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Implications of Using the Delphi Method in Forecasting Threats to International Security Based on Security, Political, and International Relations Studies

Introduction

The Delphi method is considered one of the most effective forecasting methods, as evidenced by its widespread use by public and private institutions, including NATO[1]. Its undoubted advantage is high effectiveness resulting from its qualitative, not quantitative, character, which is, on the one hand, very precise, but, on the other hand, not taking into account variables, which researchers may not have known about, negatively affects the final result[2]. For

[1] Here are examples of selected large supranational organisations using various forecasting methods, with particular emphasis on different variations of the Delphi method: NATO: https://www.act.nato.int/futures-work; SHELL: https://www.shell.com/energy-and-innovation/the-energy-future/scenarios.html; EY: https://www.ey.com/en_gl/alliances/microsoft/intelligent-forecasting; Goldman Sachs: https://www.goldmansachs.com/insights/topics/economic-outlooks.html

[2] J. W. Creswell, *Projektowanie badań naukowych, Metody jakościowe, ilościowe i mieszane*. Wydawnictwo Uniwersytetu Jagiellońskiego, Kraków 2013, p. 161–187.

example, trend models are excellent at forecasting changes in quantitative data in a relatively short time (the longer the perspective, the greater the risk of error because the risk of the appearance of previously unknown, thus not considered, variables increases)[3]. The Delphi method includes processing the knowledge and experience of many experts in a given field and ultimately obtaining an average final result consistent with all or the vast majority of them. It is worth remembering that the human mind, in the perceptual and decision-making process shaped over millions of years, calculates many variables, most of which remain processed outside the human consciousness[4]. In other words, an expert develops a forecast based on his knowledge and experience, making every effort to fulfil this task as reliably as possible with the data he knows. However, in practice, he will usually not be aware that his mind has included in the forecast a much larger number of variables (even in the final result) remaining outside his consciousness.

In conclusion, this is the advantage of information processing by the human mind over the processing of strictly selected quantitative variables by a computer. Even modern artificial intelligence systems cannot dynamically expand the catalogue of variables (including predicting variables that may yet arise), focusing on the extremely complex and meticulous processing of variables entered from the beginning by programmers[5]. It does not exclude progress in this area in the future. However, at the current stage of technological development, quantitative methods supported by artificial intelligence programs will be phenomenal, but in short-term forecasting. On the other hand, despite the lack of awareness of all variables calculated by their minds, people will be able to forecast with sufficiently high efficiency in the medium- and even long-term (assuming the prior acquisition of sufficiently extensive expert knowledge).

Forecasting Using the Delphi Method and Quantitative Methods

The Delphi method belongs to a special type of methods of forecasting phenomena and events that may occur in the future, either or not, caused by human activity. The key is the source of information to be examined, i.e., the knowledge of recognised experts. Based on

[3] Cieślak, M. (Ed.). *Prognozowanie gospodarcze. Metody i zastosowanie*. Wydawnictwo Naukowe PWN, Warszawa 2011.

[4] D. Kahneman. *Pułapki myślenia*. Media Rodzina, 2012, p. 29–138.

[5] R. Kurzweil. *Jak stworzyć umysł, Sekrety ludzkich myśli ujawnione*. Studio Astropsychologii**,** Białystok 2012, p. 59–265

external premises, selected persons (as part of the Delphi method, it is the investigators who independently identify people with such knowledge in the subject of cognition) can be recognised as experts regardless of their titles, positions, or degrees[6]. The key is the selection of people whose achievements and recognition of their achievements in the subject matter covered by the study do not raise doubts. Therefore, this elite group may include scientists, journalists, experts employed at public and non-governmental institutions, as well as hobbyists, if only based on external opinion or information disseminated by them it will be possible to state unequivocally that these people have highly professional knowledge in a given field. Therefore, research investigators should be competent (for example, educated through a literature review) to select experts accurately to participate in the study. The next step is to develop questions to make the expected forecast[7]. At this stage of research, based on the accumulated knowledge, questions can be asked, or a preliminary study can be carried out, the purpose of which will be to determine during interviews (usually non-standardised and unstructured[8]) the development of questions that will be asked to all experts. The number of the latter should be representative of the expert community in a given field, which means that it should include all people with professional knowledge and represent all possible approaches to a given issue, not to omit experts with a different perspective, thus contributing to the risk of losing an objective view of research and conclusions. In a quantitative study, it would be important how many people express a given view, while in a qualitative study, the number of views is more important, not the number of people who express these views[9].

The next stage includes sending questions by correspondence to experts. In this case, it allows for providing thoughtful and extensive answers, which, due to the qualitative nature of the study, is particularly important for the final result[10]. The advantage of the correspondence formula of asking questions is that the experts maintain anonymity, which excludes exerting influence between them and even the by person researching them – which could happen during a direct conversation. An expert conducting conversations with individual experts over time would gain more knowledge and involuntarily assimilate the perspective of the people with whom he talked. That, in turn, could lead to a significant cognitive bias, which should be ruled

[6] A. F. Jorm. Using the Delphi expert consensus method in mental health research. *Psychiatry, 49*. 2015.

[7] M. Wyrzykowski, *Metoda delficka,* 24.11.2022. https://ptsp.pl/metoda-delficka (20.08.2023)

[8] B. Glinka, & W. Czakon. *Podstawy badań jakościowych*. PWE, Warszawa 2021, pp. 101–104.

[9] E. Babbie. *Badania społeczne w praktyce*. PWN, Warszawa 2005, pp. 200–239.

[10] M. Wyrzykowski, *Metoda…*, op. cit.

out to objectify the results[11]. Experts who have no contact with each other and deal only with the interview questionnaire, provide as comprehensive and independent answers as possible. Then, after collecting all completed questionnaires, the investigators can proceed using theoretical methods to process them (such as analysis, comparison, and synthesis[12]). Ultimately, they receive a complete picture of the knowledge of experts in the subject of cognition and can distinguish content that is similar or different from those recognised by most experts.

For example, if one asks experts how the international situation around a selected armed conflict may develop over the months, many will probably have similar views (possibly differing in details), while individual people subjected to the study may express views contrary to the majority, but not necessarily less interesting or unjustified. The investigators' role is to exclude the least likely versions but maintain the full independence of experts in formulating their opinions. Therefore, the next stage consists in arranging new questions about previously given answers in a way to eliminate the doubts that have arisen (e.g., in the form of several parallel but completely inconsistent scenarios of the situation's development). The questions will allow experts to delve deeper into the subject of knowledge and give more detailed and comprehensive substantive statements[13]. It may then happen that by analysing the issue and providing answers, experts will conclude that the approach presented during the first round of questions was wrong because it was based on flawed assumptions (methodological, substantive, etc.). They will then verify their answers spontaneously. Another possibility is that the investigators will notice gaps in knowledge or the train of thought adopted by the others, which will allow them to ask another series of questions to cease growing doubts or verify the credibility of the previous answers. Repeating questions will continue until answers are obtained that do not raise any substantive or methodological doubts. It may also happen that several forecasts of the situation's development will emerge from the study based on forecasted variables that may yet appear, although each scenario allows for the emergence of other variables[14]. Assuming that the forecasts' substantive and methodological bases are appropriate, the investigators may be tempted to assess the verifiability of a given forecast by finally

[11] J. Zieliński. *Metodologia pracy naukowej*. ASPRA-JR. Warszawa 2012, pp. 20–24.

[12] The analysis serves to identify individual content in the answers of key importance in relation to the subject of cognition, comparison of the sum of these contents and identification of similarities and differences, and synthesis: the condensation of the obtained results to comprehensive content common to all experts subjected to the study – content that is similar or different from those recognised by the majority of respondents (Frankfort-Nachmias & Nachmias, 2001, pp. 350–367).

[13] A. F. Jorm. Using the Delphi expert consensus…, op. cit.

[14] M. Sułek. *Prognozowanie i symulacje międzynarodowe*. SCHOLAR, Warszawa 2010, pp. 186–195.

formulating conclusions and indicating these few forecasts along with an appropriate assessment of the possibility of their fulfilment.

Difference between Data Processing Methodology in Qualitative and Quantitative Research

The key difference between qualitative and quantitative research is the adopted methodology of data processing[15]. The results can be presented in qualitative (descriptive) and quantitative forms based on expert answers and answers provided as part of the survey. The former offers the opportunity to present the results in a much wider, multifaceted, and multithreaded spectrum. For example, by providing answers in a descriptive form, various possible interpretations of the obtained answers can be presented, including content resulting indirectly from the provided answers (e.g., using tools typical for sociological, pedagogical, anthropological, economic, or psychological sciences). In the case of the latter (quantitative) form, the cognitive effort put into formulating the answer is limited only to facts expressed in the form of numbers[16]. Therefore, it does not allow for any interpretation beyond the spectrum of the substantive scope of the subject of cognition adopted in the quantitative approach. At the same time, qualitative research, or rather processing the acquired data, hides a greater risk of error than quantitative data[17]. In the case of the latter, the risk consists mainly in not taking into account some variables, which will negatively affect the reliability of the final result, and not in an over-interpretation of the results. It is worth remembering that this interpretation should also fit into a strictly defined methodological framework, but it will always be burdened with a greater or lesser risk when formulating conclusions[18].

The Delphi Method and the Possibilities of Data Processing by Experts

In data processing and concluding, there is a weakness and a strength of any qualitative research. Allowing for a more far-reaching interpretation of the results, the burden of proof lies on the possibilities of human perception, accepted models of reasoning (human perceptual and decision-making process), the intricacies of which no one understands[19]. Referring to the

[15] E. Babbie. *Badania…*, op. cit., pp. 48–50.

[16] Ch. Frankfort-Nachmias, & D. Nachmias, *Metody badawcze w naukach społecznych*. Zysk S-ka, Poznań 2001, pp. 490–514.

[17] Silverman, D.. *Prowadzenie badan jakościowych*. PWN. Warszawa 2011, pp. 27–38.

[18] J. W. Creswell, *Projektowanie badań… op. cit.,* p. 189–210.

[19] D. Kahneman. *Pułapki myślenia…, op. cit., p. 70–121.*

comparison to artificial intelligence, it is similar to a situation in which processing the collected data and formulating the final results was entrusted to an extremely advanced system of biological intelligence, which had been developing independently for several decades (in the body of a given individual) from an early stage, remaining beyond the control of "programmers" whose role was to upload only basic data processing algorithms (codes functioning in the individual's DNA). During its development, this system has been creating its own data processing algorithms for some time, and independently acquiring further data to improve them. As a result, from a specific, early moment, none of the developers of the basic software was able to understand, let alone explain, based on which algorithms this program works after several decades of continuous collection of information and autonomous development of algorithms[20]. At the same time, this program accumulated a huge amount of knowledge, and processed and formulated a specific result. The same observation applies to the human brain, which operates based on self-created algorithms that no one knows, including the "user" of this most advanced biological computer on the planet[21]. It does not mean that this result will be wrong. Given the powerful knowledge base, it should rather be assumed that the developed result will contain numerous variables that the person would not even be able to indicate. Thus, the formulated forecast will be written consciously, but at the same time, its content will be determined subconsciously by a huge amount of data and variables stored in the expert's memory[22]. It is also the advantage of qualitative methods over quantitative ones in relation to medium- and long-term forecasts. In the case of short-term forecasts, processing quantitative data and variables of which the forecasters are fully aware should be sufficient and the whole process very clear. Therefore, in the case of qualitative data, the possibility of actually reviewing the entire data processing in the medium- and the long-term forecast seems to be very limited.

Conclusions

In conclusion, using the Delphi method in forecasting threats to international security is characterised by a long tradition, conditioned by its high effectiveness, especially with regard

[20] Ch. Duhigg, *Siła nawyku*. PWN. Warszawa 2014, p. 29–141.

[21] R. Kurzweil. *Jak stworzyć umysł…, op. cit., p. 239–263.*

[22] J, LeDoux, *Historia naszej świadomości*. Copernicus Center Press, 2021, pp. 313–400

to medium- and long-term forecasts. Forecasting based on quantitative data can only be ancillary in this respect, optionally explaining forecasts made with qualitative research. The Delphi method's potential is the possibility of relatively clear (although not fully, because it is impossible at the current level of scientific development) forecasting phenomena and events that may occur by considering a much larger number of variables than in quantitative research/forecasts. Therefore, as long as the human brain is more efficient in this respect than computers (namely artificial intelligence programs based on these technologies), the Delphi method will be statistically more effective than quantitative forecasting based on existing computer systems. Simultaneously, it is worth remembering that technological development accelerates every year. At some point, it may turn out that self-learning artificial intelligence programs based on new quantum technologies (and perhaps carbon ones) will prove more efficient and economical than this method based on the knowledge processed by people and their personal experience.

Streszczenie:

Bezpieczeństwo międzynarodowe jest szczególnym obszarem badań, który może być przedmiotem dociekań przedstawicieli nauk o bezpieczeństwie, polityce i stosunkach międzynarodowych. Każda z tych dyscyplin dysponuje własną metodologią, a niektóre z wykorzystywanych w tychże metod, technik i narzędzi nabrały cech odpowiadających specyfice poszczególnych dyscyplin. Tym samym próba zbadania możliwości prawidłowego i w efekcie efektywnego wykorzystania tzw. metody delfickiej wydaje się uzasadniona, biorąc pod uwagę genezę i charakterystykę tej metody/techniki. W artykule podjęto próbę odpowiedzi na pytanie ilustrujące problem badawczy: Dlaczego metoda delficka jako metoda jakościowa jest częściej stosowana w prognozowaniu międzynarodowym, niż metody ilościowe? W celu uzyskania odpowiedzi na to pytanie posłużono się przeglądem literatury oraz teoretycznymi metodami takimi jak: analiza, porównanie i synteza, a także techniką dedukcji celem opracowania wniosków końcowych. Metoda delficka cieszy się niesłabnącą popularnością wśród organizacji publicznych i pozarządowych zajmujących się prognozowaniem, a problem badawczy dotyczył ustalenia przyczyn tego stanu rzeczy.

Słowa kluczowe:

Metodologia, metoda badawcza, technika badawcza, metoda delficka, prognozowanie

Keywords:

Methodology, research method, research technique, Delphi method, forecasting

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