

## PRACTICAL APPLICATION OF THE DELPHI METHOD TO IDENTIFY KEY FACTORS OF SOCIAL CHANGE IMPLEMENTATION

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**Purpose:** The aim of the paper is to demonstrate the methodology and applicability of the Delphi method for the identification of key factors of social change implementation.

**Design/methodology/approach:** This article represents a theoretical study, based on the literature review and the authors' own research experience.

**Findings:** As a general review, this paper provides knowledge on the genesis, the genesis, possible application, principles, strengths, and weaknesses of the Delphi, as well as presents research procedure of this technique.

**Practical implications:** The application of the Delphi method allows scientific evidence to be translated into the planning and implementation of effective public policies. An elementary requirement of rationality in public policymaking is the use of logical and fact-based justification. Nevertheless, referring to facts requires clarification, which is what they are called, i.e., finding out what results of observation or analysis of a given phenomenon will be useful. Thus, a rational basis for the actions of public authorities can be formulated. The application of the Delphi method allows scientific evidence to be translated into the planning and implementation of effective public policies.

**Social implications:** The use of the Delphi method to support decision-making processes during the selection of objectives or the way in which they are implemented in public policies contributes to a better spending of the cohesion policy funds. It is also important to underline the frequent use of the Delphi method for the evaluation of financial allocations within specific programming periods in the European Union and the importance of this process for the effective management of public funds.

**Originality/value:** The main contribution of this article is a detailed description of the research procedure using the Delphi method. The article is addressed to researchers in the field of public management sciences who are looking for original research methods as well as to policymakers seeking a rational and evidence-based basis for decision-making.

**Keywords:** methodology, Delphi method, public management, public policy.

**Category of the paper:** General review.

## 1. Introduction

Social change is any significant change in social structures, norms and customs, social institutions, social roles, and the values that determine people's actions, life plans, and worldviews. Social change can be considered a revolution, evolution, or modernization. It may follow a gradual emergence of changes in society (in the social system), taking place in stages. In the study of social phenomena, including change associated with the functioning of social systems related to the provision of public services, the contextual determinants of social processes should be sought. Defining reliable findings on the context in which the phenomenon of social change takes place is a major challenge for the researcher, as in social systems both the problem and the corresponding solution emerge gradually. Hence, the need to search for a new, or rather, dust off and restore the old research technique, because inductive approaches and qualitative methods contributed significantly to the construction of organisation and management theory a century ago (Czakon, 2009). Also, the combination of approaches typical for different disciplines is no longer regarded as reprehensible and subject to environmental ostracism but is gaining a growing group of supporters. What is even more obvious is that the more we give our approval to the statement 'people build their worlds, construct their institutions (society), and knowledge is socially constructed', the greater our tendency to strive for cognition to be close to the ideal, thus we make it by multiple methods (Czarniawska, 2010, p. 14). Czarniawska (2010) strongly valorises the notion of 'constructing' and encourages to consider the usefulness for the discipline of management science of research carried out in the regime of constructivism. We can now see constructivism as a fractious method of studying, among other things, organizations, and their lives because humans are social beings, and their creations include organisations as well. Such a statement encourages to consider it true that the cognition made by the researcher should be more social. This statement corresponds to the assumptions adopted for constructivism that an individual's knowledge is the result of his or her active action and is therefore a construction created by the learning subject; the acquisition of knowledge is a process during which the individual organises his or her world; this process takes place in constant interaction with the environment and confrontation with oneself to result in the reconstruction of one's own image of the world. This creative search for the context in which change takes place can be facilitated by, among other things, using the Delphic method, which is demanding, but at the same time offers a chance to gain a deep insight into the conditions in which a social phenomenon occurs.

The purpose of this paper is the detailed description of the research procedure using the Delphi method in the social science. It contributes both to the public management theory, as well as practice of public policy making processes, offering the evidence-based approach to the management of public organizations and the design of public policies towards social change.

## **2. Genesis, application, characteristics, and principles of the Delphi method**

The Delphi method is a commonly accepted exploratory research approach (Kraus et al., 2017). Also known as the expert method, it is one of the intuitive heuristic methods (Sudoł, 2016) and is a special process of systematically agreeing on expert opinions (Linstone, Turoff, 2002). As a social and political research technique, it is used to generate consensus among experts dealing with complex issues (Robertson et al., 2017; Profillidis, Botzoris, 2019).

The genesis of this method is to be found in the shortcomings of traditional forecasting methods in areas where precise scientific knowledge had not yet been established. The Delphi method was developed at the beginning of the Cold War as a result of attempts to predict the impact of technology on warfare. In the 1950s, mathematicians N. Dalkey and O. Helmer, employed by the US research organisation RAND Corporation, introduced surveys of individual opinions based on multiple repetitions with feedback from the results of a previous survey. The aim was to make long-term predictions about the future. This gave rise to the Delphi method. The name 'Delphi' was invented by A. Kaplan, a qualified philosopher also employed by the RAND Corporation (Taghipoorreynh, 2023).

The Delphi technique was initially used in foresight projects (Dalkey, Helmer, 1963). Nevertheless, Sudoł (2016) indicates that limiting this method to forecasting the future is an unjustified narrowing due to its universal character and important insight into the analysed problem. The scope of the Delphi method can be much wider, and it can be successfully applied to study existing reality (Delbecq, Van de Ven, Gustafson, 1975). Indeed, as Flostrand (2017, p. 230) indicates, 'the Delphi technique has been used to poll and aggregate information from experts in a number of management disciplines'. Also, Okoli and Pwalowski (2004, p. 16) highlight that 'researchers have applied the Delphi method to a wide variety of situations'.

In this regard, the possibility of using the Delphi method for the development of social science in the discipline of management science is increasingly being pointed out in the literature, mentioned by Sudoł (2016), Landeta (2006), Matejun (2012) and Baron et al. (2015).

The Delphi technique, based on the rationale that ‘two heads are better than one’ (Dalkey, Brown, Cochran, 1969), ‘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’ (Linstone, Turoff, 1975, p. 3), characterized by dependence on many factors that are difficult to quantify (Sudoł, 2016). The Delphi method is especially ‘used to establish a highly qualitative solution to a specific issue where no exact knowledge currently exists’ (Kraus et al., 2017). Consequently, ‘this allowed new ideas to emerge, founded on the knowledge pooled from panelists’ expertise, and ensured that all views were actively engaged’ (Toumbourou, 2020, p. 2).

The Delphi method is a series of questionnaires, where subsequent questionnaire is built upon responses to the preceding questionnaire (dell’Olio et al., 2018). Therefore, experts can consider and revise their views after analysing the feedback reports summarising the views of other panellists. The aim is to obtain the most reliable consensus of the expert panel (Naisola-Ruiter, 2022)

The Delphi method must meet the following four criteria (Borodako, 2009; Landeta, 2006; Landeta, Barrutia, 2011):

- **Anonymity.** The experts remain anonymous. The members of the expert panel are known by the study moderator, but they do not know each other, and the individual responses of participants are known directly only to the research coordinator.
- **Repetitive of the process.** The experts must be consulted at least twice on the same question, so that they can revise their views, aided by the information they receive from the rest of the panellists. The data from the previous round are used to create the subsequent round.
- **Controlled feedback.** The exchange of information between the experts is carried out by means of a study moderator, controlling the quantity and quality of the feedback, so that all irrelevant information is eliminated.
- **Statistical analysis.** The questions are formulated so that the answers can be processed quantitatively and statistically. It is done by appropriately quantifying the qualitative responses given by experts to the questionnaire questions. The responses are then analysed statistically using measures of central tendency – median, quartiles, arithmetic mean, dominant, and measures of dispersion – primarily standard deviation. Respondents are informed after each round about the statistics of each questionnaire item, so that they have the opportunity to compare their own position with the group and to change their own view.

The literature points to several advantages as well as disadvantages of the Delphi method (Table 1).

**Table 1.***Advantages and disadvantages of the Delphi method*

Advantages	Disadvantages
<ul style="list-style-type: none"> <li>• Flexible methodology and simple execution.</li> <li>• Anonymity eliminates disadvantageous group phenomena – prevents domination by certain individuals, removes the sense of danger associated with confronting one's own position with the opinion of others, guarantees full honesty of respondents and eliminates the influence of the social group on opinions.</li> <li>• Reduction in the influence of undesirable psychological effects among the participants.</li> <li>• Independence of expert opinion.</li> <li>• Fosters a climate of exploration, creativity and self-development among participants.</li> <li>• Selective feedback of the relevant information.</li> <li>• Extensive consideration thanks to the repetition.</li> <li>• Possibility of reaching a consensus in a specific area of uncertainty or in the absence of empirical evidence.</li> <li>• Possibility of remote communication – the ability to participate regardless of the space separating individual respondents from each other or from the moderator.</li> <li>• Reconciliation and aggregation the opinions of competent persons.</li> <li>• Creating multidisciplinary synergies.</li> <li>• Exploit of the creative synergies resulting the combination of effort and knowledge of experts in the area where no exact knowledge currently exists.</li> <li>• Use of an iterative mechanism for collective learning and drawing conclusions.</li> <li>• Multi-stage approach eliminates elements of participants' preconceptions that may distort the reality of the issue described – gives more and more objective results with each round.</li> <li>• Statistical processing and presentation of results.</li> </ul>	<ul style="list-style-type: none"> <li>• Ease inherent in the methodology of interested manipulation by the person running the study.</li> <li>• Significant dependence of the results on the selection of experts and on the quality and design of the questionnaire.</li> <li>• Time required to carry it out – relatively long period for obtaining results.</li> <li>• High organisational requirements.</li> <li>• Effort required on the part of the participants.</li> <li>• Difficulty in selecting experts.</li> <li>• Lack of clear rules for the inclusion of persons in the expert panel and its optimal size.</li> <li>• Difficulty of actually assessing the expertise of the panel participants.</li> <li>• Little involvement of experts if they are not introduced to the details of the study.</li> <li>• Limitation of the interaction involved in written and controlled feedback – lack of opportunity for a direct exchange of views between participants.</li> <li>• Restriction to the possibility of social compensation for individual contribution to the group (the reinforcement and motivation normally provided by the support and social approval of the other expert group members are removed).</li> <li>• Impunity conferred by the anonymity with respect to irresponsible actions on the part of the experts.</li> <li>• Use of consensus as a way to approach the truth, while consensus is defined by study's moderator</li> <li>• Difficulty to normalise, objectify and standardise it, given the qualitative features.</li> <li>• Lack of validation.</li> <li>• Difficulty of checking the method's accuracy and reliability.</li> <li>• Sensitivity of results to ambiguity.</li> </ul>

Source: Delbecq, Van de Ven, Gustafson (1975); Flostrand (2017); Górski, Skorupka (2011); Landeta (2006); Matejun (2012); Pritchard (2002); Taghipoorreyneh (2023).

In despite of these weaknesses, results for the application of the Delphi method are mostly positive (cf. Cleemput et al., 2015; Landeta, 2006; Wiewiora et al., 2016). 'On the other hand, we have observed that, when this method is used without the required knowledge, the characteristics inherent in the methodology usually result, on occasion, in a certain „disappointment" with the technique, both among researchers running a Delphi exercise for the first time as well as in those who take part as experts in this research' (Landeta, 2006, p. 469). Thus, the use of this method requires good understanding and conscientious preparation, followed by a lot of work and effort involved in its execution.

### 3. The Delphi method research procedure

In the Delphi approach 2 to 4 rounds are considered optimal, while expert groups typically reach broad consensus after 3 rounds (Flostrand, 2007; Sudoł, 2016). The experience of other researchers shows that in the third and subsequent rounds, the results of the survey do not change substantially from round two (Kowalewska, Głuszyński, 2009). In the described research, three rounds were conducted.

To ensure the relevance and accuracy of the results, a rigorous selection of experts is necessary in the Delphi method (Landeta, 2006; Toumbourou, 2020). In a typical procedure the emphasis is on expertise rather than on statistical representation, thus a convenience sample of experts is used (Flostrand, 2017). The definition of expert in the Delphi approach has been constantly expanded. There is a growing trend in the application of the Delphi method to involve a wide variety of stakeholders (in terms of education, occupations, and experience) in the belief that a multiplicity of perspectives is a valuable asset. Individuals who have knowledge of the subject of the study are invited to participate, although this does not necessarily have to be documented by formal education or achievements in this field (UNIDO, 2005). Delphi generally targets experts with diverse backgrounds, rather than using a homogeneous panel of experts (Linstone, Turoff, 2002; Wiewiora et al., 2016).

The size of the respondent panel is variable, but usually varies between 20 and 30 experts (Sekayi, Kennedy, 2017). According to Pawłowski (2010), a minimum of 25 experts must participate in each survey round.

Then, as Delbecq, Van de Ven and Gustafson (1975) argued, alongside with the selection of experts, development of the Delphi questionnaire is the key. The Delphi questions might focus upon problems, objectives, solutions, or forecasts. If respondents do not understand the purpose or particular questions, they may answer inappropriately or become frustrated with the questionnaire and lose interest. In the questionnaire applied to identify factors of social change implementation, Likert scale may be adapted (Elliott, Woodward, 2007). The questionnaire included then statements on the proposed factors and experts are asked to assess the importance of each factor. The 5-point rating scale is used: 1 – very low importance, 2 – low importance, 3 – medium importance, 4 – high importance, 5 – very high importance.

Since the Delphi method is a series of consecutive questionnaires and entire research procedure remains anonymous (Kraus et al., 2017), the distribution of questionnaires is necessary. In the classic version, the questionnaires were transmitted through the mails (Linstone, Turoff, 1975). Nowadays, traditional mail has been replaced by e-mail or online instruments (Cleemput et al., 2015; Grant, Armstrong, Khodyakov, 2021; Kraus et al., 2017; Northcote et al., 2008).

It is generally accepted (see Delbecq, Van de Ven, Gustafson, 1975; Hill, Fowles, 1975; Matejun, 2012) that the three-rounds Delphi method consists of ten stages:

- 1) Conceptual phase – development of the questionnaire.
- 2) Selection and contact with potential experts, determining the conditions for participation in the study and compiling the final list of experts.
- 3) Selection of the sample size.
- 4) Distribution of Questionnaire #1, forming preliminary positions by the experts and returning the questionnaire.
- 5) Analysis of Questionnaire #1 with the use of statistical tools and development of the subsequent questionnaire.
- 6) Distribution of Questionnaire #2. The experts take *getting acquainted with* the combined results, reflect on these and can alter their judgements. Respondents return the questionnaire.
- 7) Analysis of Questionnaire #2 with the use of statistical tools and development of the last questionnaire.
- 8) Distribution of Questionnaire #3. The experts *getting acquainted with* the combined results, reflect on these and can alter their judgements. Respondents return the questionnaire.
- 9) Analysis of Questionnaire #3 with the use of statistical tools and formulation of conclusions.
- 10) Preparation of final report.

In order to determine whether the consensus between expert opinions have been reached, the interquartile range (IQR) can be applied. The aim of the Delphi method is to narrow down it during subsequent rounds of study. In addition, the median (M) is calculated (Mullen 2003; Pawłowski, 2010). IQR comprise 50% of all measured values of a variable and is located between quartile 1 (Q1) and quartile 3 (Q3). The interquartile range tells the spread of the middle half of distribution The median is the value in the middle of a data set (Ross, 2010).

When the scale from 1 to 5 is adopted, the consensus can be defined as IQR between 3.5 (Q1) and 5 (Q3). This means that the factors whose importance ratings are agreed by the experts between 3.5 and 5, are considered key factors in of social change implementation.

#### **4. Application of the Delphi method in the identification of key factors of social change implementation**

The Delphi method is especially useful in the identification of key factors of social change implementation for several reasons. First, because of its anonymity reduces the influence of disadvantageous and undesirable psychological effects among the participants (Landeta, 2006).

The anonymity prevents domination by certain individuals (Kraus et al., 2017), allows to avoid the negative influence that could be exercised by factors in the individual answers in terms of the personality and status of the participating experts (Landeta, 2006), removes the sense of fear of authority and danger associated with confronting one's own position with the opinion of others, guarantees full honesty of respondents and eliminates the influence of the social group on opinions (including group think syndrome). In an atmosphere of anonymity, respondents can become authentic and engaged participants in the discussion. They have the chance to feel equal to the other members of the expert panel, free from the influence of the group, and are therefore willing to address topics relevant to themselves. Furthermore, they have the confidence that by changing their own answers in the next Delphi round they will 'not lose face' (cf. Mullen, 2003).

Second, given that Delphi does not require face-to-face contact, it is useful for involving experts who cannot come together physically (personally), or it would be difficult (Sekayi, Kennedy, 2017). In the carried out study, it would be particularly difficult to bring together such a large and diverse group of experts, and to bring the discussion under control. Moreover, because participants receive the questionnaire, they have longer timeframe to answer and freedom/ discretion as to when exactly they do it (Okoli, Pawlowski, 2004).

Third, the Delphi method enable the exploit of the creative synergies resulting from the combination of effort and knowledge of experts in the area where no exact knowledge currently exists. The application of this method allows the use of an iterative mechanism for collective learning and drawing conclusions (Matejun, 2012). The Delphi makes use of consensus instead of focusing on differences between opinions. Participants are able to alter their opinion and adapt their views by having more time to overview their prior answers and reflect on these. Moreover, the Delphi technique obtains a high degree of effectiveness in regard to the accuracy of results because it allows for successive rounds of judgments to be sought and then clarifies (Dalkey, Helmer, 1963; dell'Olio, 2018).

Similarly, Kraus et al. (2017) indicate that Delphi technique has advantages over other qualitative methods which seek to gather expert opinion in issues concerning social change and public policies. The cited authors point to three advantages of this method. First, the approach is based on anonymity. Second, the participants do not have a fixed timetable regarding when the discussion will take place, but they have a longer timeframe to answer its respective questions. Third, the Delphi method obtains a high degree of effectiveness regarding the accuracy of judgments. The participants can alter their opinion and may adapt their views by having more time to review their previous answers and reflect on these.

In turn, Wiewiora et al. (2016, p. 492) in the study of the public services provision process, selected the Delphi method *as an appropriate technique to gain a better understanding of infrastructure-based public service delivery concerning the involvement of key actors in that process*. They argue that using this technique allowed capture the opposing views of experts across various management organizational, disciplinary and sectoral arenas to eventually obtain an agreement on important public policy issues (Wiewiora et al., 2016)



The applications of the Delphi method in social science, as Landeta (2006, p. 472) emphasizes, *highlight how this technique may be adapted to different social realities and requirements, making a positive contribution to social progress, provided it is applied with the necessary methodological rigour and with a good knowledge of the social medium in which it is being applied.* Therefore, this approach can be successfully used to support decision-making processes during the selection of objectives or the way in which they are implemented in public policies.

## 5. Summary

In conclusion, the value of the Delphi method for identifying the conditions for implementing new solutions in planned changes to public policies should be emphasized. Public policies are activities aimed at solving the problems of a community related to the provision of public goods, where the ultimate aim should be rational decision-making. The stages of this process are (1) recognition of conditions (facts), (2) selection of objectives (in the context of the recognised facts and in the light of the values of the decision-maker), (3) adjustment of measures to the objectives, (4) implementation, and (5) evaluation of the results obtained. An elementary requirement of rationality in public policymaking is the use of logical and fact-based justification. Nevertheless, referring to facts requires clarification, which is what they are called, i.e., finding out what results of observation or analysis of a given phenomenon will be useful. Thus, a rational basis for the actions of public authorities can be formulated. The application of the Delphi method allows scientific evidence to be translated into the planning and implementation of effective public policies. However, this depends on the simultaneous fulfilment of several conditions. First, the problem has a clear scientific explanation. Second, its causes are reliably identified. Third, the selection of experts for the expert panels is correct so they have the knowledge and experience necessary to generalize the observed phenomena. Finally, it should be stressed that although it is currently a fashionable method used especially for the evaluation of the disbursement of aid available under the cohesion policy, it is a method that requires reliable research skills and considerable professional knowledge.

While this paper offers some directions and strategies for public managers and policymakers seeking a rational and evidence-based basis for decision-making, there are also several limitations. Firstly, the article constitutes a general overview and represents a theoretical study based on the literature review and the authors' own research experience, which may interfere with scientific objectivity. Secondly, the traditional literature review, which is not systematic, has been conducted. Therefore, not all key publications may have been cited.

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