

THE DELPHI TECHNIQUE  
VERSUS  
PARTICIPATIVE TECHNIQUE FOR DECISION ANALYSIS:

by

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ABSTRACT

In the business world today, the emphasis on the participative approach to management has popularized the use of group interactive meetings for decision making. Recent literature has cited a number of dysfunctional aspects in using this type of decision making.

This research tests the behavioural aspects of decision analysis by experimenting with a management team which regularly uses interactive meetings for general administrative problems. First, a questionnaire was used to determine the management team's attitudes towards decision making by group interactive meetings. Next, a business problem was selected at random for the management team to solve by the Delphi technique of decision analysis. Following the implementation of the solution by Delphi analysis, a second attitude questionnaire was sent to the management team seeking their attitudes towards the decision and the Delphi technique.

Managers were found to be much more favourable towards Delphi decision analysis than group interactive meetings. For general administrative problems, it was concluded that the Delphi technique of decision analysis is the preferable mode of participative management.

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CHAPTER ONE  
INTRODUCTION

In the business world today, the emphasis on the participative management style has popularized the use of group interactive meetings for decision making. These meetings are usually called by the leader of a management team in an effort to solicit the input of the individual members. The process begins with the leader stating the problem to be solved, followed by an unstructured discussion to generate alternative solutions. From discussing the alternative solutions, a consensus decision should evolve. The above method of group decision making is strongly supported by Douglas McGregor, Rensis Likert, William Reddin, Harold Leavitt and other experts on management.<sup>1</sup> They cite behavioural reasons for participation, because such participation leads to increased feelings of commitment and reduced levels of resistance to change. This resulting commitment helps lead to successful implementation of the decision.

Problems with the Interactive Group Process

In observations of group meetings and surveys in recent literature, there are indications of many problems that are common to the interactive group meetings of participative decision making. The main criticisms are:

1. Interpersonal conflict-



Most decisions affect the lives and behaviour of the participants. The emotional involvement of face to face discussion between individuals of differing personalities and backgrounds frequently leads to conflict that damages relationships. This conflict subsequently lowers the individual's effectiveness.

2. Lack of creativity-

Previous research has shown the group process to be inhibitory in generating new ideas<sup>2</sup> and that group norms lead discussions towards areas of agreement. This agreement reduces the free flow of information toward divergent viewpoints.<sup>3</sup>

3. Dominance of individuals-

Those with strong personalities tend to dominate discussions in group meetings, thereby inhibiting those with less outgoing personalities. Yet, the silent person may be the one with the most creative ideas.<sup>4</sup> The competitive nature within organizations supports the "win-lose" behavioural characteristics of individuals. These characteristics contribute to the dominance found in group meetings.

4. Social-Emotional-

The concern for the maintenance of social and emotional relationships tends to waste time and energy, leaving insufficient quantities of both for the task at hand.<sup>5</sup>

5. Length of meetings-

Meetings are felt to be too long for the problem to be solved. The design of the group process is unstructured. Consequently, discussions tend to wander off the subject.

6. Low feeling of accomplishment-

Van de Ven and Delbecq<sup>6</sup> found that meetings concluded with a high perceived lack of closure, low felt accomplishment and low interest in the future phases of problem solving.

7. Lack of commitment-

Commitment is only temporary because of the factors as mentioned in number 6.

Many businesses have been using this method of decision making for several years now, even with the growing recognition of the deficiencies of the interactive group meetings by both managers and academics. The advantages of motivation theoretically derived from the use of the participative approach to management decision making<sup>7</sup> warrants a search for an alternative method that will give us the additional advantages while minimizing or eliminating the deficiencies. It is to that goal that this research is undertaken.

### The Delphi Technique

Besides participative decision making, there are a number of alternative decision making techniques. Typical examples are individual brainstorming, the Nominal group

technique<sup>8</sup> and individual decision making. In this study, the Delphi technique is analyzed as a new approach to participative decision making. The Delphi technique has many traits which avoid or minimize the deficiencies of interactive group meetings.

The Delphi technique uses a series of questionnaires interspersed with summarized information and opinion feedback derived from the previous responses. In this research, four iterations will be used:

1. The problem statement with a solicitation for alternative solutions from the participants.
2. Summary of the alternatives with a request to evaluate and comment on the alternatives offered.
3. Feedback of scores and a request for reevaluation.
4. Feedback of the decision made, scores of the reevaluation and method of decision analysis.

All the iterations are done anonymously. This anonymity overcomes a number of the problems that have been identified in the interactive group meetings. These problems are interpersonal conflict, participant dominance and the factors that inhibit creativity. In addition, the Delphi technique utilizes statistical methods to quantitatively evaluate alternatives. This quantitative evaluation enables the leader to make a rational decision by analytical means rather than by the more traditional heuristic approach.

### Hypothesis

The hypothesis is that the use of the Delphi technique of decision making will produce a higher perceived level of satisfaction among the participants than will the use of the interactive group meetings. The higher level of satisfaction will in turn improve the probability of successful implementation of any decision.

This research will test this hypothesis by having a Management team use the Delphi technique to solve a problem. Pre and post Delphi surveys will be taken to measure the attitudes of the participants. These managers normally utilize a participative mode to reach decisions. Prior to the Delphi experiment, they will be asked about their attitudes towards participative decision making. After the Delphi experiment, they will be asked similar questions regarding their Delphi experiences. The hypothesis specifies that greater satisfaction will result from the Delphi process.

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CHAPTER TWO  
SURVEY OF LITERATURE

The Delphi technique was developed by the staff of the Rand Corporation and has been in use for about 25 years. Much of the research to date has been well documented in the Rand publications. The applications of Delphi have been primarily in the area of forecasting of future events by using experts as participants. Many of these experiments were related to warfare and were first considered as classified information. Consequently most of the research was not released for publication until the early 1960's.

Dalkey<sup>1</sup> offers this description of the Delphi technique:

In general the Delphi procedures have these features: 1. anonymity, 2. controlled feedback, 3. statistical group response. Anonymity effected by the use of questionnaires or other formal communication channels such as on-line computer communication is a way of reducing the effect of dominant individuals. Controlled feedback--conducting the exercise in a sequence of rounds between which a summary of the results of the previous round are communicated to the participants--is a device for reducing noise. Use of statistical definition of the group response is a way of reducing group pressure for conformity; at the end of the exercise there may still be a significant spread in individual opinions. Probably more important, the statistical group response is a device to assure that the opinion of every member of the group is represented in the final response. Within these three basic features, it is of course, possible to have many variations.

The use of anonymity in the Delphi technique creates an individual brainstorming situation for idea generation.

Dunnette, Campbell & Jaastad<sup>2</sup> in their research found that individual brainstorming produced thirty to fifty percent more ideas than group meetings. They used researchers and advertising men at Minnesota, Mining and Manufacturing to solve hypothetical problems. They found that the participants in the interacting group meetings tended to fall into ruts and pursued the same train of thought. The higher number of ideas generated was considered a measure of creativity.

In the area of accuracy of the Delphi technique, both Dalkey<sup>3</sup> and Campbell<sup>4</sup> experimented with a comparison of the Delphi technique to committee discussion. They had the participants work on a problem in estimating the accuracy of a set of facts. The pooled estimates were found to be more accurate in the Delphi than in the committee discussions. Nevertheless, Van de Ven & Delbecq, questioned<sup>5</sup> whether the results would have been different if a more real, controversial and emotional problem were chosen. They also questioned whether accuracy was an appropriate criterion of effectiveness.

As a communication tool, the more recent experiments have been in the area of decision making. Van de Ven & Delbecq's<sup>6</sup> research compares three decision making techniques--Nominal group technique, Delphi and the interactive group meetings. The Nominal group technique was developed in 1968 by Andre Delbecq and Andrew Van de Ven and is



describe by them as follows:

The Nominal group technique is a group meeting in which a structured format is utilized for decision making among individuals seated around a table. This structured format proceeds as follows:

- a) Individual members first silently and independently generate their ideas on a problem or task in writing.
- b) This period of silent writing is followed by a recorded round-robin procedure in which each group member (one at a time, in turn, around the table) presents one of his ideas to the group without discussion. The ideas are summarized in a terse phrase and written on a blackboard or sheet of paper on the wall.
- c) After all individuals have presented their ideas, there is a discussion of the recorded ideas for the purposes of clarification and evaluation.
- d) The meeting concludes with a silent independent voting on priorities by individuals through a rank ordering or rating procedure, depending upon the group's decision rule. The "group decision" is the pooled outcome of individual votes.

Their research was conducted in the Division of Student Affairs at a midwestern university. The problem was to define the job description of the Student Dormitory Counselors. The problem was considered difficult to solve because there was no solution equally acceptable to all groups involved. Moreover, the problem would evoke highly emotional and subjective responses. Sixty groups of seven participants were selected, twenty Nominal group technique groups, twenty Delphi groups and twenty interactive groups. These groups were made up of students, administrators and faculty. The measurements for effectiveness were defined as "the quantity of unique ideas generated by a group and the perceived level of satisfaction participants experienced with the decision process.

Their research compared firstly, the effectiveness of the Nominal Group technique with Delphi and secondly, the effectiveness of Delphi with interactive group meetings. They hypothesized that Nominal Group technique will be more effective than the Delphi technique. They also hypothesized that Delphi will be more effective than the interactive group meetings. Their corollary hypothesis is that the Nominal Group technique of decision making will be more effective than the interacting group process. The findings of their research showed that the Nominal Group Technique was slightly more effective than the Delphi technique and that the difference was statistically insignificant. However, the difference in the Delphi versus the interactive group was found to be statistically significant. Van de Ven and Delbecq concluded that the latter differences were convincingly large and that practitioners should change their conventional pattern of using the interactive group meetings in favour of either Nominal group technique or Delphi techniques on applied problems of the kind used in their study.

Experimentation with the Delphi technique and the psychological aspects was also done in W.Wedley's<sup>7</sup> paper on the use of the Delphi technique for job enrichment. He looks at the behavioural implications of commitment and consensus in the process of job enrichment.

His experiment uses a group of students enrolled in Masters of Business Administration Program as participants in a Delphi process to improve an Operations Research course. He parallels this course enrichment with job enrichment. The first round of Delphi was to generate ideas for improvement of the course. The subsequent rounds were used to rate the ideas for benefit and ease of implementation. In the third round, the respondents were also asked to rank each of the suggestions in order of desirability. Feedback in each round was the mean score, which provided a discriminative measure of usefulness of the suggestion. A measure of consensus was provided by use of the standard deviation. Wedley's study showed the ability of the Delphi technique, by use of statistical methods, to generate a measure of discrimination and convergence of opinion.

A critique of these Delphi experiments was considered long overdue by H. Sackman of the Rand Corporation. Sackman's<sup>8</sup> rather extensive evaluation of Delphi concluded with sixteen points of criticism that led to a final recommendation that conventional Delphi be dropped from institutional, corporate and government use until further research can establish that Delphi is scientifically tenable. His study primarily evaluated Delphi processes that related to forecasting by expert opinion. The criticisms were on the basis of the use of unscientific approaches to sampling, expert selection, definitions, prediction and validation.

Another critique of the Delphi technique was conducted by Juri Pill<sup>9</sup>. He concluded from his analysis that--

- 1) The Delphi technique should be used at high levels of uncertainty and one must accept the difficulty of measuring its usefulness.
- 2) It should be possible to apply Delphi in conjunction with a more concrete procedure which works backwards from the real world.
- 3) Its eventual usefulness will be judged by its performance, rather than by any abstract analysis of its worth.
- 4) Research in Delphi should stress its psychological aspects in terms of communication, rather than in mathematical terms.

It is the works of Pill, Van de Ven and Delbecq, and Wedley on Delphi that is the motivation behind bringing the Delphi research into the real world of business decision making. There has been no previous research published comparing the effectiveness of Delphi versus interacting group meetings in a real business environment. The objective of this research is to conduct a field study of the Delphi technique in a real life situation. Since there are no hypothetical problems, no selecting of participants to produce a mock organization, some of Sackman's criticisms are answered by this research. The belief that the failure of many business decisions is not so much the making of the

wrong decision, but the failure of successful implementation of the decision itself, is basic in this study. The need of commitment of the management group to the decision is a key factor in the successful implementation of a business decision<sup>10</sup>.

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CHAPTER THREE  
METHODS AND PROCEDURES

The managers

For this experiment, a corporate management team that uses the interactive group meetings for decision making was needed. The Management group of a District plant of Westinghouse Canada Ltd. consented to participate in this experiment. This team of five--the Plant Manager, Production Manager, Operations Manager and two Product Managers had all received formal training in the interactive group meeting decision process. This training was in the form of William J. Reddin's "Managerial Effectiveness 3-D Seminar" and "Team Role laboratory".<sup>1</sup> This method of participative decision making has been used by this team since 1971. This experience ensured that the participants would have reasonably valid attitudes towards the interactive group process. Their perceptions would not be a first impression to a new process but one developed from four years of experience.

Attitude Questionnaires

All questionnaires including the Delphi questionnaires were sent to participants with a guarantee of anonymity letter written by Dr. W.C. Wedley of Simon Fraser University (see Appendix A). Anonymity was accomplished by using Dr. Wedley and his secretary to code, record and prepare the question-



naires for mailing. It was necessary to code the questionnaires for statistical analysis. Each participant was assigned a respondent number for the duration of the experiment.

The first questionnaire was to survey the participants for their level of satisfaction towards the use of interactive group meetings for decision making. The questionnaire (see Appendix A) consisted of twenty-two questions related to factors that influence an individual's feelings of satisfaction. The factors were:

1. Accomplishment
2. Commitment
3. Decision quality
4. Number of alternatives offered
5. Time utilization
6. Interpersonal conflict
7. Individual dominance
8. Freedom of interaction
9. Implementation history
10. Understanding
11. Satisfaction

The respondents were asked to select a numerical value from an eleven point scale of zero to ten that best represents their feelings on the questions asked. They were given one week to respond to the questionnaires. When the completed questionnaires were received at Simon Fraser University, a graduate student who volunteered to assist in this

research, copied the numbers selected onto a blank questionnaire to disguise the identity of the handwriting. The numerical attitude towards interactive group meetings were then keypunched onto cards for computer calculation of Means and Standard deviations. These statistical measures established a standard for comparison with the attitudes of the individuals after using the Delphi technique of decision making.

#### The Problem for Delphi solution

The management group had, in their "Team Role Laboratory" developed a taxonomy of problem types. The problems that they identified as "General Administrative types" were classified as the type to be solved by consensus in interactive group meetings. It was decided that this was the problem type we would address and that the specific problem would be selected at random.

The problem selected was one concerning a loss of productive time in the clerical-technical staff (see Appendix B for Problem Statement). The problem was considered as a difficult one because management felt that either an authoritarian or laissez-faire stance could be dysfunctional to the organization. The operation had been very successful in the past year in spite of the loss of productive time.

#### Round One

With the problem for Delphi solution selected, the next

step in the Delphi technique was to solicit alternative solutions from the participants. The first round questionnaire kit (see Appendix B) included the following:

1. Introductory letter by the researcher.
2. Anonymity assurance letter by Dr. W.C. Wedley.
3. Problem Statement.
4. Alternatives response form.
5. Return envelope.

When the round one responses were completed and returned, the alternative solutions were edited by the volunteer graduate student for clarity, brevity and to protect the identity of the respondent.

#### Round two

The edited alternative solutions were typed onto the round two Alternatives Evaluation sheets (see Appendix C.)

These sheets provided space for comments by the participants if they wished to. The participants were asked to evaluate each alternative solution as to its: a) Effectiveness to the company, b) Ease of implementation, c) Desirability to the respondent. Again, an eleven point scale was used for ratings. The explanation to the participants stressed that they rate each alternative and not rank them. It would not be realistic to suggest that the individual must in all cases say that one alternative is better than another. This questionnaire set (Appendix C) included:

1. Problem statement.
2. Delphi round two explanation.
3. Alternatives evaluation sheet.
4. Return envelope.

On the return of the evaluation sheets the scores were recorded. The Mean and Standard deviation of each of the three factors for each alternative was then calculated.

### Round three

In the third round, the Mean score of the participant evaluations for each alternative was provided as feedback. The Mean was entered on the Alternatives evaluation sheet (see Appendix D). Again, the participants were asked to rate each alternative solution on the same three factors and on the same eleven point scale. In this round the participants had the benefit of feedback of not only the Mean but any comments that had been made by the respondents. The questionnaire kit in the third round (see Appendix D) included:

1. Problem Statement.
2. Round three Delphi explanation sheet.
3. Alternative evaluation and Feedback sheet.
4. Return envelope.

### Round four

The fourth round is the feedback of the decision made

to the participants. The scores from the third round were, as in the second round, used to calculate the Mean and Standard deviation. These scores were analyzed in the same manner as Dr. Wedley's study<sup>2</sup>.

In Dr. Wedley's paper he states:

A comparison of the differences between means for the two rounds indicates whether the panel has shifted its opinion, whereas comparing average scores between suggestions yields a discriminative measure of the desirability of each suggestion. The standard deviations, on the other hand are a measure of consensus. The lower the variance around a mean, the greater the agreement amongst the panel. A drop in standard deviation between rounds implies a better consensus as a result of feedback and reassessment.

In addition to this, a paired sample T-test was taken to identify the statistically significant differences in the standard deviation between rounds or as we use it in this study, the degree of consensus. The decision maker used the statistical information for his decision analysis. The decision he arrived at was then announced to the participants with the reasons for his choice. A copy of the statistical results of the Delphi exercise was also fed back with the decision maker's analysis of those results.

#### Post Delphi Attitude Questionnaires

Included with the decision feedback was the final questionnaire set. The Delphi attitude questionnaire was handled in the same manner as the first attitude questionnaire. The respondents were asked about their feelings after using the Delphi technique. The same factors were considered, only

the wording of the questions was modified to suit the Delphi technique. This final set (see Appendix E) included:

1. Dr. W. Wedley's letter re anonymity.
2. The Decisions statement.
3. The Delphi Statistical Results.
4. The Attitude questionnaire.
5. Return envelope.

On the return of the questionnaires, the recopied scores from the graduate student were again keypunched on cards for computer analysis. The mean score of each question was calculated, yielding a measure of the level of the attitudes of each of the psychological factors. A paired sample T-test analysis was also conducted by computer. This compared the means of the attitudes towards the Group interactive meetings with the attitudes towards the Delphi technique. This manipulation showed the statistically significant changes in the mean score and the correlation of the respondents change in attitude scores.

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CHAPTER FOUR  
DELPHI AND ATTITUDE RESULTS

The Delphi Findings

The statistical results of the Delphi rounds to solve the problem of loss of productive time of the clerical-technical staff are shown on Table I. The first round of the Delphi generated eleven alternative solutions to the problem. In the second round, the evaluation round, a twelfth suggestion was added to the response form.

Means

- The mean scores of effectiveness were highest on--
- Alternative three - Make no changes (score 6.4).
  - Alternative four - Concentrate on getting work done and tolerate casual attitude (score 7.0).
  - Alternative five - Deal with offenders on an individual basis, extreme non-conformists can leave (score 7.0).
  - Alternative six - Institute flex hours, with core time (score 6.5).
  - Alternative eight - Management should set an example by observing conspicuously starting and quitting times (score 6.2).

These suggestions were highest by a large difference.



TABLE I COMPARISON OF  
DELPHI DECISION ROUND 2 & 3

ALTERNATIVE	FACTOR	MEAN		STANDARD DEVIATION	
		RND. 2	RND. 3	ROUND 2	ROUND 3
1. Increase lunch break to 60 minutes	Effectiveness	4.8	4.0	2.387	2.345
	Implementation	9.8	9.4	.447	.894
	Desirability	5.6	4.6	2.702	3.209
2. Decrease lunch breaks	Effectiveness	4.0	3.2	2.739	1.643
	Implementation	6.4	7.8	4.159	2.490
	Desirability	2.4	1.8	2.302	.837**
3. Make no changes	Effectiveness	6.4	6.0	1.949	1.414
	Implementation	10.0	10.0	0.0	0.0
	Desirability	6.2	6.2	2.168	1.789
4. Concentrate on getting work done & tolerate casual attitude	Effectiveness	7.0	6.4	1.871	1.571
	Implementation	7.2	8.0	3.834	2.550
	Desirability	7.4	7.6	3.286	2.074
5. Deal with offenders on individual basis, extreme non-conformists can leave	Effectiveness	7.0	7.2	1.225	0.837
	Implementation	6.0	6.8	2.739	1.924
	Desirability	7.8	7.2	1.924	1.789
6. Institute flexible hours, with core time	Effectiveness	6.5	6.0	2.966	2.449
	Implementation	5.4	4.8	3.578	3.114
	Desirability	5.2	4.2*	2.588	2.588
7. As is, except enforce conformity, time clock, signing book and/or a system of penalties	Effectiveness	3.8	3.8	2.588	1.924
	Implementation	4.6	5.0	3.847	3.162
	Desirability	1.2	0.8	1.304	0.837
8. Management should set an example by observing conspicuously starting & quitting times	Effectiveness	6.2	6.8	1.924	1.304
	Implementation	6.0	6.2	2.915	2.280
	Desirability	4.6	6.2	3.286	1.483 *
9. Explain problem to employees making them aware of the extent of present abuse & relying on them to shape up	Effectiveness	4.4	5.0	1.140	1.732
	Implementation	7.6	7.6	2.881	2.510
	Desirability	4.8	5.6	1.924	1.342

ALTERNATIVE	FACTOR	MEAN		STANDARD DEVIATION	
		RND. 2	RND. 3	ROUND 2	ROUND 3
10. A compressed work week with or without flexible hours such as 9 working days of 8 hours & 20 minutes each 2 week period	Effectiveness	4.4	4.0	4.722	2.000*
	Implementation	4.2	4.8	3.962	2.387
	Desirability	4.6	4.6	4.980	2.408*
11. A compressed work week of 4 days/week consisting of 9 hours & 25 minutes/day	Effectiveness	4.0	4.0	4.183	1.871*
	Implementation	3.0	5.0*	2.550	2.828
	Desirability	3.4	3.2	3.435	0.837**
12. Upgrade lunchroom facilities	Effectiveness	1.4	4.4	3.130	3.647
	Implementation	0.8	5.2*	1.789	3.701*
	Desirability	1.5	5.4	3.578	4.219

\* Significant of .10 level, paired sample 2 tailed T-test for Mean and grouped sample 1 tailed T-test for Standard Deviation

\*\* Significant of .05 level, grouped sample 1 tailed T-test for Standard Deviation

The next highest solution was one and four-tenths points lower. In the third round, the re-evaluation round, these same suggestions were scored highest again. The mean scores were 6, 6.4, 7.2, 6, and 6.8 respectively. The changes in the means between rounds were found to be statistically insignificant.

These top five suggestions in effectiveness, also scored highly in ease of implementation score, with the exception of the flex hours suggestion (alternative six). The flex hours suggestion was scored as being moderate (4.8) for ease of implementation. The other four high effectiveness solutions were rated as being easy to very easy to implement (6.2 to 10.0). Nevertheless, just because a suggestion scores low on ease of implementation, it does not necessarily follow that a manager should discard it. Therefore, the scoring for desirability of these suggestions must be studied.

For desirability, the five top-rated effectiveness alternatives also received the highest desirability ratings. There were no statistically significant changes in the means from round two to round three for these suggestions. The solution suggesting that management set an example was not rated highly (4.6) in the second round but was re-evaluated at 6.2 in the third round. The re-evaluation moved it into the top four alternatives even though the differences between

the second and third round were statistically insignificant. The only changes in mean scores that were statistically significant were (1) the flex hours solution (alternative six) which changed downwards for desirability, (2) the compressed work week (alternative eleven) and (3) upgrading of the lunchroom facilities (alternative twelve), both of which changed upwards for ease of implementation. These changes were significant but not to a degree sufficient to move them to a position of likely implementation.

The lowest overall scores were given to the solutions suggesting (1) enforcement by timeclock, book, or penalties (alternative seven), (2) decreasing lunch breaks (alternative two), and (3) the compressed work week (alternative eleven). The desirability scores for these alternatives tended to be rated lower than effectiveness and implementation scores.

The scoring for the three factors indicated that there was some agreement amongst the participants as to which were the best solutions to the problem being addressed. The alternatives with the best overall scores were--

- a) making no changes (alternative three).
- b) concentrate on getting work done and tolerating the casual attitude (alternative four).
- c) dealing with offenders on an individual basis (alternative five).

d) management should set an example (alternative six).

### Standard Deviation

A measure of convergence of opinion is provided by the standard deviation of the mean. For example, the desirability score for the suggestion for management to set an example (alternative eight) had a dramatic reduction in the standard deviation. The standard deviation in the second round was 3.286 and in the third round 1.483. This indicates a significant decrease in variance and a significant increase in the degree of consensus. The alternative suggesting a shortening in the length of lunch breaks (alternative two) has a high degree of consensus (.837) at the end of the third round. Since this suggestion had a very low rating of desirability (1.8) and effectiveness (3.2), the high consensus indicates that the respondents agreed that this idea was no good. From these figures, one would conclude that more than normal resistance to change would be experienced if a decision to reduce the length of the lunch break were to be made. Therefore, such a decision should not be made as the results would likely be dysfunctional. In this manner, managers can utilize knowledge of the means and standard deviations to help them to make a decision.

In each round, the respondents made a total of thirty-six evaluations--three factors (effectiveness, ease of implementation and desirability) for each of twelve alternatives.

A comparison of the thirty-six standard deviations in round two and round three reveals that twenty-nine of the standard deviations were lower in the third round. Two were the same and five were higher. If there was no tendency for convergence of opinion, one would expect one-half of the standard deviations to randomly increase while the other half randomly decreases. Since over eighty percent of the standard deviations decreased, it appears that there is greater consensus in the third round.

Further evidence on consensus is provided by the number of statistically significant changes in standard deviations between the second and third rounds. A grouped sample one-tailed T-test (see Table I) demonstrates that two standard deviations were lower by a statistically significant amount at the .05 level and four others at the .10 level. One standard deviation increased by a statistically significant amount (.10 level), and it is noteworthy that the standard deviation is associated with one of the three means which changed by a statistically significant amount (see alternative twelve, Table I). The preponderance of evidence still indicates greater consensus at the end of the third round.

#### The Decision

The leader of the management team, the Plant Manager,

was instructed to use the statistical information as he wished for his analysis in making a decision. His method of analysis (see Appendix E, pp. 76-78) adjusted the mean scores for his own perception of importance of the three factors. He applied different weights to the scores. The effectiveness score was given a weight of two, desirability a weight of one and one-half and the implementation score a weight of one. He added the three results to derive a composite score for each alternative solution. Using this scoring technique, alternative four (concentrate on getting work done and tolerate casual attitude) scored the highest (32.2). Alternatives three (make no changes), five (deal with offenders on an individual basis and extreme non-conformists can leave) and eight (management set an example) scored close behind--31.3, 32.0, and 29.1, respectively. The standard deviation of these four suggestions also showed a convergence of opinions.

The decision maker's choice was a combination of alternatives three, four and eight. He announced his decision to the participants by letter (see Appendix E, pp. 76-77). Due to the sensitivity of alternative five, he felt it would be more appropriate to announce that portion of the decision in a team meeting. As a part of the agenda of the same meeting, the actual method and timing of implementation was to be discussed. The meeting was held a week later, where alternative five was announced as being part of the overall decision. The decision

was well received by the members of the management team and generated no further discussion. There was consensus that the decision should be implemented immediately.

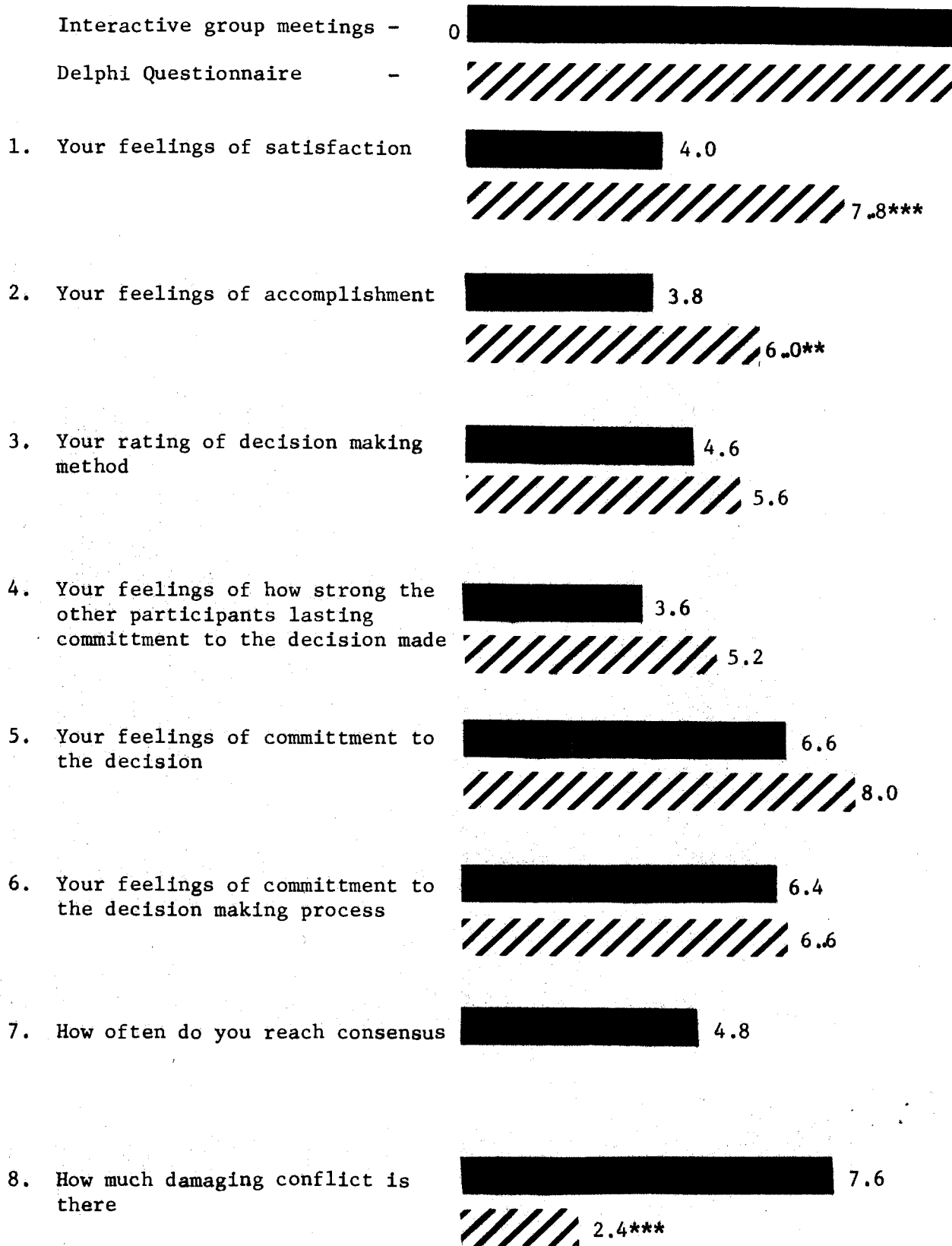
### Attitude Findings

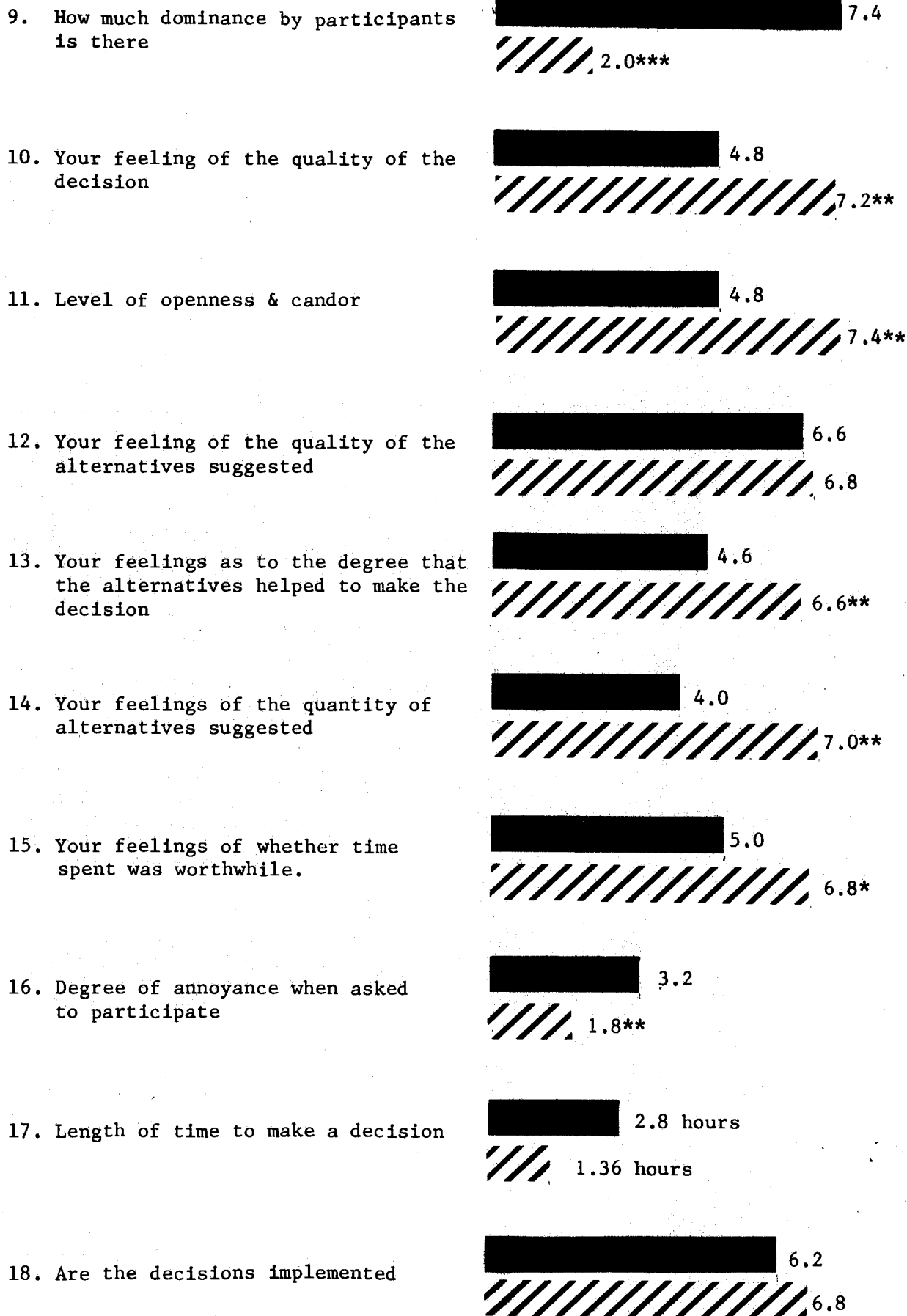
The participants' reaction to the manager's decision indicates that they were receptive to the Delphi decision. Further information on the Delphi results is provided by the before and after attitude surveys which compare the participants' prior attitudes to interactive group meetings to their subsequent attitudes towards their Delphi experiences. The results of both attitude surveys are presented in Table II. The mean score for each question is represented in the form of a bar graph with the numerical mean beside it. Attitudes towards the interactive group meetings are shown in solid black bars and attitudes towards Delphi in striped bars. Of the twenty-two attitude questions, not one had an attitude score which indicated greater favourableness towards the interactive group process. Three of the attitudes showed statistically significant changes of attitude scores at the .01 level using a paired sample one-tailed T-test. These changes were greater satisfaction (number one), less conflict (number eight), and less participant dominance (number nine) with the use of the Delphi technique. The use of Delphi also yielded more positive attitudes at the











TABLE II COMPARISON OF ATTITUDES

TOWARDS DECISION MAKING TECHNIQUES





19. Your feeling of understanding the implications of the alternatives	 7.8	 7.8
20. Your feeling of the other participants understanding of the implications of the alternatives	 5.4	 7.2
21. Your feeling of understanding the implications of the decision	 7.4	 8.0**
22. Your feeling of the other participants understanding or the implication of the decision	 5.4	 7.2

\* Significant at .10 level, paired sample 1 tailed T-test for Mean

\*\* Significant at .05 level, paired sample 1 tailed T-test for Mean

\*\*\* Significant at .01 level, paired sample 1 tailed T-test for Mean

.05 level of significance in feelings of more accomplishment (number two), higher quality decision (number ten), higher level of openness and candor (number eleven), more help in decision choice from alternatives (number thirteen), larger quantity of alternatives (number fourteen), less annoyance (number sixteen), and a better understanding of the implications of the decision (number twenty-one). The respondents' perception of worthwhileness (number fifteen) was significantly higher with Delphi at the .10 level.

Of the remaining eleven attitudes, six scores indicated positive attitudes towards the Delphi process, but not by a statistically significant amount. These attitudes were towards rating of the decision making method (number three), other participants' feelings of commitment to the decision (number four), your feelings of commitment to the decision (number five), length of time to make decision (number seventeen), other participants' understanding of the implications of alternatives (number twenty), and other participants' understanding of implications of the decision (number twenty-two). The difference in scores for these six attitudes was large enough to further convince the researcher that there is a positive attitude change towards the Delphi technique of decision analysis. Scores for commitment to the decision process (number six), quality of alternatives suggested (number twelve), and are decisions implemented (number eighteen) were min-

utely higher for the Delphi process. There was no discernable difference for attitudes towards feelings of the implications of the alternative (number nineteen).

To summarize, the use of the Delphi technique of decision analysis seems to be superior to the group interactive process producing--

1. more feeling of satisfaction and accomplishment,
2. less conflict and individual dominance,
3. higher quality decisions,
4. more openness and candor,
5. more alternative solutions offered, and
6. better understanding of the implications of the decision.

The participants' feelings of--

1. commitment to the decision process and decision,
2. how the other participants understood the implications of alternatives and decision, and
3. length of time to make decision,

were not significantly better in using the Delphi technique.

However, the changes in attitude were positive towards the Delphi technique when it was used.

The participants indicated indifference between the interactive group process and the Delphi technique for-

1. committment to the decision process
2. the respondents' own understanding of the alternatives and the quality of the alternatives.

#### Additional Implications

Some additional benefits derived from the use of the Delphi technique have been highlighted in the results of this research. The participants have estimated that in the past when using the interactive group process the average elapsed time to make a decision was 2.8 hours. In this Delphi process the time spent was 1.36 hours. If the decision used in this study is typical of all the interactive decisions, then the Delphi process saved 1.44 hours of each manager's time. The savings in dollars would be approximately about  $(1.44 \times 5) \$20 = \$140$  of productive time per decision made. This, of course, assumes the time saved will be put to productive use.

Administrative costs of the Delphi process used in this research has been approximately \$600 ( $30 \text{ hours} \times \$20 = \$600$ ) excluding computer costs. Extra costs were incurred due to rigid procedures specified in this research. In future business decision making some of these specifications may possibly be relaxed without undesirable consequences.

Perhaps the Delphi technique of the future will be "Delphi Conferencing". Delphi conferencing would involve using interactive computer terminals at the managers desk to

input the Delphi process. Feedback would also be received from the computer terminal. This would eliminate most of the administrative time required for conducting a Delphi process. With computer costs going down the way they have been, this may be not be far away.

CHAPTER FIVE  
CONCLUSION

The first chapter of this research identified seven major criticisms of the use of the interactive group process. These criticisms are--

1. Interpersonal conflict,
2. Lack of creativity in solution generation,
3. Dominance by individuals,
4. More concern for maintenance of social and emotional relationships,
5. Lengthy meetings,
6. Low feeling of accomplishment, and
7. Lack of commitment.

The attitudes that develop from these factors are included in both attitude questionnaires. Questions two, five, eight, nine, fourteen and fifteen surveys these attitudes, All but one question (number five) resulted in statistically significant improvements in attitude scores. Even though number five (commitment to the decision) was not significant at the .10 level, it was at the .14 level. The difference in mean was also convincingly large (6.6 versus 8.0) that there was a substantial change in the level of commitment between the typical decision made in the interactive process and the Delphi decision. One of our goals as stated in chapter one was to minimize or eliminate the deficiencies of using the participative approach to decision



making. From the above analysis it can be concluded that these deficiencies have been minimized or lessened by a significant amount (if not eliminated) by use of the Delphi technique of decision analysis.

The factors measured in the attitude questionnaires are all contributing factors to the total overall satisfaction of the participants. From the results of the survey conducted in this research, it can be concluded that managers should use the Delphi technique of decision analysis rather than the interactive group technique, for the solution of general administrative problems. The use of Delphi will result in a higher perceived level of satisfaction among the participants. This greater satisfaction should improve the probability of successful implementation if (1) the decision affects the participants and (2) the final decision maker chooses a solution which is compatible with the group opinion.

APPENDIX A

INTERACTIVE GROUP ATTITUDE QUESTIONNAIRE SET

Introductory letter	-	page 44
Anonymity assurance	-	page 45
Attitude questionnaire	-	page 46-49



From : Vancouver S & C  
WIN :  
Date :  
Subject: Decision Making Study

Dear Co-worker:

The study you are about to participate in is an evaluation of the decision making technique we have been using in the past few years, that is, making decisions by consensus in group participative meetings. George Ward has given his permission to run this study in the Vancouver Plant.

Please answer all the questions as honestly and promptly as possible. Your responses will be held completely anonymous, even to me, as outlined by Doctor Wedley in the attached letter.

The results of this study will be extremely valuable to us as a group.

Thank you for your cooperation in advance.

Roger H. Jung  
Operations  
Vancouver S & C

RHJ/mv



SIMON FRASER UNIVERSITY, BURNABY 2, B.C., CANADA  
M.B.A. EXECUTIVE PROGRAMME; 291-3639

Dear Sir:

I am writing to explain my role in Mr. Roger Jung's study on decision making through group participation. I have been advising and assisting Roger in organizing the study. I have also agreed to act as the person who codes, mails out, and receives the questionnaires you will be completing. This procedure enables us to keep track of which individuals respond while assuring their anonymity.

The procedure works as follows. Roger will present me with (1) envelopes with your addresses on them, (2) uncoded questionnaires, and (3) pre-addressed return envelopes. I or my secretary will place a code number on your questionnaire and send the materials to you. Upon return of the completed questionnaire from you, I will open and discard the envelope. The completed and coded questionnaires will then be given to another graduate student (Mr. John Sims) for analysis and preparation of the next questionnaire. In no case will Roger Jung or any other person from Westinghouse be allowed to see your written response. They and you, however, will later receive a typed summary of the overall results.

I can assure you that only I and my secretary will know the names associated with the code numbers. If it ever became known that I did not respect confidentiality, then my ability to be involved in similar studies in industry would be seriously jeopardized. As a consequence, I have no intention of revealing names and breaking your trust.

Your participation in these series of questionnaires should be a worthwhile experience without a major expenditure of time on your part. The project has many benefits for you, and I urge you to give it your serious consideration.

Yours sincerely,

W.C. Wedley  
Assistant Professor

WW/vod



Computer Code #0165  
G3912

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(1, 2, 3)

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(4)

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(5)

CONSENSUS

DECISION-MAKING EVALUATION

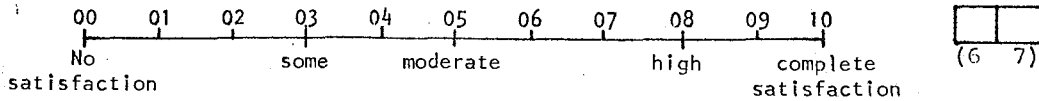
Please ignore numbers in brackets, numbers are for computer use. Questionnaire to be returned by \_\_\_\_\_

All the following questions are regarding your feelings towards making Decisions by Group Consensus by Team meetings in which you have been a participant.

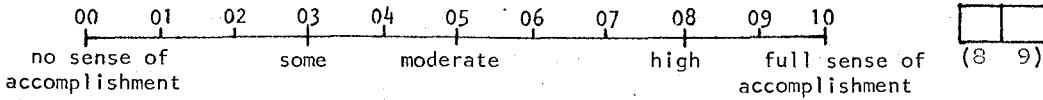
Please select the numerical value that best fits your feelings and enter that value in the box provided to the right of the question. (eg.) 

0	5
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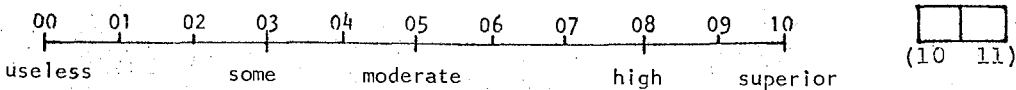
1. How satisfied do you feel after these meetings?



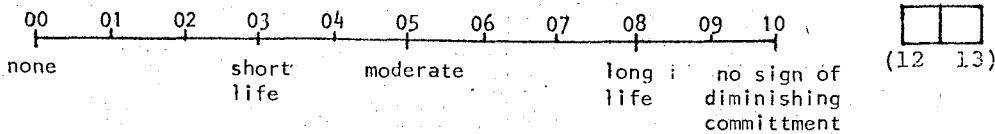
2. How is your feeling of accomplishment after?



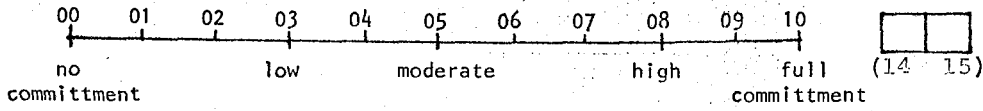
3. How do you rate this method of Decision Making?



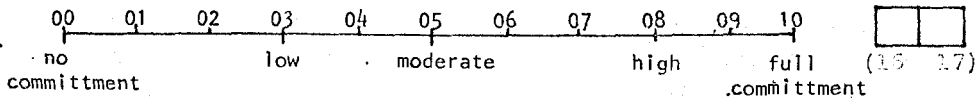
4. What is your impression of the other participants feelings of "Lasting commitment to the Decision?"



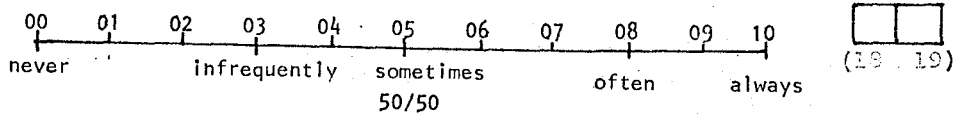
5. How is your feeling of commitment to these decisions?



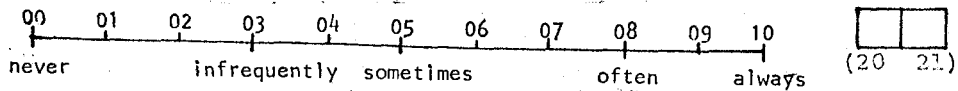
6. How is your feeling of commitment to this type of Decision Making Process?



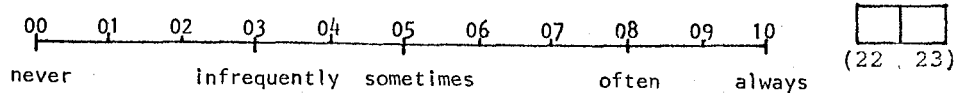
7. How often do you, as a group, reach a Consensus Decision?



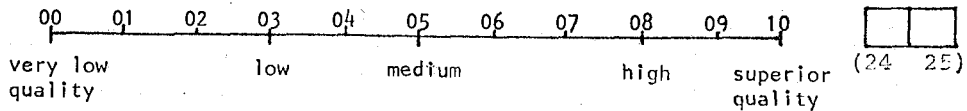
8. Is there damaging conflict between individuals in these meetings? ("damaging" defined as harmful to the effectiveness of the individuals.)



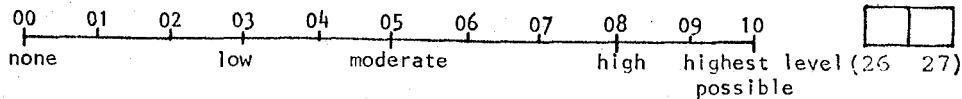
9. Do some people dominate the discussions?



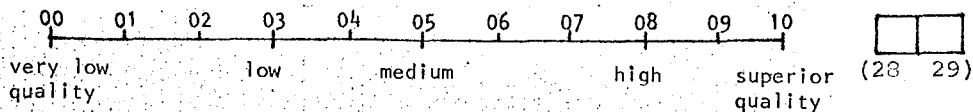
10. How do you feel about the quality of the Decisions?



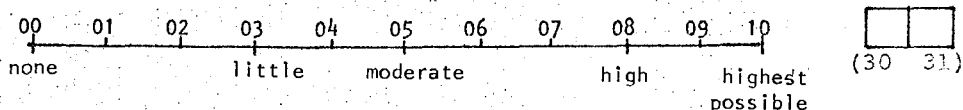
11. What level of openness and candor was there?



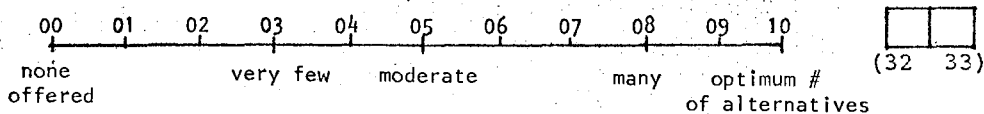
12. How do you feel about the quality of the alternatives presented before a Decision was reached?



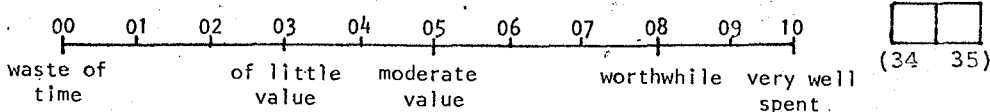
13. To what degree do you feel the Alternatives suggested helped to make the decision?



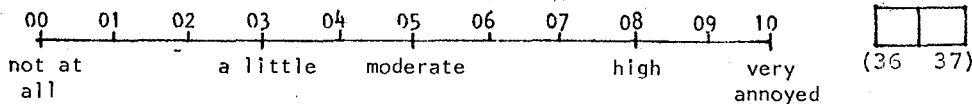
14. How do you feel about the number of alternative solutions offered?



15. How do you feel about the time spent?

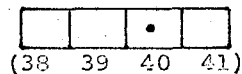


16. Did you feel annoyed when you were asked to attend these meetings because "it was taking you away from doing your job".

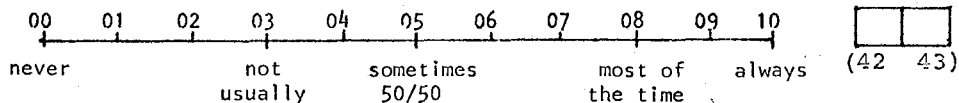


17. Using a best guess, what would you say is the average length of time in these meetings to reach a Consensus Decision?

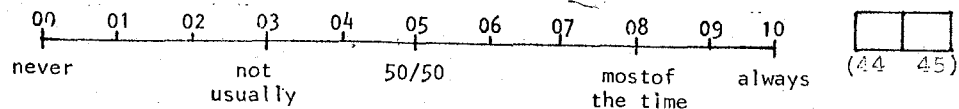
(Put down number of hours: eg. for 7½ hr.



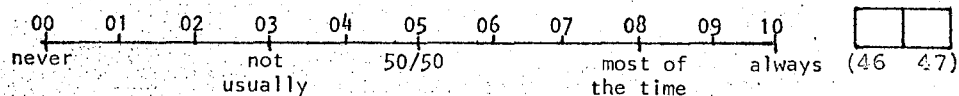
18. Are the resultant Decisions implemented?



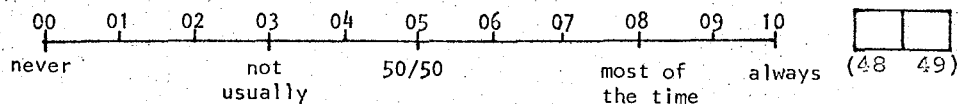
19. Do you feel you understood fully the implications of the alternative decisions?



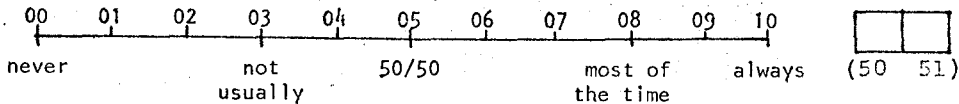
20. Do you feel the other participants understood fully the implications of the alternative decisions?



21. Do you feel you understood fully the implications of the Consensus Decision?



22. Do you feel the other participants understood fully the implications of the Consensus Decision?





APPENDIX B

DELPHI - ROUND I

Introduction to Delphi	- page 51
Anonymity assurance	- page 52
Problem Statement	- page 53
The "staggering" effects of a changing work week	- page 54-57
Alternatives response form	- page 58-59



Westinghouse Canada Limited

281 Industrial Avenue  
Vancouver 4 BC

Attached you will find a questionnaire package which is related to the same study we had initiated a few weeks ago.

We will now test other decision-making techniques for management consensus decisions. The guarantee of anonymity is the same as in the first questionnaire.

The problem we are going to try to solve in this series is outlined in the problem statement and the instructions for offering your alternatives are on the first page of the alternative response form. All the alternatives offered will be fed back to all of us in the next mailing.

Responses should be given to Wendy Morris for pick-up by courier by June 13, 1975.

Thank you very much for your cooperation.

R. Jung.

RJ:zg  
Attach.

P.S. Feed back of the results of the decision making evaluation questionnaire will be given to us at a later date,

RJ



SIMON FRASER UNIVERSITY, BURNABY 2, B.C., CANADA  
M.B.A. EXECUTIVE PROGRAMME; 291-3639

Dear Sir:

I am writing to explain my role in Mr. Roger Jung's study on decision making through group participation. I have been advising and assisting Roger in organizing the study. I have also agreed to act as the person who codes, mails out, and receives the questionnaires you will be completing. This procedure enables us to keep track of which individuals respond while assuring their anonymity.

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I can assure you that only I and my secretary will know the names associated with the code numbers. If it ever became known that I did not respect confidentiality, then my ability to be involved in similar studies in industry would be seriously jeopardized. As a consequence, I have no intention of revealing names and breaking your trust.

Your participation in these series of questionnaires should be a worthwhile experience without a major expenditure of time on your part. The project has many benefits for you, and I urge you to give it your serious consideration.

Yours sincerely,

W.C. Wedley  
Assistant Professor

WW/vod



PROBLEM STATEMENT

The problem we wish to solve in this series of questionnaires is one which has been with us for some time and is considered to be getting worse, that is - loss of productive time among the clerical and technical staff because of:-

- A) Tardiness
- B) Absenteeism
- C) Extended lunch breaks
- D) Dissatisfaction with hours of work

Attached is an article published recently called 'The Staggering Effects of a Changed Work Week'. The article is included to bring us all up to date as to the currently popular 'time management' techniques. It is not intended to influence or to show any bias towards the solution.

You are encouraged to generate any potential solutions, even modifications of more established methods of 'time management'.

Management

# The "staggering" effects of a changed work week

by Mary Ricard

Whether you know it or not, your life is going to undergo a major change. If the predictions of futurist Herman Kahn of the Hudson Institute, and author of *The Year 2000*, are accurate, 25 years from now most people will be working a four-day, 32-hour week with a three-day weekend. Annual holidays will be lengthened to three months; leisure and the individual's right to manage his own time will be placed ahead of monetary gains. In other words, the age-old work ethic, with all its constraints upon individual freedom, will be given a run for its money.

Yet ideals like Kahn's are more than mere predictions. Some are already in practice today and are the first phase in a movement toward a "leisure society" in which a relatively small portion of our time is spent working.

In the past eight years, North America has seen a remarkable change in attitudes toward hours of work. Both management and labor are beginning to question the suitability of the traditional work week for today's needs. In addition, both are beginning to realize they are dealing, not with a passing fad, but with a trend toward a new life style.

## Three systems

In Canada, the area of time management has developed in three basic directions:

- \* the compressed work week
- \* the flexible hour system
- \* staggered hours of work

Staggered hours of work require only a slight modification to the traditional work week, but a major distinction does exist between the compressed work week and the flexible hour system. The former emphasizes leisure time, providing the individual with one and sometimes two additional days of leisure per week, whereas the latter emphasizes the individual's freedom to arrange a work schedule to suit himself.

The compressed work week is just that:

the normal number of hours worked per week (we will assume a 40-hour week) are compressed into fewer days. The work day has been lengthened and it is the work week that has been shortened.

A North American phenomenon, the compressed week first arose in the U.S. some eight years ago. Owing in part to the close parallel between the Canadian and U.S. economies, it gradually spread across the border into Canada where more companies are adopting it as an alternative to the five-day week. Available statistics show that two years ago only about 25 companies in Canada were experimenting with the shorter week, whereas last year 200 had adopted it. However, the latest Canadian study, made by Gordon Harrison, vice-president, Riddell, Stead & Associates, indicates that the compressed week has seen a 20% failure rate in the past year.

The compressed work week, like other modified forms of the traditional week, is still in the experimental stage, although some companies such as Texaco and Imperial Oil have had it in practice in one form or another since the 40s. Companies that make the change usually implement the program first in a small segment of the firm to enable management to gather the necessary data to evaluate the merits of the program. Then, if feasible, the program is gradually extended to other parts of the organization. One reason for this cautious approach is coordination: coordination both within the firm and with those firms still working on the nine-to-five, five-days-a-week, schedule.

Two variations of the compressed 40-hour week are being tried. The first is straightforward: the five-day week is compressed into four days with 10 hours in each day. The second is not so simple. Based on an average of 40 hours per week over a three week period, the employee works two weeks of three 12-hour days and one week of four 12-hour days, for a total of 120 hours.

The compressed work week, however, is not everyone's answer to more leisure time. Some sections of organized labor are against — whichever variation is suggested. They see it as a retrograde step after their long fight for the eight-hour day and argue that it is a ploy used by management to further their own ends.

In September of last year, in a submission to the Commission of Inquiry into the Modified or Compressed Work Week the two million strong Canadian Labor Congress presented the trade unionist case. In effect, they said that the shorter work week would be favored only if it did not involve an increase in the number of hours worked per day. They further pledged to oppose any proposals which might mean the loss of any employee benefits which might accompany the introduction of an extended work-day to accommodate the compressed work week.

The compressed work week is "a device conceived by management, particularly in the unorganized sector of industry, to create the illusion of offering more 'available or usable leisure' to their employees. In fact, however, the prime purpose of the compressed work week is not what it has to offer in the way of benefits to working people. Rather, it is the age-old search for greater profits, regardless of the possible ill effects, in terms of safety or health, such action may have on working men and women," the submission said.

In discussing labor's attitude toward the compressed work week, Gordon Harrison said, "Unions have been plain stupid in their approach to the compressed work week. They are saying, in effect, that 'we are against it because we have fought hard for the eight-hour day.' Translated, this means: if a local wants to adopt a four-day week, we will go along with it if they are paid overtime for the ninth and tenth hour."

The Public Service Alliance, largest civil servant union in Canada with

136,000 members, is also opposed to the shorter week. Government, too, is hesitant in changing the labor code to allow workers to work more than an eight-hour day as a regular shift, unless performing jobs which call for long or irregular hours.

Human physical limitations also argue against the compressed work week, fatigue being the major stumbling block. For most, a sudden switch to a 10 or 12 hour day is, quite simply, exhausting. Some oil companies (Imperial and Texaco) have had their home delivery men doing three 12-hour shifts a week for 20 to 25 years, but there are long periods of rest between each period of physical activity. The moral is, the greater the physical effort in the job, the more difficult it is to impose a compressed work week successfully.

But not everyone experiences fatigue for the same reasons. One company where the compressed week has actually reduced it is Kruger Pulp and Paper. In its newsprint mill at Bromptonville, six years ago they implemented the four-two schedule (four days on, two days off). Prior to that their schedule was seven days on before any days off. Under the old schedule, fatigue and the excessive and unavoidable heat in the plant were major problems for the workers. The impetus for change came from the workers, who, together with local management, worked out their own program.

The results for Kruger were startling. With the same number of employees and no additional investment, during the first six months the program was in operation newsprint production went up from 380 tons per day to 425 tons.

Generally speaking, employee reaction to the compressed week has been mixed. Workers like having the extra time at home with their families and more time to indulge in their favorite hobby. Another plus factor which, incidentally, applies to all forms of the modified week, is the avoidance of rush hour congestion. Per-

sonal expenses, too, are reported by some to be less. Employees have found that they spend less on meals and transportation while on a four-day week. Many women who used to spend their Saturdays shopping in crowded supermarkets are now, since changing to the shorter week, able to shop at their leisure during the week. Bell Canada who recently completed a one year trial of the four-day, 40-hour week, reports that "the employees involved are just as positive now about the trial as they were when it began."

However, the shortened week presents problems for some groups of employees. Married women with children have problems finding day care centers willing to care for their children the additional two to four hours per day. There is also a major problem with older men (say 55 and over) who have been with the company for many years. They have gradually established a routine which they find impossi-

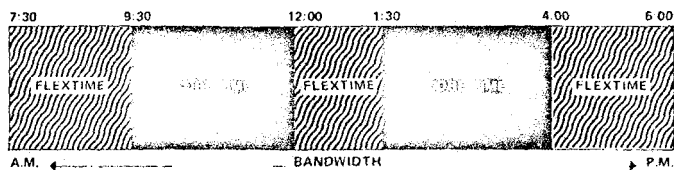
ble to break. And some employees complain that their entertainment expenses have risen considerably with the extra time off.

The future of the compressed work week in Canada is not at all clear. While many companies are experimenting with it, and many have plans to implement it, the immediate goal of organized labor is a four-day, 32-hour week. And the experts agree that it is only a matter of time until that becomes a reality.

#### Flexible hour system

According to those in the field, the flexible hour system is fast becoming the most popular form of the modified work week in Canada. In fact, this year Harrison has been able to identify 100 Canadian companies experimenting with the flexible hour system, up from five last year. As he puts it, "Flexible hours are really taking off!"

### How flextime works



*Prior to the implementation of a flexible hour system, management must analyze their requirements, taking into consideration manpower needs, work load variations, accounting practices, personnel policies and the demands of the market place, to establish the parameters of their system. Then a company can define core time, as for example, Monday to Friday, 9:30 a.m. to 4:00 p.m. and the flexible time band on either end of the core period as 7:00-9:30 a.m. and 4:00-6:00 p.m. Lunch can be taken between 12:00 noon and 1:30 p.m., with the employee being required to take a minimum of 30 minutes and up to 1 1/2 hours for lunch.*

And for good reason. Not only is the concept of flexible hours simple, but there is the added advantage of being flexible enough to meet the needs of almost any organization. Under the system, employees are allowed to start and finish their work day at any time during the "flexible hours" at the beginning and end of each working day. They must be present at work during designated "core" hours, and they are also required to work a minimum number of hours per day, week or month, depending on the accounting period the company adopts. The total possible work period, including flexible hours and core hours, is known as

"bandwidth." (See diagram, page 51.) Management establishes both the bandwidth and the mandatory core.

If he wishes, an employee can accumulate additional time beyond the minimum number of hours required by the company. These hours can be carried over or "banked" and credited in the following month. In most cases, credits are limited to ten hours. An employee can also carry over "debits" — that is, work fewer hours than required, with the promise to make them up during the following time period. Some companies have even extended the banking of extra hours to a year-long plan. Employees who are required first to

work long hours for a period of months, and then much shorter hours over a similar period, can bank their overtime hours during the busy periods and use them during the slack periods. Some government departments (such as the department of the environment) use such a system since most of their work is done during the summer months.

It is vital that everyone in the organization understands what the system is designed to achieve and how it operates. The employee now has the responsibility of how to spend his time and must consider not only his personal needs, but those of the company as well. To do this he must know the work load and staffing requirements for his department during flexible hours in order to make the right decision.

An important feature of flexible time is that it is really a contract between the employee and management under which the employee agrees to work a fixed number of hours per week or month. As Harrison points out, "This means that lost time hours for non-sickness reasons, such as lateness, delays caused by snow storms, shopping, personal and family problems, are charged against the employee's own time during the flexible time bands, since the employee has agreed to give a certain number of actual hours of work per month."

The positive results management can expect from a flexible hour system are most impressive. Again, according to another report by Riddell Stead & Associates which Harrison prepared, results of flexible hours are:

- 1) a decrease in the number of employees while maintaining or increasing productivity — especially true in white collar positions.
- 2) a decrease in supervisory staff.
- 3) a decrease in absenteeism, particularly single day absences.
- 4) a reduction in overtime costs.
- 5) improved employee moral accompanied by a greater interest in work.

The report concludes: "Perhaps the most interesting feature of flexible hours is that while management secures many tangible gains, the system is enthusiastically endorsed by employees." However the change to flexible hours requires as much from management as from employees. Management for the first time will have to manage rather than merely attempting to supervise."

Employee reaction to the flexible hour system has been totally positive. Flexible time does not, for example, require the employee to change his life style patterns unless he wants to, Sun Life of Canada, Montreal, one of the largest installations of the flexible hour system, recently

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### 52nd Milan Trade Fair: April 14-25

15th International Exhibition of Heating - Air-conditioning - Refrigeration & Sanitary Installations - Ceramic-glazed Tiles Salon: **March 1-7**

1st EUROPEL - European Handbag Manufacturers' Trade Fair: **March 7-9**

MIAS 74 - International Market for Sporting & Camping Equipment: **March 9-12**

1st EUROCUINA - Biennial International Kitchen Furniture Exhibition: **March 9-12**

Baby Salon: **March 12-19**

10th COMIS/PEL - International Fur Dealers' Salon: **March 21-25**

29th MIFED - International Film, TVfilm and Documentary Market: **April 18-25**

35th MITAM - International Market for Clothing Textiles: **May 5-8**

MI-DO 74 - International Exhibition of Optical, Optometric and Ophthalmic Goods: **May 10-14**

INTERBIMALL 1974 - 4th International Biennial Exhibition of Timber- & Woodworking Machinery: **May 18-25**

4th SASMIL - International Exhibition of Semi-finished Products & Accessories for the Manufacture of Furniture, Upholstery & Wooden Articles: **May 18-25**

MITAM/STAR 74 - International Trade Show of Carpets & Furnishing Fabrics: **May 23-27**

4th FLUID - Italian Exhibition of Hydraulic & Pneumatic Equipment & of Lubrication

3rd EleMac - Exhibition of Machine Components: **June 5-10**

25th MIPEL - Italian Leather Goods Market (International Salon): **June 7-11**

22nd COMIS/EUROTRICOT - European Hosiery & Knitwear Salon: **June 18-21**

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completed a survey of employee attitudes toward it. According to their spokesman, employee reaction has been 100% positive. Similar results have been recorded by other companies.

### Staggered hours of work

Staggered hours of work, where a company requests that different groups of employees begin and finish work at different times, is also in the experimental stage. While not as popular as either the compressed work week or flexible time, this system should not be overlooked.

In a statement last October, made to the Ontario legislature, premier William Davis outlined a program to introduce staggered hours into the Ontario public service. There are about 11,500 members of the Ontario public service employed in the Queen's Park complex who are involved in the program. (Just imagine 11,500 people hitting the streets at the same time of the morning!) During the program's test period, only 50% will begin work at the normal time and the others will start at off-peak times ranging from 7:30 to 9:30 am.

Davis, as well as many others, sees staggered hours as one method of tackling transportation problems "because they offer a means of making better use of roads and transit systems which now remain idle during periods of the day."

The director of service and planning for the Montreal Urban Community Transit Commission, Henri Bessett, gives some indication of the strain placed on transit facilities in large urban centers during peak hours. He points out that the Montreal area facilities carry an average of one million people per day. Of that, two thirds are carried during peak hours (7:30 - 9:00 am and 4:00 - 6:00 pm). Any modification to the present work week would improve the utilization of the transit system. In fact, it would reduce the need for the present huge capital investment in rolling stock. "We require three times the number of vehicles and personnel during rush hour periods as during off times," says Bessett. And such an investment can only increase in order to meet the increasing peak hour needs as the population around urban centers grows. Perhaps we can go so far as to say that to insure freedom of movement in our cities in the future, large scale application of more flexible work schedules is imperative.

While the modified work week is still in its embryonic stage, if Kahn and others like him are correct, leisure and the individual's control over his own time will become the rule rather than the exception in our often anxiously anticipated leisure society. *CE*

### Committee

*Continued from p. 49*

appointed by the incompetent to do the unnecessary? Perhaps the truth, as is often the case, lies somewhere in between.

For it cannot really be disputed that the committee does have its uses. In the capacity for which it was originally created — to provide back-up help and advice to a business manager who has neither the time nor the training to go deeply enough into some of the more complicated technical problems under his review — there is general agreement that it functions well. If, given a clear mandate, adequate guidelines and an appropriate membership, it undoubtedly is most useful in this area. And its importance in this essentially advisory role, given the increasing demands of a more and more complex technology and a larger and larger business sector, can only grow.

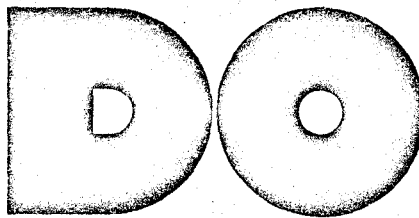
Many of the criticisms of the committee, in fact, are not so much criticisms of the idea itself as of its misuse. The committee was never meant, for example, to take the place of a decision-making executive or to otherwise help him "escape" responsibility. To criticize it on these grounds is to miss the point. Neither was it ever intended to help an individual or a company "sit on" a problem in the hope that the problem would disappear; nor

should it be expected to "carry" raw young executives while they "learn their trade." It is when it is abused in such ways that it becomes a white elephant.

Most of the above objections and abuses the committee is subjected to could be eliminated, and the positive contributions of the committee to the corporation strengthened if the following simple set of guidelines were adhered to:

- a) duties and authority must be clear
- b) members must be selected with the duties of the committee clearly in mind
- c) the committee must be supported with the necessary staff assistance
- d) procedures must be designed to obtain prompt and effective action
- e) the right chairman must be chosen

The trend today is toward more and more committees, toward more and more prevalent use of group thinking, so that the problem of the indiscriminate multiplication of such groups, their containment and possible redirection toward greater productivity needs urgent attention. And, while the old virtues of responsibility and individual initiative must survive to retain their place in corporate life, there is an equal necessity for a serious redefinition of the committee function to enable this method of decision-making to find its full and appropriate place in modern business structure. *CE*



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ALTERNATIVES RESPONSE FORM

With the information outlined in the Problem Statement and your knowledge of the Business Organization you are in, generate as many alternative Decisions the Management Group could make that you would consider as possible answers to the Problem. Naturally you will have a preference of one to another, but do not be concerned with preferences at this time, just any potential solutions to the Problem. Use the space below to list your alternatives (add more pages if necessary). Number your alternatives starting from #1. Please do not discuss these alternatives with your co-workers that are participating in this study.

Alternative 1 -

Alternative 2 -

Alternative 3 -

Alternative 4 -

Alternative 5 -

Alternative

APPENDIX C

DELPHI - ROUND II

Anonymity assurance	- page 61
Problem Statement	- page 62
Round II explanation	- page 63
Alternatives evaluation form	- page 64-66



SIMON FRASER UNIVERSITY, BURNABY 2, B.C., CANADA  
M.B.A. EXECUTIVE PROGRAMME; 291-3639

Dear Sir:

I am writing to explain my role in Mr. Roger Jung's study on decision making through group participation. I have been advising and assisting Roger in organizing the study. I have also agreed to act as the person who codes, mails out, and receives the questionnaires you will be completing. This procedure enables us to keep track of which individuals respond while assuring their anonymity.

The procedure works as follows. Roger will present me with (1) envelopes with your addresses on them, (2) uncoded questionnaires, and (3) pre-addressed return envelopes. I or my secretary will place a code number on your questionnaire and send the materials to you. Upon return of the completed questionnaire from you, I will open and discard the envelope. The completed and coded questionnaires will then be given to another graduate student (Mr. John Sims) for analysis and preparation of the next questionnaire. In no case will Roger Jung or any other person from Westinghouse be allowed to see your written response. They and you, however, will later receive a typed summary of the overall results.

I can assure you that only I and my secretary will know the names associated with the code numbers. If it ever became known that I did not respect confidentiality, then my ability to be involved in similar studies in industry would be seriously jeopardized. As a consequence, I have no intention of revealing names and breaking your trust.

Your participation in these series of questionnaires should be a worthwhile experience without a major expenditure of time on your part. The project has many benefits for you, and I urge you to give it your serious consideration.

Yours sincerely,

W.C. Wedley  
Assistant Professor

WW/vod



PROBLEM STATEMENT

The problem we wish to solve in this series of questionnaires is one which has been with us for some time and is considered to be getting worse, that is - loss of productive time among the clerical and technical staff because of:-

- A) Tardiness
- B) Absenteeism
- C) Extended lunch breaks
- D) Dissatisfaction with hours of work

Attached is an article published recently called 'The Staggering Effects of a Changed Work Week'. The article is included to bring us all up to date as to the currently popular 'time management' techniques. It is not intended to influence or to show any bias towards the solution.

You are encouraged to generate any potential solutions, even modifications of more established methods of 'time management'.

DELPHI ROUND II

EXPLANATION

Listed on the next page(s) are all the solutions generated by yourself and your co-workers in the First Round. In this, the Second Round you are asked to evaluate each alternative on a 11 point Scale as to its-

A - Effectiveness to the Company.

B - Difficulty of Implementation.

C - Desirability Rating.

The Evaluation Scale to be used and an example is repeated on each page for your convenience.

When you have selected a numerical value, please enter that number in the appropriate box to the right as shown in the example. In making an evaluation, it is quite reasonable to award the same numerical value to several solutions, ie., there may not be "one best" but "several best" solutions to the Problem from your viewpoint.

As you will notice there is space for you to write any comments about each solution if you so wish.

You may also add new solutions that may come to your mind at this time.

Please ignore the numbers in brackets, they are for Computer Keypunch use. Questionnaire should be returned by July the 2nd, 1975.

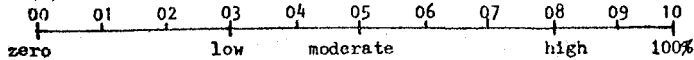
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Please evaluate each alternative for-

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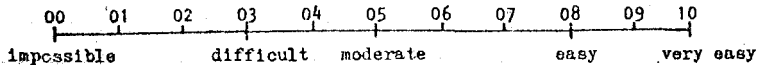
Evaluation A - Effectiveness

How do you rate this alternative for Effectiveness for the Company?



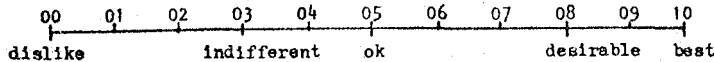
Evaluation B - Implementation

How difficult is the implementation of this decision in view of Company Policies, Organization, Finances, etc.?



Evaluation C - Desirability

What is your personal feelings of desirability on this alternative?



Your evaluation  
HERE

EXAMPLE/EVALUATION	SCORES
Alt. 0 - Details of the alternative to be evaluated will appear here.	A-Effect. . . . . <input type="text"/> <input type="text"/> ( 0 , 9 )
<u>COMMENTS-</u>	B-Implem. . . . . <input type="text"/> <input type="text"/> ( 0 , 4 )
	C-Desirab. . . . . <input type="text"/> <input type="text"/> ( 0 , 9 )

Alt. 1 - Increase lunch breaks to 60 minutes or more.	A-Effect. . . . . <input type="text"/> <input type="text"/> ( 6 , 7 )
<u>COMMENTS-</u>	B-Implem. . . . . <input type="text"/> <input type="text"/> ( 8 , 9 )
	C-Desirab. . . . . <input type="text"/> <input type="text"/> ( 10 , 11 )

Alt. 2 - Decrease lunch breaks (A very short one would make it difficult to leave the office.)	A-Effect. . . . . <input type="text"/> <input type="text"/> ( 12 , 13 )
<u>COMMENTS-</u>	B-Implem. . . . . <input type="text"/> <input type="text"/> ( 14 , 15 )
	C-Desirab. . . . . <input type="text"/> <input type="text"/> ( 16 , 17 )

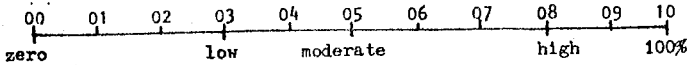
Alt. 3 - Make no changes, as plant profitability has been good and, the present casualness may be contributing to high productivity.	A-Effect. . . . . <input type="text"/> <input type="text"/> ( 18 , 19 )
<u>COMMENTS-</u>	B-Implem. . . . . <input type="text"/> <input type="text"/> ( 20 , 21 )
	C-Desirab. . . . . <input type="text"/> <input type="text"/> ( 22 , 23 )

Alt. 4 - Concentrate on getting work done and tolerate casual attitude toward punctuality.	A-Effect. . . . . <input type="text"/> <input type="text"/> ( 24 , 25 )
<u>COMMENTS-</u>	B-Implem. . . . . <input type="text"/> <input type="text"/> ( 26 , 27 )
	C-Desirab. . . . . <input type="text"/> <input type="text"/> ( 28 , 29 )

Please evaluate each alternative for-

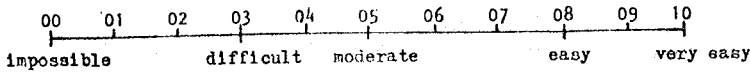
Evaluation A - Effectiveness

How do you rate this alternative for Effectiveness for the Company?



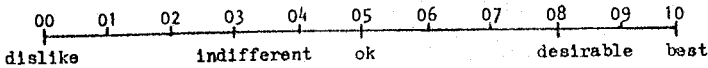
Evaluation B - Implementation

How difficult is the implementation of this decision in view of Company Policies, Organization, Finances, etc.?



Evaluation C - Desirability

What is your personal feelings of desirability on this alternative?



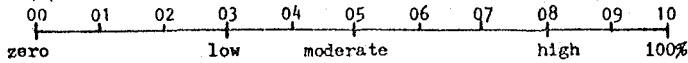
EXAMPLE EVALUATION	SCORES
Alt. 0 - Details of the alternative to be evaluated will appear here.  COMMENTS-	A-Effect. . . . . ( ) B-Implem. . . . . ( ) C-Desirab. . . . . ( )
Alt. 5 - Deal with offenders on an individual basis - Extreme nonconformists can leave.  COMMENTS-	A-Effect. . . . . ( 30, 31 ) B-Implem. . . . . ( 32, 33 ) C-Desirab. . . . . ( 34, 35 )
Alt. 6 - Institute flexible hours with essential core period for salaried employees making 7 1/2 hours on the job necessary and, making up time for longer lunch breaks.  COMMENTS-	A-Effect. . . . . ( 36, 37 ) B-Implem. . . . . ( 38, 39 ) C-Desirab. . . . . ( 40, 41 )
Alt. 7 - Leave arrangement as it is, but, enforce conformity (By time clock, signing in and out books, or a system of penalties).  COMMENTS-	A-Effect. . . . . ( 42, 43 ) B-Implem. . . . . ( 44, 45 ) C-Desirab. . . . . ( 46, 47 )
Alt. 8 - Management should set a rigorous example by always being present by starting time and remaining conspicuously at work until quitting time.  COMMENTS-	A-Effect. . . . . ( 48, 49 ) B-Implem. . . . . ( 50, 51 ) C-Desirab. . . . . ( 52, 53 )



Please evaluate each alternative for-

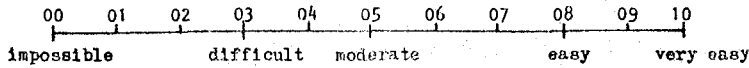
Evaluation A - Effectiveness

How do you rate this alternative for Effectiveness for the Company?



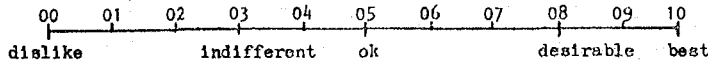
Evaluation B - Implementation

How difficult is the implementation of this decision in view of Company Policies, Organization, Finances, etc.?



Evaluation C - Desirability

What is your personal feelings of desirability on this alternative?



EXAMPLE EVALUATION	SCORES
Alt. 0 - Details of the alternative to be evaluated will appear here.	A-Effect. . . . . ( <input type="text"/> , <input type="text"/> )
<u>COMMENTS-</u>	B-Implem. . . . . ( <input type="text"/> , <input type="text"/> )
	C-Desirab. . . . . ( <input type="text"/> , <input type="text"/> )

Alt. 9 - Explain problem to employees making them aware of the extent of present abuse and relying on them to shape up.	A-Effect. . . . . ( <input type="text"/> , <input type="text"/> ) (54 , 55)
<u>COMMENTS-</u>	B-Implem. . . . . ( <input type="text"/> , <input type="text"/> ) (56 , 57)
	C-Desirab. . . . . ( <input type="text"/> , <input type="text"/> ) (58 , 59)

Alt. 10 - A compressed work week with or without flexible hours such as 9 working days of 8 hours and 20 minutes each per two week period, or;	A-Effect. . . . . ( <input type="text"/> , <input type="text"/> ) (60 , 61)
<u>COMMENTS-</u>	B-Implem. . . . . ( <input type="text"/> , <input type="text"/> ) (62 , 63)
	C-Desirab. . . . . ( <input type="text"/> , <input type="text"/> ) (64 , 65)

Alt. 11 - A Compressed work week of 4 days per week, consisting of 9 hours and 25 minutes each day.	A-Effect. . . . . ( <input type="text"/> , <input type="text"/> ) (66 , 67)
<u>COMMENTS-</u>	B-Implem. . . . . ( <input type="text"/> , <input type="text"/> ) (68 , 69)
	C-Desirab. . . . . ( <input type="text"/> , <input type="text"/> ) (70 , 71)

Alt. -	A-Effect. . . . . ( <input type="text"/> , <input type="text"/> ) ( , )
<u>COMMENTS-</u>	B-Implem. . . . . ( <input type="text"/> , <input type="text"/> ) ( , )
	C-Desirab. . . . . ( <input type="text"/> , <input type="text"/> ) ( , )

APPENDIX D

DELPHI - ROUND III

Anonymity assurance	- page 68
Problem Statement	- page 69
Round III explanation	- page 70
Alternatives re-evaluation form	- page 71-73



SIMON FRASER UNIVERSITY, BURNABY 2, B.C., CANADA  
M.B.A. EXECUTIVE PROGRAMME; 291-3639

Dear Sir:

I am writing to explain my role in Mr. Roger Jung's study on decision making through group participation. I have been advising and assisting Roger in organizing the study. I have also agreed to act as the person who codes, mails out, and receives the questionnaires you will be completing. This procedure enables us to keep track of which individuals respond while assuring their anonymity.

The procedure works as follows. Roger will present me with (1) envelopes with your addresses on them, (2) uncoded questionnaires, and (3) pre-addressed return envelopes. I or my secretary will place a code number on your questionnaire and send the materials to you. Upon return of the completed questionnaire from you, I will open and discard the envelope. The completed and coded questionnaires will then be given to another graduate student (Mr. John Sims) for analysis and preparation of the next questionnaire. In no case will Roger Jung or any other person from Westinghouse be allowed to see your written response. They and you, however, will later receive a typed summary of the overall results.

I can assure you that only I and my secretary will know the names associated with the code numbers. If it ever became known that I did not respect confidentiality, then my ability to be involved in similar studies in industry would be seriously jeopardized. As a consequence, I have no intention of revealing names and breaking your trust.

Your participation in these series of questionnaires should be a worthwhile experience without a major expenditure of time on your part. The project has many benefits for you, and I urge you to give it your serious consideration.

Yours sincerely,

W.C. Wedley  
Assistant Professor

WW/vod



PROBLEM STATEMENT

The problem we wish to solve in this series of questionnaires is one which has been with us for some time and is considered to be getting worse, that is - loss of productive time among the clerical and technical staff because of:-

- A) Tardiness
- B) Absenteeism
- C) Extended lunch breaks
- D) Dissatisfaction with hours of work

Attached is an article published recently called 'The Staggering Effects of a Changed Work Week'. The article is included to bring us all up to date as to the currently popular 'time management' techniques. It is not intended to influence or to show any bias towards the solution.

You are encouraged to generate any potential solutions, even modifications of more established methods of 'time management'.

ROUND III  
EXPLANATIONS

Listed on the following pages are all the solutions generated by yourself and your co-workers in the previous rounds together with the Average Point Score Evaluation of all the Participants in this Study.

In this Round you are again asked to evaluate the Alternatives. Only this time you will have the Feedback of the Scores given by your co-workers.

The following instructions are identical to instructions issued to you in the previous Round and is only repeated for your convenience.

"The Evaluation Scale to be used and an example is repeated on each page for your convenience. When you have selected a numerical value, please enter that number in the appropriate box to the right as shown in the example. In making an evaluation, it is quite reasonable to award the same numerical value to several solutions, ie, there may not be "one best" but "several best" solutions to the problem from your point of view.

As you will notice there is space for you to write any comments about each solution if you so wish."

Please ignore the numbers in brackets, they are for Computer Keypunch use. Questionnaire should be returned by July the 15th, 1975.

( 4 )

Please evaluate each alternative for-

( 5 )

Evaluation A - Effectiveness

How do you rate this alternative for Effectiveness for the Company?

00 01 02 03 04 05 06 07 08 09 10  
zero low moderate high 100%

Evaluation B - Implementation

How difficult is the implementation of this decision in view of Company Policies, Organization, Finances, etc.?

00 01 02 03 04 05 06 07 08 09 10  
impossible difficult moderate easy very easy

Evaluation C - Desirability

What is your personal feelings of desirability on this alternative?

00 01 02 03 04 05 06 07 08 09 10  
dislike indifferent ok desirable best

Average Score of Previous Round (In Red)

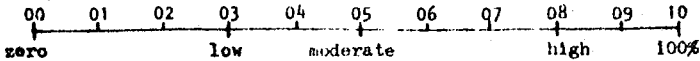
Your evaluation was 7

Alternative	Description	A-Effect.	B-Imple.	C-Desirab.	Score Range
Alt. 0	Details of the alternative to be evaluated will appear here.	0.8	0.4	0.9	( 0 , 9 )
Alt. 1	Increase lunch breaks to 60 minutes or more.	0.8	0.8	0.6	( 6 , 7 ) ( 8 , 9 ) ( 10 , 11 )
Alt. 2	Decrease lunch breaks (A very short one would make it difficult to leave the office.)	0.4	0.4	0.3	( 12 , 13 ) ( 14 , 15 ) ( 16 , 17 )
Alt. 3	Make no changes, as plant profitability has been good and, the present casualness may be contributing to high productivity.	0.6	1.0	0.8	( 18 , 19 ) ( 20 , 21 ) ( 22 , 23 )
Alt. 4	Concentrate on getting work done and tolerate casual attitude toward punctuality.	0.8	0.7	0.8	( 24 , 25 ) ( 26 , 27 ) ( 28 , 29 )

Please evaluate each alternative for-

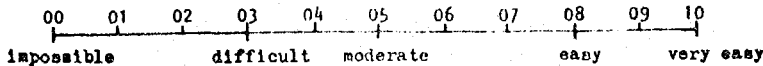
Evaluation A - Effectiveness

How do you rate this alternative for Effectiveness for the Company?



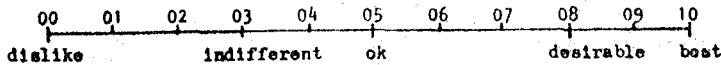
Evaluation B - Implementation

How difficult is the implementation of this decision in view of Company Policies, Organization, Finances, etc.?



Evaluation C - Desirability

What is your personal feelings of desirability on this alternative?



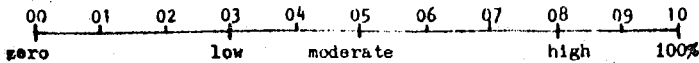
Your  
Average Score of Evaluation  
Previous Round , Here ,

<u>EXAMPLE EVALUATION</u>		<u>SCORES (In Red)</u>	
Alt. 0 - Details of the alternative to be evaluated will appear here.		A-Effect. ( )	( )
		B-Implem. ( )	( )
		C-Desirab. ( )	( )
<u>COMMENTS-</u>			
Alt. 5 - Deal with offenders on an individual basis - Extreme nonconformists can leave.		A-Effect. 07.1	( )
			30,31
<u>COMMENTS-</u>		B-Implem. 06.0	( )
Some of the non conformists are part of Management			32,33
		C-Desirab. 07.8	( )
			34,35
Alt. 6 - Institute flexible hours with essential core period for salaried employees making 7 1/2 hours on the job necessary and, making up time for longer lunch breaks.		A-Effect. 06.6	( )
			36,37
<u>COMMENTS-</u>		B-Implem. 05.4	( )
			38,39
		C-Desirab. 05.2	( )
			40,41
Alt. 7 - Leave arrangement as it is, but, enforce conformity (By time clock, signing in and out books, or a system of penalties.		A-Effect. 03.8	( )
			42,43
<u>COMMENTS-</u>		B-Implem. 04.6	( )
			44,45
		C-Desirab. 01.3	( )
			46,47
Alt. 8 - Management should set a rigorous example by always being present by starting time and remaining conspicuously at work until quitting time.		A-Effect. 06.2	( )
			48,49
<u>COMMENTS-</u>		B-Implem. 06.0	( )
Not possible for all Managers in Sales Calls etc.			50,51
		C-Desirab. 04.4	( )
			52,53

Please evaluate each alternative for-

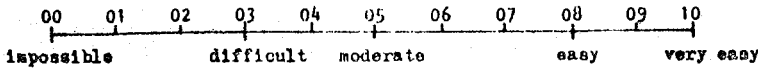
Evaluation A - Effectiveness

How do you rate this alternative for Effectiveness for the Company?



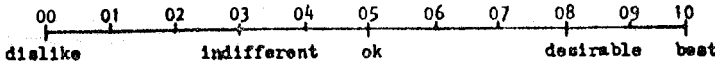
Evaluation B - Implementation

How difficult is the implementation of this decision in view of Company Policies, Organization, Finances, etc.?



Evaluation C - Desirability

What is your personal feelings of desirability on this alternative?



Your  
Average Score of Evaluation  
Previous Round,  
Here

<u>EXAMPLE EVALUATION</u>		SCORES (In/Red)	
Alt. 0 - Details of the alternative to be evaluated will appear here.  <u>COMMENTS-</u>	A-Effect.	<input type="text"/>	<input type="text"/>
	B-Implen.	<input type="text"/>	<input type="text"/>
	C-Desirab.	<input type="text"/>	<input type="text"/>
Alt. 9 - Explain problem to employees making them aware of the extent of present abuse and relying on them to shape up.  <u>COMMENTS-</u>	A-Effect.	78.4	(54 55)
	B-Implen.	07.6	(56 57)
	C-Desirab.	04.8	(58 59)
Alt. 10 - A compressed work week with or without flexible hours such as 9 working days of 8 hours and 20 minutes each per two week period, or;  <u>COMMENTS-</u> 1-Advantages are-Longer business hours, no co-ordination problems with shop, customers or Wesco 2-Staff can plan personal appts. on day off 3-Impossible to use in our present organization	A-Effect.	64.4	(60 61)
	B-Implen.	03.2	(62 63)
	C-Desirab.	03.6	(64 65)
Alt. 11 - A Compressed work week of 4 days per week, consisting of 9 hours and 25 minutes each day.  <u>COMMENTS-</u> Requires more staff or co-ordination with Wesco	A-Effect.	66.8	(66 67)
	B-Implen.	03.0	(68 69)
	C-Desirab.	03.1	(70 71)
NEW Alt. 12 - Upgrade Lunchroom Facilities. <i>* Average Score is NOT AVERAGE, BECAUSE IS A NEW ALTERNATIVE &amp; ONLY 2 COMMENTS SUBMITTED.</i>	A-Effect.	07.4	(72 73)
	B-Implen.	03.6	(74 75)
	C-Desirab.	03.0	(76 77)
<u>COMMENTS-</u>			



APPENDIX E

DELPHI - ROUND IV

Anonymity assurance	- page 75
Decision Statement	- page 76-77
Letter to researcher	- page 78
Delphi statistics	- page 79-80
Delphi Attitude questionnaire	- page 81-84



SIMON FRASER UNIVERSITY, BURNABY 2, B.C., CANADA  
M.B.A. EXECUTIVE PROGRAMME; 291-3639

Dear Sir:

I am writing to explain my role in Mr. Roger Jung's study on decision making through group participation. I have been advising and assisting Roger in organizing the study. I have also agreed to act as the person who codes, mails out, and receives the questionnaires you will be completing. This procedure enables us to keep track of which individuals respond while assuring their anonymity.

The procedure works as follows. Roger will present me with (1) envelopes with your addresses on them, (2) uncoded questionnaires, and (3) pre-addressed return envelopes. I or my secretary will place a code number on your questionnaire and send the materials to you. Upon return of the completed Questionnaire from you, I will open and discard the envelope. The completed and coded questionnaires will then be given to another graduate student (Mr. John Sims) for analysis and preparation of the next questionnaire. In no case will Roger Jung or any other person from Westinghouse be allowed to see your written response. They and you, however, will later receive a typed summary of the overall results.

I can assure you that only I and my secretary will know the names associated with the code numbers. If it ever became known that I did not respect confidentiality, then my ability to be involved in similar studies in industry would be seriously jeopardized. As a consequence, I have no intention of revealing names and breaking your trust.

Your participation in these series of questionnaires should be a worthwhile experience without a major expenditure of time on your part. The project has many benefits for you, and I urge you to give it your serious consideration.

Yours sincerely,

W.C. Wedley  
Assistant Professor

WW/vod





From :Vancouver S & C PG 060  
WIN :  
Date :September 2, 1975  
Subject:DELPHI STUDY ANALYSIS

As the next and almost final stage of the Delphi Study being conducted by Simon Fraser University on behalf of Roger Jung, I have been asked to make a decision based on the information gathered through the study.

The decision as outlined below is based almost entirely upon the results of the survey. Although some of the suggestions that came forward during the course of the Delphi Study would, had they obtained a high rating, made it necessary for me to override the results, the actual results obtained are well within my sphere of authority and I can enthusiastically endorse the decisions at which we have arrived.

By analyzing the scoring system and giving more weight to the score of effectiveness than for instance implementation. Four of the suggestions stand out far ahead of the other eight. By considering these four suggestions and combining them the following decision has been made.

The decision breaks down into three basic parts:

1. Working through the Department Managers we must appeal to our staff to give the Company a fair break regarding hours of work. This requires that each employee make a strong effort to observe the hours of work, and to communicate to us if for any reason they are difficult to keep. Further to the above we should communicate to our employees that if time is lost inadvertently by being late or by the necessity of leaving early, then it is a responsibility of that employee to make the time up at the earliest possible time.

...../2

DELPHI STUDY ANALYSIS  
September 2, 1975  
Page 2

2. It is generally conceded that there should be no change in the current hours of work or method of keeping time, but that we should concentrate on getting the work done and meeting our objectives rather than on the bureaucratic requirements of the job. This means that each one of us must be sure that every job is well designed and that every employee understands his job and the objectives of it. Another important feature of a well designed job is that the objectives provide for a feedback of information to the job incumbent as to how effective he is in meeting these objectives.
3. All members of the Management Team should make a special effort to be in the office at or before the beginning of normal working hours, both in the morning and in the afternoon. If for any reason one must be away from the office then the Switchboard Operator or the Secretary should be advised ahead of time of the absence and its probable duration. This should include long lunch hours, holidays, meetings away from the office, business trips etc.

At our next team meeting I would suggest that this be a topic of discussion and that the method of implementation of this discussion be established at that time.  
<sub>decision</sub>

George Ward, Manager  
Vancouver S & C

GW/mc



From : Vancouver S & C PG 060  
WIN :  
Date : September 3, 1975  
Subject: DELPHI STUDY

Roger Jung

---

The decision coming out of the Delphi Study is probably a little harder to implement than the score would indicate because it is simply to do what we are already trying to do, only to do it well. I have considered the three sets of scores and weighted them giving effectiveness twice the weighting of difficulty of implementation and desirability one and a half times the rating of implementation. Under that scoring system number 4 scored highest with numbers 5 and 3 very close behind, and a little back of that is number 8. The rest of the suggestions are well away from these, particularly those that suggest a radical change in hours or methods of timekeeping.

Therefore, for these reasons the decision is outlined in the attached letter with the one exception that very little has been said in that letter regarding the dealing with offenders. Suggestion 5 which scored very high suggests that individuals who do not comply be punished and even dismissed. I would expect to discuss this in a team meeting rather than put it in a letter.

I wish to express my appreciation for the work you have done and I feel that the quality of decision is probably a good deal higher than it would be under most other techniques. I am also relieved to be able to say that the decision does not violate my range of authority and you might be interested to know that during a meeting in Hamilton in July, Cece MacNeil stated very bluntly that "flexible hours" were under no condition to be practiced in our division. He was not aware so far as I know of the details of our study.

George Ward

GW/mc  
Attach.

COMPARISON OF  
DELPHI DECISION ROUND 2 & 3

ALTERNATIVE	FACTOR	MEAN		STANDARD DEVIATION	
		RND. 2	RND. 3	ROUND 2	ROUND 3
1. Increase lunch break to 60 minutes	Effectiveness	4.8	4.0	2.387	2.345
	Implementation	9.8	9.4	.447	.894
	Desirability	5.6	4.6	2.702	3.209
2. Decrease lunch breaks	Effectiveness	4.0	3.2	2.739	1.643
	Implementation	6.4	7.8	4.159	2.490
	Desirability	2.4	1.8	2.302	.837**
3. Make no changes	Effectiveness	6.4	6.0	1.949	1.414
	Implementation	10.0	10.0	0.0	0.0
	Desirability	6.2	6.2	2.168	1.789
4. Concentrate on getting work done & tolerate casual attitude	Effectiveness	7.0	6.4	1.871	1.571
	Implementation	7.2	8.0	3.834	2.550
	Desirability	7.4	7.6	3.286	2.074
5. Deal with offenders on individual basis, extreme non-conformists can leave	Effectiveness	7.0	7.2	1.225	0.837
	Implementation	6.0	6.8	2.739	1.924
	Desirability	7.8	7.2	1.924	1.789
6. Institute flexible hours, with core time	Effectiveness	6.5	6.0	2.966	2.449
	Implementation	5.4	4.8	3.578	3.114
	Desirability	5.2	4.2*	2.588	2.588
7. As is, except enforce conformity, time clock, signing book and/or a system of penalties	Effectiveness	3.8	3.8	2.588	1.924
	Implementation	4.6	5.0	3.847	3.162
	Desirability	1.2	0.8	1.304	0.837
8. Management should set an example by observing conspicuously starting & quitting times	Effectiveness	6.2	6.8	1.924	1.304
	Implementation	6.0	6.2	2.915	2.280
	Desirability	4.6	6.2	3.286	1.483 *
9. Explain problem to employees making them aware of the extent of present abuse & relying on them to shape up	Effectiveness	4.4	5.0	1.140	1.732
	Implementation	7.6	7.6	2.881	2.510
	Desirability	4.8	5.6	1.924	1.342

ALTERNATIVE	FACTOR	MEAN		STANDARD DEVIATION	
		RND. 2	RND. 3	ROUND 2	ROUND 3
10. A compressed work week with or without flexible hours such as 9 working days of 8 hours & 20 minutes each 2 week period	Effectiveness	4.4	4.0	4.722	2.000*
	Implementation	4.2	4.8	3.962	2.387
	Desirability	4.6	4.6	4.980	2.408*
11. A compressed work week of 4 days/week consisting of 9 hours & 25 minutes/day	Effectiveness	4.0	4.0	4.183	1.871*
	Implementation	3.0	5.0*	2.550	2.828
	Desirability	3.4	3.2	3.435	0.837**
12. Upgrade lunchroom facilities	Effectiveness	1.4	4.4	3.130	3.647
	Implementation	0.8	5.2*	1.789	3.701*
	Desirability	1.5	5.4	3.578	4.219

\* Significant of .10 level, paired sample 2 tailed T-test for Mean and grouped sample 1 tailed T-test for Standard Deviation

\*\* Significant of .05 level, grouped sample 1 tailed T-test for Standard Deviation

Computer Code #0165  
G3912

(1, 2, 3)

2  
(4)

1  
(5)

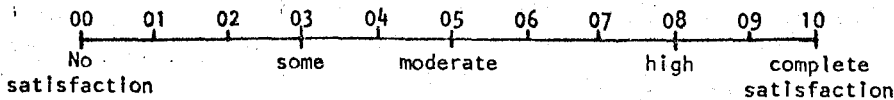
DELPHI  
DECISION-MAKING EVALUATION

Please ignore numbers in brackets, numbers are for computer use. Questionnaire to be returned by \_\_\_\_\_

All the following questions are regarding your feelings towards making Decisions by The Delphi Questionnaire Technique in which you have been a participant.

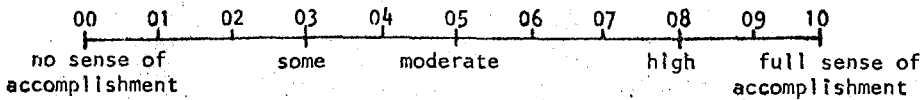
Please select the numerical value that best fits your feelings and enter that value in the box provided to the right of the question. (eg.)  0  6

1. How satisfied do you feel with the Decision made with the Delphi Process re: "Work Hours Problem."



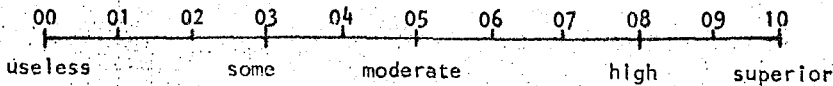
(6 7)

2. How is your feeling of accomplishment after?



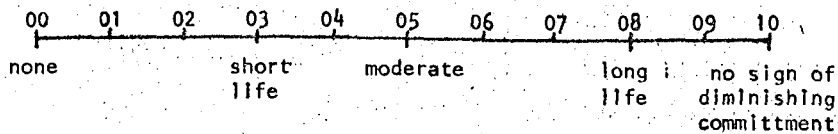
(8 9)

3. How do you rate this method of Decision Making?



(10 11)

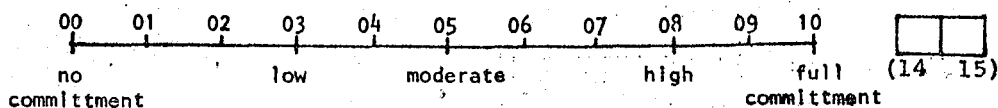
4. What is your impression of the other participants feelings of "Lasting commitment to the Decision that was made on the Work Hours problem."



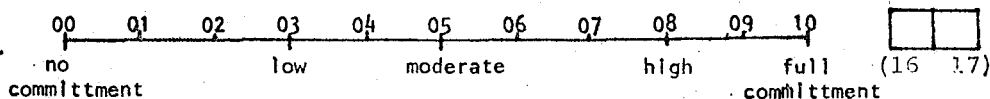
(12 13)



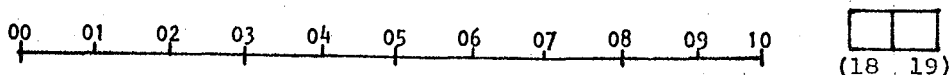
5. How is your feeling of commitment to the decisions made on the "Work Hours" Problem.



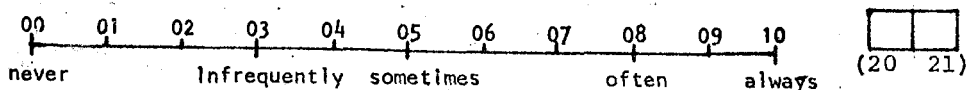
6. How is your feeling of commitment to this type of Decision Making Process?



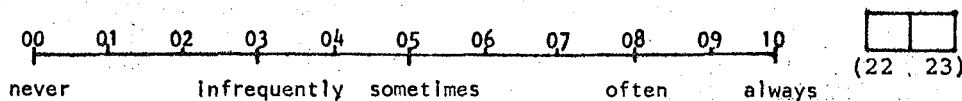
7.



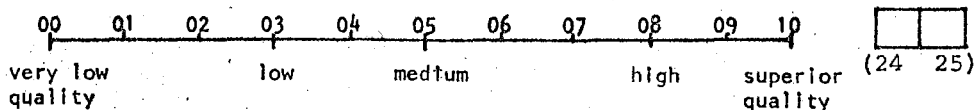
8. Was there damaging conflict between individuals in the Delphi Process? ("damaging" defined as harmful to the effectiveness of the individuals.)



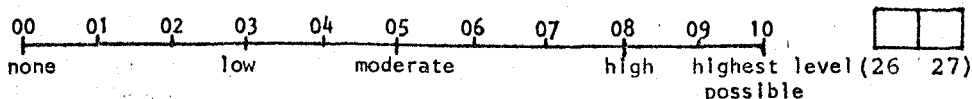
9. Does The Delphi Process allow a strong personality to dominate communications on the problem.



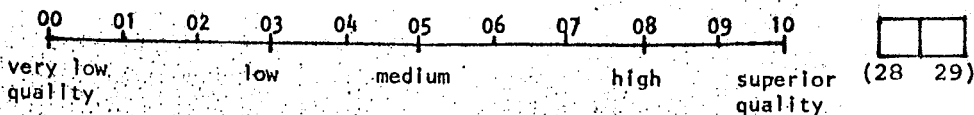
10. How do you feel about the quality of the Decision?



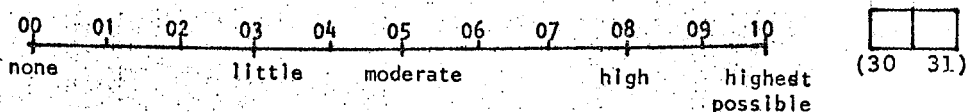
11. What level of openness and candor was there?



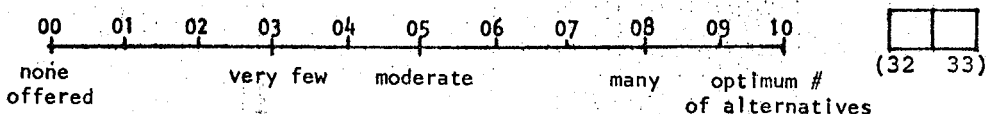
12. How do you feel about the quality of the alternatives presented before a Decision was reached?



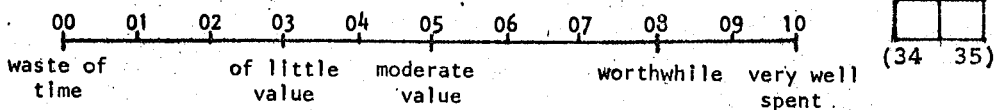
13. To what degree do you feel the Alternatives suggested helped to make the decision?



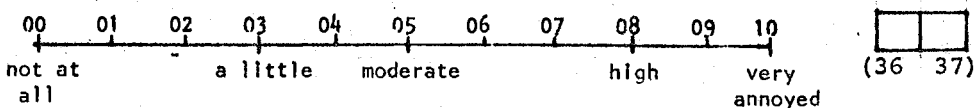
14. How do you feel about the number of alternative solutions offered?



15. How do you feel about the time spent?

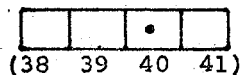


16. Did you feel annoyed when you were asked to complete the Questionnaires because "it was taking you away from your job".

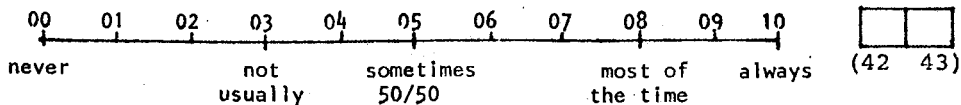


17. Using a best guess, what would you say is the average length of time filling Questionnaires to reach a Consensus Decision?

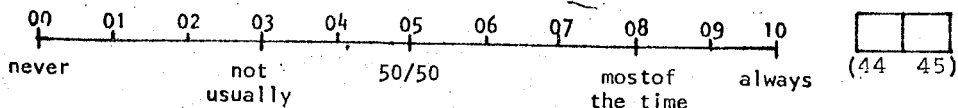
(Put down number of hours: eg. for 7½ hr.   .



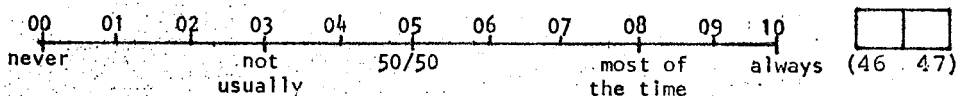
18. Is the resultant Decision implemented?



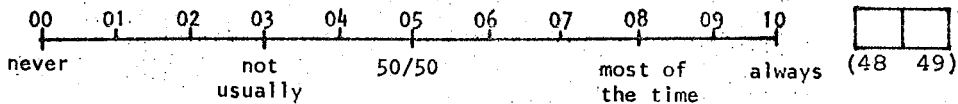
19. Do you feel you understood fully the implications of the alternative decisions?



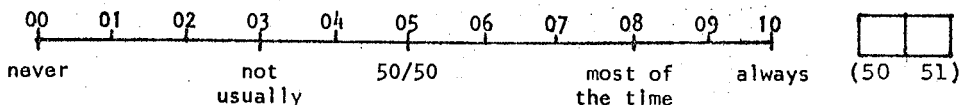
20. Do you feel the other participants understood fully the implications of the alternative decisions?



21. Do you feel you understood fully the implications of the final decision?



22. Do you feel the other participants understood fully the implications of the final decision?



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