

Popularising Delphi method

Developing an instrument to control technological change for employees

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Abstract. The article reports on a methodical part of a combined substantive and methodical investigation experimenting with a new type of Policy Delphi method. The common problem defined for both parts was the question whether Delphi method could be transformed in an instrument of controlling technological change by employees. The question was answered positively by the participating (bank) employees, all union members engaged with an automatisa-tion project, themselves. Self rating scales, an evaluation questionnaire and numerous data collected about the research process showed that the most relevant social categories of partici-pants managed to serve as “experts” according to the high levels of cognition, effort, involve-ment and self-confidence required in a Delphi research project. Participants with low job level, women and non-trained union members joined in very well. The special steps required to broaden a successful participation of all categories, particular methods and techniques of information transmitting questioning and reporting, did not violate the quality of scientifically valid information gathering. So the result was a practical and scientific instrument.

1. Five myths about Delphi method

A number of myths about Delphi method prevail. First, some people still think it is foremost a method of forecasting the future by a panel of experts. However, in the last ten years this traditional application has almost certainly been surpassed by policy-oriented uses for present-day problems in applied social research. As a communicative method on the subjective base of norms and opinions it is particularly suited to this type of research.¹ Delphi method is tied for time, not necessarily for the future.

The second myth holds that the primary aim in this method is to reach a common opinion among experts. Such a common opinion cannot be pre-supposed or reached in many settings of applied social research. In these cases decisions according to authority of majority rule prevail.

A third myth is that Delphi method always uses mail questionnaires. Although the reports of intermediary results should be written in some way (on paper or screen), it is certainly practicable, and increasingly so, to apply oral techniques (individual and group interviews).

A fourth myth is usually linked to the former: the members of the Delphi-panel participate at a distance and in an anonymous way. Of course, the existence of the so called "realtime Delphi" in conference settings besides the "conventional Delphi" has been known at least since the appearance of the standard textbook of Linstone and Turoff.² But most people are not aware that in many applications of the conventional Delphi method participants also meet, albeit on other occasions, and know of their participation. Although the source of a particular response is kept anonymous in almost every case of Delphi research, it can be traced by participants then, especially if the panel is small.

The last myth on Delphi method mentioned here is that the participants should be experts. This article shows that this is not necessarily the case. It reports on a Delphi project breaking with all these myths. It was clearly an example of a Policy Delphi in applied social research. Decisions were reached not through agreement and concensus, but by revealing and even promoting differences (of opinions) for the purpose of well-informed majority rule. Mail questionnaires, individual and group interviews were used in equal amounts and quasi-experimentally assigned to the respondents for purposes of methodical research. As some members of the panel met each other in group interviews or beyond the context of the project, participation was only partly anonymous. Finally the participants were only experts in such a broad sense that the project could be called an attempt to popularise Delphi method, broadening its scope of application while trying to safeguard its scientific status.

2. A substantive and a methodical investigation

The reported Delphi, called "Open Bank Project ABN", was a combination of a substantive and a methodical investigation. The common problem defined for both was the question whether Delphi method could be transformed into an instrument of controlling technological change by employees. It is questionable whether managers of industrial, commercial or governmental organisations really get a hold on the technological "revolution" presently going on in industrial states. It is certain that employees and their unions or other representatives do not manage to do this. Most often they receive late and insufficient information on technological plans. They are not stimulated to be concerned with these plans, so they will not acquire enough technical and organisational knowledge to have a say in them or ask for information in time themselves. A vicious circle. This Delphi project was an attempt to break this circle at the link of "knowledge". Would it be possible

for plain employees, in a certain way “experts” on their own work, to become experts in more general strategic matters participating in a Delphi, that is to say to become able to discuss these matters with management by way of their representatives?

The investigation was conducted at the ABN, the largest commercial bank in Holland, among a hundred members of the union of commercial workers, *Dienstenbond FNV*. It lasted from May 1986 to July 1987. The problematic subject matter was the introduction of a largescale automation of bank work by an all-embracing information network called “Open Bank Project” (OBP). All employees in the front offices of the bank would henceforth sit at terminals right in front of customers (“Open Bank”) with on-line connection to central computers. The consequences of this massive computerisation of bank work for the quantity and quality of work were estimated to be far-reaching. However, the regional groups of FNV-union members at this bank did not know what was at stake exactly, let alone what to do about it. Therefore the general formulation of a research problem was achieved very quickly: what is the best strategy (goals and means/demands) for the union with regards to the OBP on the themes of (A) information, (B) quantity of work, (C) quality of work, (D) training and (E) consultation (of employees by managers). Later these themes were filled in with dozens of subthemes.

So the first goal of the investigation was action- or decision-oriented. The second one was a means for this: learning about the subject matter. The third goal was publicity of the results among other union members and employees not participating in the research project. The investigator could easily convince the groups of active union members concerned that a special type of Delphi method would serve as the best instrument to attain all of these goals.

If necessary, this method would have to be accompanied by so-called “input research” into the Delphi process. Unfortunately it is often forgotten that the results of Delphi research are *not facts* but *opinions about facts*, however well informed they may be. The investigator conducted an extensive preliminary investigation resulting in the facts that formed the input of the first questionnaire. During the Delphi process he was charged twice for an evaluation research at the four offices that already worked with the new computers on an experimental basis. The employees in these offices were interviewed twice about all aspects of their daily work. The request was made by the works council ABN, a general organisation for all employees. The effort produced very concrete information which served as an input into the second and third Delphi rounds. The total design of this Delphi project can be sketched as in Fig. 1.

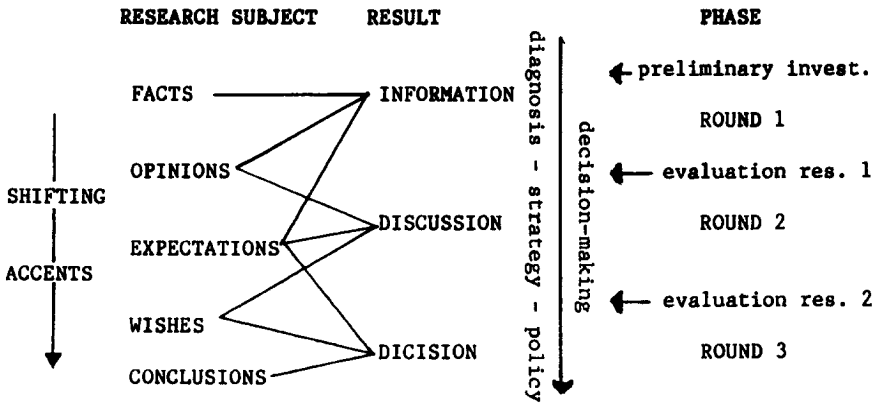


Fig. 1. Elements and structure of the Delphi design.

The time between the start of every new round was five months (2–3 months of data collection, 1–1½ months of data analysis and reporting and 1 month of evaluation research). These intermediary periods, that are rather long for a Delphi project, were responsible for a partly changing panel membership (see the subject of “drop out” below). Another reason was the admission of 12 new participants in the second round. The total panel-membership number moved from 90 (Round 1) to 101 (Round 2) and 95 (Round 3). The number of participants in Round 1 was gathered in the following way. The first part of the panel was composed by (most of them trained) union members entering their names at the invitation of the union (53 members). The second part entered the panel at the request of the investigator. Some categories of union members were proportionally under-represented in the first empanelment: non-trained and female members, members in particular parts of the country. So the investigator took a random sample ($n = 125$) of only these categories on the union-membership list ($N = 877$ out of 1038 members). The response was 30% (37 members). The resulting panel had the same relative distribution on all relevant social categories as the total union membership, except for the (still overrepresented) trained membership. So union membership could only be considered as a hypothetical population in statistical tests (the membership interested in the subject and motivated to participate). This is a consequence of the selective empanelment of every Delphi project.

3. The methodical research questions

The first couple of questions of this exploratory methodical investigation were inspired by the doubt whether the participants, many of them “plain”

union members in executive jobs, would have the capacity and motivation to follow the exacting Delphi process:

- A. How well do the following categories³ of employees (all of them union members) serve as experts in a Policy Delphi about the transformation of their work by technological innovation according to the high levels of cognition, effort, involvement and self-confidence required:
- employees with low previous education compared to employees with high previous education,
 - employees in low (executive) jobs compared to employees in high (leading) jobs,
 - female employees compared to male employees,
 - non-trained union members compared to trained union members?
- B. If there appear to be differences in the levels of cognition appealed to, effort, involvement and self-confidence among these categories at the start of the project, do these differences remain during the Delphi rounds, or do they change?

The second couple of questions dealt with the consequences of a series of steps made to allow the participation of all categories concerned, that is to say to “popularise” Delphi method:

1. using individual and group interviews besides mailed questionnaires,
 2. introducing every question by a block of information (not much knowledge presupposed),
 3. posing (half) open questions and pointedly asking for amplification of answers on questions most often possessing a balanced dual structure (f.i. “for” or “against”) meant to stimulate thinking by stressing choice,
 4. employing much effort in presentation techniques for readable and understandable questionnaires and reports.
- C. Aren’t these steps turning Delphi method into an information-*transmitting*, that is possibly a directive or even a manipulative method, instead of an information-*gathering* method?
- D. Aren’t these steps turning Delphi method into a unpracticable, that is to say very labour-intensive method for both sides (investigator and panel-members)?

Three additional methods of data collection were used for empirically supported answers on these questions:

1. Self-rating differential scales completed by the participants after every Delphi round

2. An evaluation questionnaire completed by the participants after the project
3. Secondary analysis of “no answer-” and “no opinion-” categories and the drop out in participation.

The first two methods can be called a subjective evaluation. This can be justified as most standards concern subjective phenomena and an objective standard for expertise on the subject is lacking. Anyway, the relative differences in the evaluation and the meeting of self-rated standards among the categories of participants are stressed, not the absolute levels. The results of two other methods employed yield evidence of a more “objective” nature, but they were employed to answer other research questions. Content analysis of interview and questionnaire transcripts and secondary analysis of changing patterns in answer categories during the Delphi rounds were applied to investigate a learning process possibly taking place among the participants. These extensive results will be published in another article.⁴

To make the comparisons as reliable and valid as possible in the ever-changing context of applied social research a large number of controllable factors was held constant: the homogeneous panel (members of one union, motivated to participate), the time period (2–3 months of data collection in every round), the place of the interview (the office of the participant), the questions (in individual and group interviews, mailed questionnaires), the reports of intermediary results, the interviewer (the investigator himself), the interview style (rather formal and task oriented), the recording apparatus (very small) and the two assistants transcribing full interview reports.

4. The participation of social categories equalised on a higher level

First of all, the minimum requirements of participation in the Delphi-process have to be considered: a reasonable level of dropout and of no-answer or no-opinion scores.

The definitive drop out was low: only six participants out of a maximum panel membership of 101. Four of them left the project for “objective” reasons (prolonged sickness, pregnancy, early retirement and prohibition of participation by a superior). Only two persons dropped out for ‘subjective’ reasons (too much effort required). The temporary dropout was higher: 17 participants did not complete the second round and 11 the third one. The most common reasons were missing or late return of mailed questionnaires (Round 2: 12, Round 3: 7). The other reasons were temporary sickness and failed appointments for group interviews. The evaluation

afterwards showed that lacking motivation was not the main factor explaining temporary dropout, but the mailed questionnaire method, the least favoured by all participants.

The number of no-answer and no-opinion scores was rather high for some categories of participants in the first round, but they diminished substantially in the second and third rounds. One important consideration has to be made about this fact and following data: the level of difficulty of the questions increased from the first to the last round. This level cannot be quantified, but its increase can be made understandable if the nature of the Policy-Delphi discussion process is stressed: it departs from general problems and opinions and arrives at specific solutions and reasons for them. (The scale score on "difficulty of answering" increased from 3.70 in Round 1 to 3.93 in Round 3 and Table 3 shows that the effort required rose according to the participants themselves.)

The no-answer and no-opinion scores taken together diminished for all categories of participants. The differences between the sexes and between trained and non-trained members decreased more than the differences between the levels of previous education and of job level (Table 1).

The principle data used to answer research questions A and B were gathered from self-rating scales (seven-point, Osgood style of opposites) completed after every interview/questionnaire. To improve validity, four summary-indexes of scales were developed as operationalisations of the appeal to cognition and of the effort, involvement and self-confidence

Table 1. Mean percentages of "no answer" and "no opinion"

N. of questions		Round 1	Round 2	Round 3
		22	22	16
(N. of interviews/questionnaires)	(n)	(n)	(n)	(n)
Total mean score	(88)	15.08	(83) 10.64	(81) 10.60
Previous education	Low	(19) 18.08	(14) 12.80	(15) 13.95
	Medium	(50) 13.79	(42) 9.90	(42) 10.01
	High	(19) 9.96	(17) 5.45	(14) 6.72
	Missing	(0)	(10)	(10)
Job level	Low	(13) 16.97	(13) 12.80	(12) 15.05
	Medium	(56) 14.55	(47) 9.92	(45) 10.00
	High	(19) 8.85	(15) 5.45	(14) 6.24
	Missing	(0)	(10)	(10)
Sex	Female	(27) 16.10	(23) 11.95	(22) 10.11
	Male	(61) 14.30	(60) 10.35	(59) 10.77
Union membership	Not trained	(57) 18.10	(55) 12.39	(56) 11.20
	Trained	(31) 10.08	(28) 6.46	(25) 9.35

required in Delphi-research. The summarized scales proved to be highly inter-correlated.

“*Appeal to cognition*” is a summary-index of three scales: the difficulty of (counted positively, as the intercorrelations were positive: +), the attention to (+) and the self-assuredness at answering (– :correlated and counted negatively, which means that (f.i.) a score “6” on the 1–7 scale of opposites is transformed in a “2” for the summary scale). The generally held opinion that Delphi method makes a high appeal to cognition was only modestly confirmed in this project. The total mean scores are about 4 on a 1–7 scale. More interesting to our research questions are the differences between the categories of participants. As far as differences appeared in the first round, only sex and union membership being statistically significant ($P = \leq 0.05$), they do diminish in the following rounds (Table 2).

Table 2. Mean scale scores of “appeal to cognition” (analysis of variance between groups)

		Round 1		Round 2		Round 3	
		(n)		(n)		(n)	
Total mean score		(85)	4.20	(78)	4.08	(81)	4.21
Previous education	Low	(17)	4.49	(11)	4.60	(15)	4.30
	Medium	(48)	4.12	(38)	4.10	(42)	4.24
	High	(18)	4.07	(16)	4.16	(13)	4.00
	<i>P</i>		0.29		0.21		0.32
	F		1.25		1.55		1.13
	Df		2		2		2
Job level	Low	(12)	4.61	(9)	4.03	(12)	4.30
	Medium	(55)	4.20	(43)	4.27	(45)	4.27
	High	(18)	3.94	(14)	4.11	(14)	4.30
	<i>P</i>		0.13		0.65		0.98
	F		2.08		0.42		0.01
	Df		2		2		2
Sex	Female	(29)	4.59	(19)	4.29	(22)	4.36
	Male	(56)	4.06	(59)	4.02	(59)	4.15
	<i>P</i>		0.01		0.21		0.35
	F		6.66		1.55		0.86
	Df		1		1		1
	Union membership	Not trained	(56)	4.38	(53)	4.10	(56)
Trained		(29)	3.86	(25)	4.05	(25)	4.17
<i>P</i>			0.00		0.79		0.78
F			7.16		0.06		0.07
Df			1		1		1

(n) = valid response (all cases with missing scale values and missing previous education or job level excluded; dropout: see table 1).

The effort required to participate in a Delphi usually exceeds the effort of a respondent in a "normal" interview or a questionnaire completion. The obvious fact that they have to respond two, three or even more times is not the only reason. They have to read (most often increasingly long) reports too. The investigator wondered whether he could require this effort of (particularly) union members not being active in their organisation otherwise. Total participation required at least 1½–2 full working days.

"Effort" is measured here as a summary-index of four scales: difficulty of (+), fatigue from (+), attention to (+) and tension of (+) answering. The results show a slightly increasing total mean score at a central point of the summary scale. Much more telling is the fact that three out of four differences between categories (job level, sex and type of union membership) were statistically significant (level 0.05) in the first round and that these differences disappear in the second and third rounds (Table 3).

Table 3. Mean scale scores of "Effort required" (analysis of variance between groups)

		Round 1		Round 2		Round 3	
		(n)		(n)		(n)	
Total mean score		(84)	3.78	(63)	3.95	(68)	3.98
Previous education	Low	(17)	4.00	(11)	4.16	(14)	3.85
	Medium	(47)	3.84	(36)	3.90	(39)	4.08
	High	(18)	3.41	(15)	3.96	(13)	3.73
	<i>P</i>		<u>0.13</u>		<u>0.71</u>		<u>0.36</u>
	F		2.07		0.33		1.02
	Df		2		2		2
Job level	Low	(12)	4.16	(8)	3.90	(12)	4.00
	Medium	(54)	3.84	(42)	3.98	(43)	4.05
	High	(18)	3.33	(13)	3.86	(13)	3.75
	<i>P</i>		<u>0.03</u>		<u>0.89</u>		<u>0.60</u>
	F		3.52		0.10		0.51
	Df		2		2		2
Sex	Female	(23)	4.21	(17)	4.14	(21)	3.92
	Male	(61)	3.61	(46)	3.88	(47)	4.01
	<i>P</i>		<u>0.00</u>		<u>0.28</u>		<u>0.73</u>
	F		7.63		1.15		0.11
		Df		1		1	
Union membership	Not trained	(56)	3.91	(43)	5.76	(47)	5.71
	Trained	(28)	3.50	(20)	4.03	(21)	3.94
	<i>P</i>		<u>0.05</u>		<u>0.60</u>		<u>0.78</u>
	F		3.84		0.27		0.07
		Df		1		1	

(n) = valid response (all cases with missing scale values and missing previous education or job level excluded; dropout: see table 1).

Involvement with the activities and subject matters of a Delphi project is a necessary condition of participation. A minimum of it could be expected in this project as the participation was completely voluntary. However, the investigator wondered whether the involvement of non-trained union members would be significantly lower than that of trained members.

“*Involvement*” is measured here as a summary of four scales: the attractiveness of (+), the motivation at (+), the reservedness at (–) and the attention to (+) answering. The total involvement scores proved to be high in all Delphi rounds. After an increase in the second round a small decrease followed in the third round. It is very likely that this is tied to the growing effort required in the last round. The presumed difference between trained and non-trained union members proved to be statistically significant in the first round. The difference substantially decreased in the next round (Table 4).

Table 4. Mean scale scores of “involvement” (analysis of variance between groups)

		Round 1		Round 2		Round 3	
		(n)		(n)		(n)	
Total mean score		(85)	5.78	(67)	6.01	(70)	5.95
Previous education	Low	(17)	5.94	(13)	5.76	(14)	5.71
	Medium	(48)	5.85	(36)	6.13	(41)	5.98
	High	(18)	5.69	(16)	5.84	(13)	5.93
	<i>P</i>		0.70		0.26		0.58
	F		0.35		1.37		0.53
	Df		2		2		2
Job level	Low	(12)	5.60	(10)	6.30	(12)	5.70
	Medium	(55)	5.73	(44)	5.95	(44)	5.96
	High	(18)	6.05	(13)	5.98	(14)	6.10
	<i>P</i>		0.35		0.47		0.51
	F		1.04		0.75		0.68
	Df		2		2		2
Sex	Female	(23)	5.72	(19)	6.10	(20)	5.95
	Male	(62)	5.80	(48)	5.97	(50)	5.95
	<i>P</i>		0.75		0.55		1.00
	F		0.75		0.35		0.00
	Df		1		1		1
Union membership	Not trained	(56)	5.59	(44)	5.92	(49)	5.91
	Trained	(29)	6.14	(23)	6.17	(21)	6.02
	<i>P</i>		0.00		0.23		0.65
	F		6.97		1.43		0.20
	Df		1		1		1

(n) = valid response (all cases with missing scale values and missing previous education or job level excluded; dropout: see table 1).

Even if one tries to keep the level of expertise required for participation in the Delphi method as low as possible, a minimum of self-confidence in answering questions is required. Here “self-confidence” is measured by a summary of four scales: difficulty of (–), self-assuredness at (+), reservedness at (–) and tension of (–) answering. The total score proved to be stable during the rounds at a positive level. However, the differences between the categories do not remain stable at all. The (statistically significant) lower self confidence of low and medium job levels, and of female and non-trained union members, rated in the first round, completely or almost completely disappears in the next round (Table 5).

In summarizing the data presented, it is possible to claim that all social categories of union members distinguished managed to serve as “experts” in the Policy-Delphi according to the high levels of cognition appealed to and

Table 5. Mean scale scores of “self-confidence” (analysis of variance between groups)

		Round 1		Round 2		Round 3	
		(n)		(n)		(n)	
Total mean score		(86)	5.09	(77)	5.33	(80)	5.21
Previous education	Low	(18)	4.97	(11)	4.68	(14)	4.98
	Medium	(48)	5.14	(38)	5.46	(42)	5.11
	High	(18)	5.36	(15)	5.11	(13)	5.36
	<i>P</i>		0.58		0.08		0.68
	F		0.54		2.57		0.38
	Df		2		2		2
Job level	Low	(12)	4.39	(9)	5.30	(12)	5.06
	Medium	(56)	5.05	(43)	5.27	(44)	5.07
	High	(18)	5.68	(13)	5.58	(14)	5.33
	<i>P</i>		0.01		0.66		0.73
	F		4.84		0.56		0.31
	Df		2		2		2
Sex	Female	(23)	4.65	(19)	5.27	(21)	5.20
	Male	(63)	5.25	(58)	5.35	(59)	5.22
	<i>P</i>		0.03		0.77		0.93
	F		4.73		0.07		0.00
	Df		1		1		1
Union membership	Not trained	(56)	4.88	(52)	5.33	(55)	5.17
	Trained	(30)	5.49	(25)	5.35	(25)	5.32
	<i>P</i>		0.02		0.94		0.58
	F		5.57		0.00		0.29
	Df		1		1		1

(n) = valid response (all cases with missing scale values and missing previous education or job level excluded; dropout: see table 1).

the effort, involvement and self-confidence required. They do so in an increasingly better way. Although the difficulty of the questions and the effort asked for increased, there is no rising drop out and the score of “no answer” and “no opinion” even decreased. However, the most telling result concerning the attempt to popularise the Delphi method is the general trend of diminishing differences in the levels called above, between participants with low and high job level, female and male sex and non-trained versus trained union membership. “Previous education” appears to discriminate less compared to these variables.

These conclusions are supported by the results of the evaluation questionnaire. A majority of 58 of the responding panel members (78) declared it had reached a better (or much better) understanding of the automation project participating in the Delphi-process. A minority of 19 participants gave the answer “no better understanding”. Almost half of them (8) were members of a works council ABN, which means a daily engagement with the policy of the project prepared. Still even a majority (13) of the total number of these members stated they had reached a better understanding. The lower two values of previous education and job level, the non-trained union members and women valued the understanding reached at clearly higher, although on this subject only “previous education” shows a statistically significant relationship (Chi-square). All of the participants with low previous education rated a better understanding. For women (except for three of them) the same applies. It is quite remarkable that female participants evaluated the project as more positive than males on all questions. Clear differences remain after holding the variable “previous education” constant. Statistical relationships cannot be proved, however, as the cell numbers get too low.

5. Broadening the participation in Delphi method

A number of steps mentioned in the research questions were deemed necessary to allow the participation of all categories of employees in this Delphi project. What follows is an evaluation of these steps.

First of all, the adjustment of the question form. All Delphi questionnaires contain blocks of information as well as questions. These blocks grow during the rounds as a result of the report of answers given in the previous round. In this project the information blocks were quite long as the subject matters had to be understandable and readable by all. The following questions themselves did not contain any new information. They had to be as short as possible and particularly well balanced. However, suggestions could still drop in by the combination of question and information block or

Table 6. Mean scale scores of question form characteristics (1–7 scale)

	Round 1	Round 2	Round 3
Clarifyingness	6.06	6.05	6.35
Instructiveness	5.51	5.58	5.88
Suggestiveness	2.45	2.81	2.12

by the design and content of this block. Therefore all blocks were composed of evenly balanced different views and facts about the subject matter. All opinions were logically grouped in f.i. “for” and “against” and the arguments for these answers in a sequence of decreasing adherence.

One self-rating scale was made of the question whether the participants found the question form clarifying or not, a second whether it was instructive or not and a third whether it suggested a particular answer or not. The results show a high mean score (1–7 scale) on the first two questions and a low score on the last one (Table 6).

No statistically significant differences of these scores between social categories of participants were found. The differences between groups, that did appear, show the same directions as exposed above: participants with low level of previous education, low job level, no union training and female sex assessed the question form as more clarifying and instructive. No systematic differences on the score of suggestivity were found.

These data were supported by the answers in the final evaluation. A large majority of 72 out of 78 respondents disagreed or strongly disagreed with the following statement: “I have the impression that the investigator has directed our opinion towards his own opinion”. Two persons agreed (without explanation) and four held no opinion.

The readability of the questionnaires/reports was valued high by 65 out of 78 respondents; 11 participants held the opposite view (“too long blocks of information before the question”, “too many quotations”). Three people held no opinion. It is striking that respondents with low and medium previous education were much more positive about readability than respondents with high previous education. The same (statistically significant) relationship was found in the answers on a question about the length of the questionnaires/reports. The investigator was afraid that papers of 20 full pages of text would be too long for participants with low previous education. The opposite appeared to be the case. A majority of 48 respondents answered that the papers could not have been shorter; 19 persons held the opposite view. The proportion of the first group decreases, and that of the last group increases with a rising level of previous education. Presumably the participants with low and medium previous education just needed the elucidations of questions and results.

To improve readability and understandability the reports were interspersed with quotations of typical answers. This was appreciated by all participants. Still half of the responding panel wanted more illustrations of another type: tables, figures and diagrams. The other half did not have such a preference.

Individual and group interviews were deliberately used besides mailed questionnaires to promote participation by all social categories. Out of the 63 respondents that were questioned in three ways successively 38 stated that their opinion appeared to the fullest advantage in the individual interview, 14 in the group interview and 8 in the mailed questionnaire (3 had no preference). Previous education appeared to be the best discriminating variable, but it was not statistically significant, as all of its categories preferred the individual interview most. None of the respondents with low previous education favoured the mailed questionnaire. This method was preferred most by panel members with medium previous education, while the group interview was appreciated most by members with high previous education.

It is beyond doubt that the decision to use interviews raises the labour intensity of participating in and doing Delphi research. However, the results of the methodical investigation show that it was worth the trouble and in some ways even necessary maybe. It has improved the validity of the results and stimulated participation.⁵ In the evaluation questionnaire 27 people agreed with the statement "participating in this research project has cost me much time/effort" (47 respondents disagreed). Most people of the former group amplified their answer with words like "no objection" or "it was worth the trouble". This was confirmed by the answers to the most important question of the evaluation. A large majority of 57 among the 78 respondents agreed with the statement: "by means of this investigation the union knows better what to do with the OBP" (7 disagreed, 14 held no opinion).

The labour intensity for the investigator was high, particularly if one counts the effort of doing an intermediary evaluation research twice. Yet the results of the former Delphi round had to be fed back within four months, otherwise the motivation of the participants would be lost and the discussion process interrupted. However, conducting this type of Delphi research can be made more practicable. In this project the interview transcripts were made on diskettes by assistants. Computer software for a qualitative and quantitative analysis of these kinds of texts is rapidly improving. More important is the fact that the number of panel members in this project was rather high, partly for methodical reasons. Most often Delphi researchers think they have acquired field representativity with a panel membership of

40–50 persons. Interviewing such a number could be a reasonable alternative to sending them a mailed questionnaire if complete anonymity is not required.

6. Conclusions

This attempt to popularize Delphi method proved to be successful. The method served not only as a scientific instrument of data collection (of opinions) but also as a practical instrument for a better control of technological change by employees. Three quarters of the participants declared that they had reached a better understanding of the coming automation project. The same number thought that their union would now be able to get a better grasp of it. The quality level of participation as “expert” met at least minimum requirements for all social categories of employees and this participation was equalized on a higher quality level among all categories at the end of the three rounds. Participants with low job level, women and non-trained union members joined in very well. The steps required to broaden a successful participation in the Delphi process, particular methods and techniques of information-transmitting questioning and reporting, were valued positively by the participants themselves. These steps did not violate the quality of valid information gathering every empirical scientific method should possess. Of course this exploratory study only shows that this application of Delphi method is *possible*, not that it will work under other circumstances. For that purpose more natural experiments with this type of Delphi method in other situations have to be done.

Notes

1. See Jan van Dijk (1986). “Methods in Applied Social Research, Special Characteristics and Quality Standards” in: *Quality & Quantity* 20 (4) pp. 357–370. Dordrecht: Martinus Nijhoff Publishers.
2. Linstone, H. & Turoff, M. (ed.) (1975). *The Delphi Method, Techniques and Applications*. London: Addison Wesley Publishing Company.
3. The important social category “age” was left out as its correlation with “job level” and “previous education” was too high.
4. Jan van Dijk. “Delphi Method as a Learning Instrument”, to be published soon.
5. Jan van Dijk. “Varieties of Delphi Method”, to be published soon.