delphi method have been used by many researchers and practitioners:

- Conventional Delphi: This is the traditional paper-and-pencil version of the Delphi method, characterized by five key features: anonymity, iteration, controlled feedback, statistical group response, and stability in expert responses on a specific issue (Hanafin, 2004).
- Real-Time Delphi: This version of the Delphi method is conducted online, where experts provide their opinions in real-time via the internet (Gnatzy et al., 2011).
- Policy Delphi: A tool for analyzing policy issues rather than making decisions. It is used to generate policy alternatives through structured public dialogue and serves as an instrument for policy development and encouraging broad participation by gathering diverse opinions (Hanafin, 2004; Turoff, 1970).
- Decision Delphi: This method is used in decision-making processes related to social developments. The decisions are made by a group of decision-makers rather than a small, ad-hoc group of individuals (Hanafin, 2004).
- Rotational Delphi: it consists of rotating subsets of the total instrument through panel subgroups by providing a mechanism for obtaining ratings on an extensive competency set while reducing the workload on any single panelist (Scarcella & Custer, 1999).
- Modified Delphi: it is an adaptation of the Delphi method for the estimation process and it focuses in the future-oriented mode (Yonghong et al., 2012).
- Hybrid Delphi: it is any mix of the above types of the Delphi method (Faucher, Everett, & Lawson, 2008).

5. APPLICATIONS OF THE DELPHI METHOD

In the literature, the Delphi method has been applied to different areas, for example, it was implemented in the education, health, manufacturing, agriculture, management, policing sectors, etc. In this section, an analysis will be conducted to understand the use of the Delphi method in the aforementioned areas.

5.1 The Delphi Method in Education

Linestone and Turoff (Linestone & Turoff, 2002) suggested that the Delphi method can be applied in the education sector to:

- Plan the development of university campuses and curricula.
- Design educational models.
- Analyze the advantages and disadvantages of potential education policy options.
- Identify and clarify actual versus perceived human motivations.
- Explore priorities related to personal values and social goals.

Minghat, Yasin, and Udin (Minghat, Yasin, & Udin, 2012) apply the Delphi method to the technical and vocational education in Malaysia. Their study concluded that the Delphi method's greatest strength is its ability to gather opinions and achieve consensus among a diverse group of participants.

Lindqvist and Nordänger (Lindqvist & Nordänger, 2007) employed the Delphi method to articulate the practical knowledge involved in teaching. However, they describe how the method could be used in combination with e-mail. Whereas, in his research, Welty (Welty, 1973) concludes that there are challenges in selecting Delphi experts for educational planning and forecasting exercises. These problems are: differences in the participants levels of expertise and the relevance of experts in predicting areas where the cultural values are very important.

As an example of the Delphi method's effectiveness, Howze and Dalrymple (Howze & Dalrymple, 2004) describe the consensus-building process used to establish standardized content for a formal library instruction course. In graduate research, the Delphi method is a strong candidate

for exploring research opportunities in the Information Systems (IS) discipline, particularly for projects that address problems, opportunities, solutions, and forecasts. This is because the method is not only quantitative but also applicable in qualitative research (Skulmoski, Hartman, & Krahn, 2007).

Stylianides and Pashiardis (Stylianides & Pashiardis, 2007) employed the Delphi method to examine the future of pre-primary, primary, and secondary education in Cyprus up to the year 2020. A new approach, the web-based Delphi method, was developed for content validation in Human Resource Development (HRD) and adult education research (Colton & Hatcher, 2004; Hatcher & Colton, 2007). Additionally, Vakani and Sheerani (Vakani & Sheerani, 2012) explore how educational experts can use the Delphi method to facilitate consensus within a set timeframe.

5.2 The Delphi Method in Health

Despite its increasing appeal in social science, the Delphi method has been rarely utilized in qualitative hospitality research (Sobaih, Ritchie, & Jones, 2012). However, Sobaih, Ritchie, and Jones (Sobaih, Ritchie, & Jones, 2012) propose a set of modifications that could strengthen the classical Delphi method for use in qualitative hospitality research.

Since its introduction in the 1950s, the Delphi method has been used in over 1,000 projects within the health sector, establishing a long-standing tradition as a reliable research technique in medical and health-related fields (De Meyrick, 2003). Furthermore, the Delphi method is particularly well-suited for health sector research due to the valuable body of knowledge held by a group of recognized experts (De Meyrick, 2003).

5.3 The Delphi Method in Agriculture and Manufacturing

In their study, Wu, Ma, Zhang, and Hu (Wu et al., 2009) used the Delphi method to select indicators, and the results demonstrated that the chosen indicators were effective for evaluating the safety of the navigation environment in three geographical areas. Additionally, the study confirmed that the Delphi method effectively utilizes experts' knowledge, experience, and expertise, providing precise evaluation indicators in a relatively short period of time.

Bevilacqua, Ciarapica, Giacchetta, and Marchetti (Bevilacqua et al., 2011) applied the Delphi method to implement a quality procedure in the production of stainless-steel tubes for automotive exhaust systems. Meanwhile, Nelson, Brem, and Husman (Nelson, Brem, & Husman, 2012) used the Delphi method to identify emerging phenomena in photovoltaics engineering, which are crucial for understanding the field, while also highlighting the misconceptions that can arise when students learn this content.

Additionally, Rikkonen, Kaivo-oja, and Aakkula (Rikkonen, Kaivo-oja, & Aakkula, 2006) used Delphi expert panels in scenario-based strategic planning for agriculture, demonstrating an approach where expert involvement ranges from narrow to broad participation in public policy planning. Bazzani and Canavari (Bazzani & Canavari, 2013) applied the Delphi method to forecast a scenario for the fresh tomato market in Italy and Germany. Furthermore, Campos-Climent, Apetrei, and Chaves-Avila (Campos-Climent, Apetrei, & Chaves-Avila, 2012) used the Delphi method to reveal the severe crisis facing Mediterranean agriculture, noting that finding solutions is a challenging task.

5.4 The Delphi Method in Management and IT

Xu, Wei, and Yuan (Xu, Wei, & Yuan, 2009) enhanced the Delphi method to be applied in machinability evaluation and examination within process planning. In contrast, Fathian, Akhavan, Hoorali, and Jafari (Fathian et al., 2007) used the Delphi method to validate a preliminary assessment model of Energy System Modelling Environment (ESME), focusing on the barriers and factors that influence Information Technology (IT) adoption in Small and Medium Enterprises (SMEs).

Chevron (Chevron, 1998) employs the Delphi method as a strategic branding tool by developing the Hepta-dimensional Brand Character Questionnaire (HBCQ), which consists of around 100 self-administered questions or statements that respondents must answer. Additionally, Grisham (Grisham, 2009) uses the Delphi method as a technique for examining complex and multifaceted topics.

Kaynak, Bloom, and Leibold (Kaynak, Bloom, & Leibold, 1994) demonstrate how the Delphi method can be used as a market research tool to analyze and forecast the future tourism potential in South Africa. In contrast, Ali (Ali, 2005) illustrates how the Delphi technique can be applied to conceptualize and operationalize the power of local planning agencies, using two Delphi studies: the first with twelve scholars and the second with sixteen professional planners.

Okoli and Pawlowski (Okoli & Pawlowski, 2004) offer detailed guidelines for using the Delphi method to select suitable experts for design decisions and to identify key factors that may influence the diffusion of e-commerce in Sub-Saharan Africa.

Kang, Tsai, Jia-Horng, and Yuan (Kang et al., 2009) establish a dedicated research team for his project through the real-time Delphi method which is based on the Internet (i.e. web-based Delphi method) and collecting participants' comments, in this way, the cost of technology foresight and the needed time can be indeed reduced. Zhu, Du, Meng, Wu, and Sun (Zhu et al., 2011) combine the Delphi method with the Analytical Hierarchy Process (AHP) to develop an evaluation criteria system for search engines and conduct an empirical study on Chinese search engines to validate it.

5.5 The Delphi Method in Policing

Loyens, Maesschalck, and Bouckaert (Loyens, Maesschalck, & Bouckaert, 2011) apply the Delphi method as a judgmental forecasting tool to predict future criminal trends, explaining how it can be used under specific conditions to complement existing crime analysis techniques. Loo (Loo, 2002) illustrates that the Delphi method can be a valuable tool for police organizations to predict future trends, supporting strategic management, program development, and other potential applications in police management.

De Las Heras, Salvatore, Rodrigues, Lovreglio, and Le-one (De Las Heras et al., 2007) state that the Delphi method proves to be useful in helping fire managers in listing and identifying the most frequent and relevant human caused ignition risks and sources, thus, it can help to identify precisely the appropriate preventive actions. Zaloom and Subhedar (Zaloom & Subhedar, 2009) conduct a study using the Delphi method, demonstrating its effectiveness in gathering expert opinions to identify and prioritize terrorist events, natural disasters, and failures of equipment and personnel in the maritime domain.

6. HOW CURRENT TRENDS AFFECT THE DELPHI METHOD?

The Delphi method is a structured communication technique used to gather expert opinions and achieve consensus on complex issues. Current trends influence its application, effectiveness, and evolution in several ways:

1. Digital Transformation

- Online Collaboration Tools: Platforms like Zoom, Google Meet, and specialized Delphi software (e.g., Real-Time Delphi) have made remote participation seamless, broadening the pool of experts and facilitating quicker iterations.
- Data Analysis Tools: Advanced data analytics and AI integration enable better aggregation, visualization, and interpretation of expert feedback.
- Global Participation: Technology removes geographical barriers, allowing for more diverse and inclusive expert panels.

2. Emphasis on Interdisciplinarity
 - Complex global challenges (e.g., climate change, public health, AI ethics) require input from experts across multiple disciplines. This trend has led to a more holistic application of the Delphi method.
 - Interdisciplinary participation increases the diversity of perspectives, improving the method's robustness but requiring more sophisticated facilitation.
3. Focus on Rapid Decision-Making
 - In fast-moving fields like technology or healthcare, the need for rapid consensus has encouraged the development of real-time Delphi approaches, where feedback cycles are shortened.
 - Iterative feedback and analysis are now more time-sensitive, demanding efficient facilitation and tools.
4. AI and Automation Integration
 - AI helps in selecting experts, drafting questionnaires, analyzing responses, and detecting biases, reducing manual effort.
 - Predictive algorithms can suggest consensus trends early, streamlining the process.
5. Demand for Transparency and Reproducibility
 - In modern decision-making contexts, stakeholders demand transparency in how consensus is reached. This has led to more detailed documentation and better access to Delphi processes.
 - Open Delphi studies, where anonymized data and results are shared publicly, are becoming more common to improve credibility.
6. Ethical Considerations and Inclusivity
 - Awareness of bias and equity in decision-making processes affects expert selection and methodology design, ensuring representation from underrepresented groups.
 - Anonymity in the Delphi method aligns well with trends in minimizing groupthink and power dynamics.
7. Adaptation to Complex Scenarios
 - The method is increasingly used to address wicked problems like sustainability, global pandemics, and geopolitical tensions. These contexts require nuanced applications and may challenge the method's traditional iterative structure.
8. Challenges from Current Trends
 - Information Overload: Easy access to information can lead to overloading experts with data, potentially impacting the quality of insights.
 - Bias in Digital Tools: Algorithms used to streamline Delphi processes can introduce unintended biases.
 - Maintaining Engagement: Ensuring sustained participation in remote settings remains a challenge.
 - By embracing these trends while addressing their challenges, the Delphi method continues to evolve as a valuable tool for collective foresight and decision-making.

7. CONCLUSION AND FUTURE WORK

After carefully reviewing 66 research papers from around the world literature, we can firmly ensure that the use of the Delphi method is valuable in many disciplines. However, the Delphi method is a way of getting a general consensus based on the opinions of many experts in which they may be available in different geographical places.

From the many types of the Delphi method, the real-time Delphi method which is based on the internet and also called web-based Delphi method becomes the appropriate one since it saves time and cost of the collecting and analyzing the experts' opinions.

The future of the Delphi method holds promising potential for further development and application across various fields. As the method has evolved significantly since its inception, several key areas for future work can be identified, driven by advancements in technology, methodological refinement, and the expanding needs of complex problem-solving.

1. **Integration with Emerging Technologies:** One of the most exciting prospects for the future of the Delphi method is its integration with emerging technologies such as Artificial Intelligence (AI), machine learning, and big data analytics. By combining the Delphi method with AI algorithms, researchers can improve the efficiency of data collection, analysis, and synthesis of expert opinions. AI-powered systems could assist in identifying patterns or trends within expert responses, enabling faster and more accurate consensus-building. Additionally, big data analytics could provide more comprehensive background information to inform expert judgments, enhancing the quality of the Delphi process.
2. **Real-Time Delphi and Online Platforms:** As digital platforms become more advanced, the Real-Time Delphi method, which allows for the synchronous gathering of expert opinions through online forums or webinars, will continue to grow in importance. This evolution could make the Delphi method more accessible and scalable, allowing for real-time, global collaboration among experts. With the increased use of virtual tools and online survey platforms, the method could be further refined to incorporate multimedia, interactive elements, and instant feedback loops that facilitate dynamic exchanges of ideas among participants.
3. **Hybrid Models and Interdisciplinary Applications:** The Delphi method's future may involve hybrid models, combining its strengths with other research methodologies, such as qualitative analysis, system dynamics modeling, or participatory action research. By integrating Delphi with these approaches, researchers can create more robust frameworks for addressing complex, multidimensional issues. Additionally, interdisciplinary applications will likely become more prevalent, with Delphi being used in areas such as climate change, global health, smart cities, and technology forecasting, where collaboration between experts from diverse fields is crucial.
4. **Increased Focus on Diversity and Inclusivity:** As the global research landscape continues to evolve, there is growing recognition of the need for diverse perspectives in decision-making processes. Future Delphi studies could place a stronger emphasis on ensuring a more inclusive representation of experts, considering factors such as gender, geographic location, cultural background, and professional experience. This would enhance the validity and generalizability of the results, especially in areas that require consideration of diverse socio-economic, political, and cultural contexts.
5. **Improving Methodological Rigor:** Despite its wide-spread use, there are still challenges related to the rigor of Delphi studies, particularly regarding expert selection, bias mitigation, and response attrition. Future work could focus on developing more standardized protocols for Delphi studies, ensuring consistency in the expert selection process, improving techniques to reduce response bias, and addressing issues related to the representativeness of panel members. Research could also explore strategies to reduce participant dropout rates, which can impact the robustness of the final consensus.
6. **Ethical Considerations and Transparency:** As Delphi methods become more integrated into policy-making, healthcare, and other critical areas, ethical considerations will take on greater significance. Future research may focus on ensuring transparency in the Delphi process, particularly in terms of how expert opinions are solicited, evaluated, and presented. Additionally, ethical frameworks may be developed to guide the use of Delphi in sensitive topics, such as public health crises or environmental policy, where the outcomes of consensus-building can have wide-ranging implications for society.
7. **Expanding Delphi into New Domains:** While the Delphi method has been successfully applied in many fields such as healthcare, business, and public policy, its use could expand into new domains, particularly those where expert judgment is critical but empirical data is scarce or unavailable. Potential areas include space exploration, artificial intelligence ethics, and the future of work, where long-term forecasting and consensus-building will play a key role in shaping strategies and decisions.

In conclusion, the future of the Delphi method is bright, with significant opportunities for innovation and expansion. By incorporating technological advancements, refining methodological practices, and ensuring inclusivity and ethical rigor, the Delphi method will continue to be an invaluable tool for gathering expert opinions and facilitating informed decision-making in an increasingly complex and interconnected world.

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