III.C.1. Delphi Research in the Corporate Environment

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Introduction

The Delphi technique has become widely accepted in the past decade by a broad range of institutions, government departments, and policy research organizations ("think tanks"). These applications are described elsewhere in this book. The use of the Delphi approach in the corporate environment will be discussed in this section. Corporate utilization of Delphi is perhaps one of the least-known aspects of the technique's application. This is a result of corporations regarding the products of their Delphi exercises as proprietary and, hence, restricting their distribution or description in professional literature. A review of the long-term planning and futurist literature has revealed that few of the corporate efforts in this field have been documented in any detail.

The first part of this analysis will examine some uses of the Delphi technique in industry. This general review will be supplemented by an analysis of the application of the methodology in six Delphi studies conducted by the Business Planning group of Bell Canada. The Bell Canada experience will be followed by a description of some of the problems and issues that arise when using Delphi in the corporate environment, This review will conclude with some comments on the potential future of the Delphi technique in the business environment.

Examples of Corporate Delphi Research

Industrial Grouping or Professional Association Sponsorship

Delphi studies sponsored by corporations can be classified into three categories. The first category includes those studies sponsored by an industry association or a professional association.

These studies are usually of a broad nature and are concerned with projecting the future of an industry or perhaps even some broader societal field. The logistics of this application usually indicate that the study has to be contracted out to an independent consultant or research organization. While this type of application does not result in the day-to-day use of the methodology in business, the results of these Delphi studies are often exposed to a broad range of high-level managers and executives in business. Thus, in this situation, corporations are the consumers of Delphi research rather than users of the technique itself.

Parsons & Williams Inc., an international consulting firm, conducted a Delphi study entitled "Forecast 1968-2000 of Computer Developments and Applications" in 1968.[1]. This study was undertaken for a conference on computer file

organization held in Denmark sponsored by the International Federation of Information Processing Societies. This study examined future computer applications in business, the home, government, and institutions and projected the future of specific computing and technological developments [2]. Another recent Danish conference has also used a Delphi study as an input to panel discussion. This study, for a conference on long-term trends in personnel management called "Delphi 71-80", examined thirty-seven areas and predicted "how far society would be moved in certain directions by 1980" [3].

Sponsorship of Delphi studies by groups of firms are generally examinations of the future of an industry or an industrial segment. Current examples in this area include reviews of the cosmetics, recreation, and insurance markets. A "Delphi Panel on the Future of Leisure and Recreation" has been conducted by Social Engineering Technology Inc. (SET Inc.) [4]. This multiclient study was conducted by SET for a group of companies interested in future market opportunities in the recreational area that could develop through the impact of cultural change.

A Delphi study on the life insurance and other personal financial services markets is being conducted for two life insurance companies by the Canadian consultants Ducharme, Deom & Associes Ltee. The objective of this study is to "design a picture of the Life Insurance market and other personal financial services in the 1980's in terms of external environmental variables..." [5].

Individual Corporate Sponsorship

This second category of Delphi research is similar to the first. The grouping includes individual corporations who sponsor Delphi studies at research organizations on subjects of general or specific interest. The Institute for the Future (IFF) has conducted the largest number of these studies on this basis. In the case of IFF, the study results are in the public domain [6]. Several of these studies have been concerned with the impact of the computer/communications revolution:

(1) The Future of the Telephone Industry; sponsored by the American Telephone and Telegraph Co. (New York, N. Y.) [7].
(2) The Future of Newsprint; sponsored by MacMillan Bloedel Ltd. (Vancouver, B. C.) [8].
(3) On the Nature of Economic Losses Arising from Computer Based Systems in the Next Fifteen Years; sponsored by Skandia Insurance Co. (Stockholm, Sweden) [9].

Another IFF study sponsored by Owens-Corning Fiberglas Corp., examines "Some Prospects for Residential Housing by 1985" [10]. The research program by Owens-Corning also produced an IFF study on "Some Developments in Plastics and Competing Materials by 1985" [11].

An interesting IFF study sponsored by General Telephone and Electronics Corp., examines "Some Prospects for Social Change by 1985 and Their Impact on Time/Money Budgets" [12]. Hence the various corporate-sponsored studies at IFF

fall into general research categories (e.g., GTE, Skandia, and Owens-Corning) and specific industry research studies (e.g., AT&T, and MacMillan Bloedel).

Delphi research has also been sponsored by corporations in other research organizations. The Danish study referenced above on personnel management was extended by the consultants (Management Training Division of the Danish Institute of Graduate Engineers) to three groups of employees from the printing firm CONFORM [13]. The Pace Computing Corporation sponsored a study by marketing research consultants to determine the potential demand for its services [14].

The Delphi technique has recently come to the attention of other marketing research consultants. This should lead to an expansion of corporate sponsorship of these studies, as the market researchers will promote the technique with customers who might not normally become exposed to Delphi or other longer term planning techniques. One Canadian market research organization has mentioned the technique in its periodic newsletter to clients [15]. As noted in the first category, this sponsorship leads to senior management exposure to the technique even though the corporations do not conduct the studies themselves.

Corporate In-House Delphi Research

This final category includes Delphi studies conducted by research or planning groups within the corporation itself. In this case, members of the corporation staff become very involved with Delphi as they must master the technique as well as use the study results. This category includes most proprietary uses of the studies and their results, and they usually have not been published or distributed widely.

The best-known example of corporate Delphi experience is that of TRW. While the TRW Delphi studies are unpublished and proprietary, a number of papers have been published by North and Pyke on the technique's use and selected study results [16]. TRW's modification of Delphi has been named PROBE. The initial study was started in 1965 and resulted in a fifty-page document containing a set of 401 forecasts published in June 1966 [17]. This has been refined in a second study called "Probe IL" The reader is referred to the papers noted above for an elaboration of the TRW experience with Delphi.

A Delphi study was conducted in the U. K. by the Hercules Powder Co. Ltd. on the future of the British Chemical Industry in the 1980s. This has been discussed in several articles by Parker of Hercules [18] and used as a case example in the book *Technological Forecasting* by Wills [19]. Other U. K. experiences with technological forecasting and Delphi were referenced in a recent article "Technological Forecasting in Six Major U. K. Companies" by Curill [20]. While he does not name specific companies, he notes that Delphi has been used by: a "Glass" Company, a "Consumer Goods" Company, two "Chemical Companies," and an "Electrical Engineering" Company and that this is one of the most popular techniques of those companies utilizing technological forecasting methodologies.

The medical field has been explored in a U. S. study by Smith, Kline and French, a major pharmaceutical manufacturer [21]. Three other large U. S. pharmaceutical companies are reported to have conducted studies as well [22].

Industries undergoing rapid change have been frequent targets of Delphi research. The merging computer and communications fields are an example of this phenomenon and a significant number of industrial studies have been conducted. IBM has conducted an internal study on future computer applications. ICL in England have also sponsored a Delphi study. In addition to sponsoring the IFF research, AT&T conducted a study, "Communication Needs of the Seventies and Eighties" (internal document) [23]. Bell Canada has undertaken six studies projecting technological and social trends in four main areas: education, medicine, business information systems, and "wired city" services (all proprietary) [24]. The Trans-Canada Telephone System conducted an internal Delphi study on future data service needs. British Columbia Telephone is conducting a Policy Delphi with senior managers.

Summary: Corporate Examples

The discussion of various forms and examples of corporate sponsorship of Delphi studies is not intended to be all-inclusive. It merely attempts to outline, on an international basis, a few of the known examples of the scope of Delphi usage in industry. The next discussion will center on our experiences in Bell Canada as one example of how corporate Delphi studies have been conducted.

Delphi and Bell Canada

Background

Bell Canada is an operating telecommunications company serving the provinces of Ontario and Quebec in Canada. In addition to offering voice, data, and visual telecommunications services, Bell Canada owns a large manufacturing subsidiary (Northern Electric) and an R & D subsidiary (Bell-Northern Research). There are also several other subsidiaries in the telephone, directory, and electronic components manufacturing fields. The Business Planning Group in Bell has the responsibility for identification of corporate opportunities (or threats) that will arise through changes in society and/or technology in the next decade or two.

The communications field is in the midst of rapid change which will have a significant impact on its intermediate and long term future. Highlights of these changes include:

- merging computer and communications technologies
- regulatory changes introducing new competitive elements
- emerging visual telecommunications markets
- perceived and projected social changes
- increasing costs of investment options

The Business Planning Group surveyed these various pressures in the late 1960s as it was developing a study plan to evaluate future trends in the visual and computer communications fields. There was a distinct lack of qualitative data on potential futures for these fields, especially in the Canadian environment. An examination of various potential technological forecasting techniques indicated that the Delphi technique would fill the perceived information gap.

Bell Canada Delphi Study Development

The individuals involved in designing, conducting and managing the Business Planning Delphi efforts have generally had a marketing background. This background includes both academic training and professional experience. These background factors were important determinants of the approach followed.

Initial steps relied upon the basic marketing approach of defining the "market segments" that will have the most important impact on future applications of visual and data communications. These segments were chosen after preliminary studies of potential segments and taking account of the time and resources available. The final choices were future applications in the educational, medical, information systems, and residential markets.

The basic philosophy in the studies was to examine the future of applications in these segments from a user point of view, not from the direction of technological imperatives. The initial questionnaires were prepared after extensive literature reviews of potential developments in each of the chosen areas. The approach in questionnaire design was to guide the discussions in some basic areas of interest in a segment rather than start with blank paper and ask the experts to suggest the most important areas of interest. Since the panelists were actively encouraged to suggest new questions or modifications to existing ones, the potential for significant study bias by the designers was low. This approach also helped reduce the number of rounds required for the studies and hence saved time for the participants and study managers alike.

Next, initial questionnaires were pretested with groups of readily available experts. This proved to be a very valuable step, as poorly worded questions or confusing questionnaire design were largely eliminated before the errors could be inflicted upon the Delphi panel. This step adds time to the study and may be somewhat ego deflating at times for the study managers; however, it pays good dividends in higher quality, less ambiguous results, and happier panelists.

Delphi Study Results-Education, Medicine, and Business

The initial studies in education, medicine, and business followed a similar format. The first part of the questionnaire asked the panelists to project their views on the long-term (thirty years) future of some basic North American values. The purpose in asking these questions was more to help the panelists get in a societal frame of mind when answering the rest of the questionnaire than to obtain the societal trend data itself. When the social trend views of the various groups of experts, as shown in Table 1, were compared after all of these studies were completed, it was

Table 1

Value Changes in North American Society
1970-2000

	Significant Increase	Slight Increase	No Change	Slight Decrease	Significant Decrease
Traditionalism				■	■
Hard Work as a Virtue				■	
Authoritarianism				■	
Materialism			■	■	
Rewarding Work as a Virtue		■	■		
Individualism		■			
Involvement in Society		■			
Participation in Decision Making		■			
Self Expression	■	■			
Acceptance of Change	■	■			

NOTE: The shaded areas represent the median responses from the five Bell Canada Delphi studies noted in the footnotes. Shading over two areas indicates differences in opinion between the various panels.

interesting to note how similar the results were, considering the diverse background of the 165 individuals in the various panels (there was no interpanel communication during the studies).

Other areas of each study also explored non technological developments as well as the adoption of systems to serve various applications. Table 2 illustrates some of these nontechnical factors considered in the three studies [25].

Table 2
Nontechnological Factors Considered in the Bell Canada Delphi Studies

EDUCATION	MEDICINE	BUSINESS
1. Value Trends	1. Value Trends	1. Value Trends
2. Evolution in School Design	2. Trends in the Medical Profession	2. Changes in Business Procedures
3. Changing Role of the Teacher	3. Changes in the Medical Environment	3. Trends in Business Physical Environment

The Education Delphi examined potential adoption of three basic types of educational technologies: Computerized Library Systems (CLS), Computer Aided Instruction Systems (CAI), and Visual Display Systems (including IRTV--Instant Retrieval Television). The summary forecasts of the panel are shown below in Table 3 [26]. The projections on the use of terminals for input and output purposes for CAI and CLS are shown in Table 4 [27]. In both tables, threshold market penetration values of 20 percent and/or 55 percent were used for the technologies. This gives the panelists and readers some feeling for the scope of service acceptance in the markets under consideration.

The Medical Delphi explored acceptance of a number of developing medical technologies. "These included: Multiphasic Screening, Computer-Assisted Diagnosis, Remote Physiological Monitoring, Computerized Medical Library Systems, and Terminal Usage. Table 5 illustrates some of the summary results from the medical study [28]. The format and adoption thresholds were similar to those in the Education Delphi.

The Business Information Processing Technology study examined trends in Management Information Systems, Mini and Small Computers, Terminals and Data Processing. Table 6 summarizes the median conclusions of the panel on 20 percent acceptance of various technologies both in business and in the home [29]. It should be noted that this Table, like the earlier ones, summarizes only the median statistical conclusions of the panels. Panelists were sometimes split into "schools of thought" on various issues. These opinion splits were often not reflected in graphic presentation of the results. In these cases the panelists were encouraged to debate their differences in writing through the rounds of the various studies. These differences are reflected in the reports along with supporting assumptions and comments of the panelists. It was found that the panelists' comments and their analyses were often very important modifications of the statistical projections shown in the above tables.

Design of the Future of *Home Services Delphi*

The three studies outlined above provided an important new source of input to the Business Planning group. However, one market area was still largely unresolved: the future of communications services in the residence market. Each of the above studies asked a few questions on home services but their combined answers still left a large information gap. Determining how to obtain the additional information reopened some important internal differences of opinion on the value of Delphi for this purpose.

The main issue revolved around the definition of what is an "expert" in the residential field. This question had developed in creating the earlier expert panels as well. In two cases (Education and Business) the question was whether selected industry specialists within the telecommunications industry were as knowledgeable as experts in the above fields when it came to projecting the future. This question was resolved by conducting two studies in the Education and Business fields. In both cases, independent panels of "internal" and "outside" experts were used.

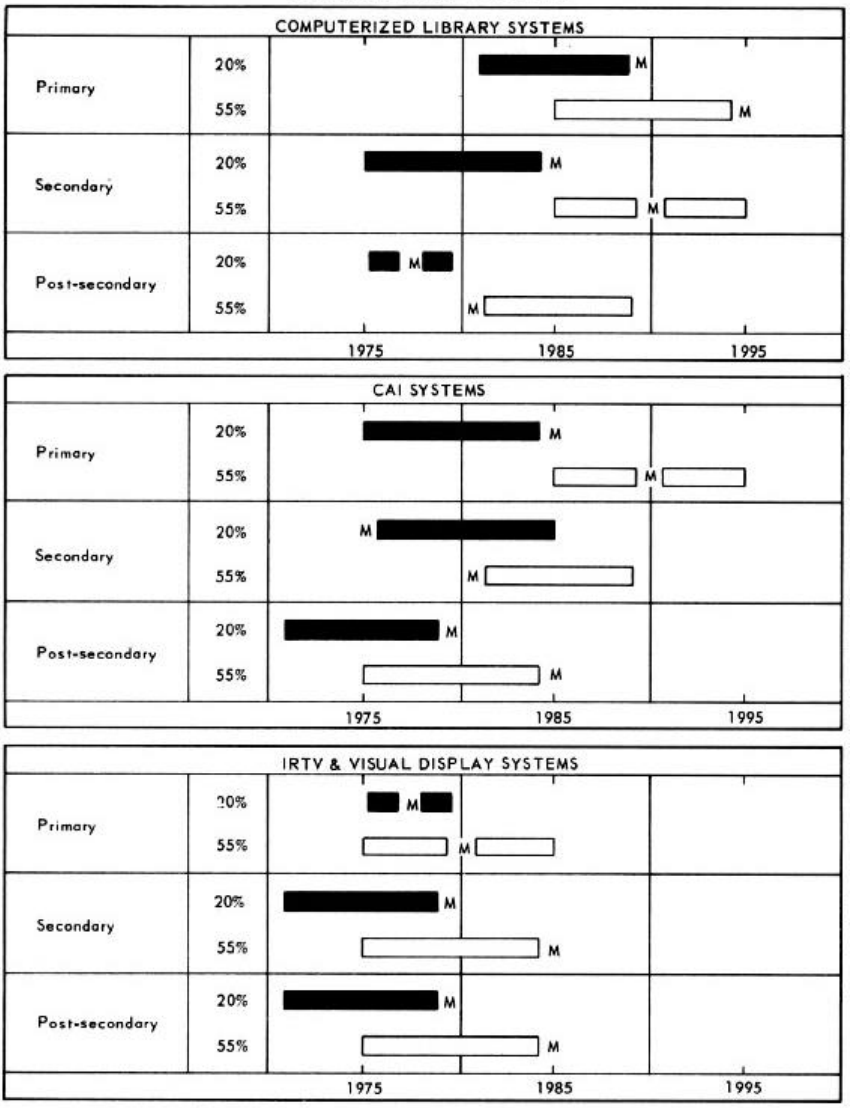
The question in the residential study was whether housewives or researchers and planners were the best experts on the future adoption of communications services in the home. In this case the study was totally service- and *not* technology-oriented. This issue was resolved by establishing two competing panels to forecast the future in this area. One panel consisted of housewives (experts through experience) and the other of experts through research or planning for "wired city" services. The study design and steps followed are shown in Table 7.

Table 7
Study Design: Future of Communications Services into the Home

1. Literature Search
2. Assemble Panels of "Experts" and Housewives
3. Design Draft Questionnaire
4. Pretest Questionnaire
5. Print and Distribute Revised Questionnaire (Identical, to Both Groups)
6. Prepare Statistical Analysis of 1st-Round Answers
7. Prepare Analysis of Supporting Comments from Each Group
8. Design, Pretest, Print and Distribute 2nd-Round Questionnaire showing:
   a) 1st-Round Statistical Results from Each Group on One Page
   b) 1st-Round Supporting Comments from Each Group on Opposite Page
   c) Ask for Resolution of Answers within Each Panel
   d) Highlight Differences between Panels and Ask for Resolution
9. Prepare Final Analysis

Table 3

LIKELY TIMING OF ADOPTION OF TECHNOLOGICAL SYSTEMS



M MEDIAN

PERIOD OF SYSTEM REFINEMENT AND EARLY ADOPTION (INTER QUARTILE RANGE)

PERIOD OF EXTENSIVE ADOPTION (INTER QUARTILE RANGE)

SOURCE: DOYLE AND GOODWILL, EDUCATIONAL TECHNOLOGY, P. 64

NOTE: THE MEDIAN SYMBOL (M) ON THIS CHART AND THE FOLLOWING ONES ONLY INDICATES THE 5 YEAR TIME FRAME THAT THE MEDIAN LIES IN, NOT ITS EXACT LOCATION. THUS, THE MEDIAN AND THE FIRST OR THIRD QUARTILE MAY BE IN THE SAME 5 YEAR PERIOD IN SOME CASES.

Table 4

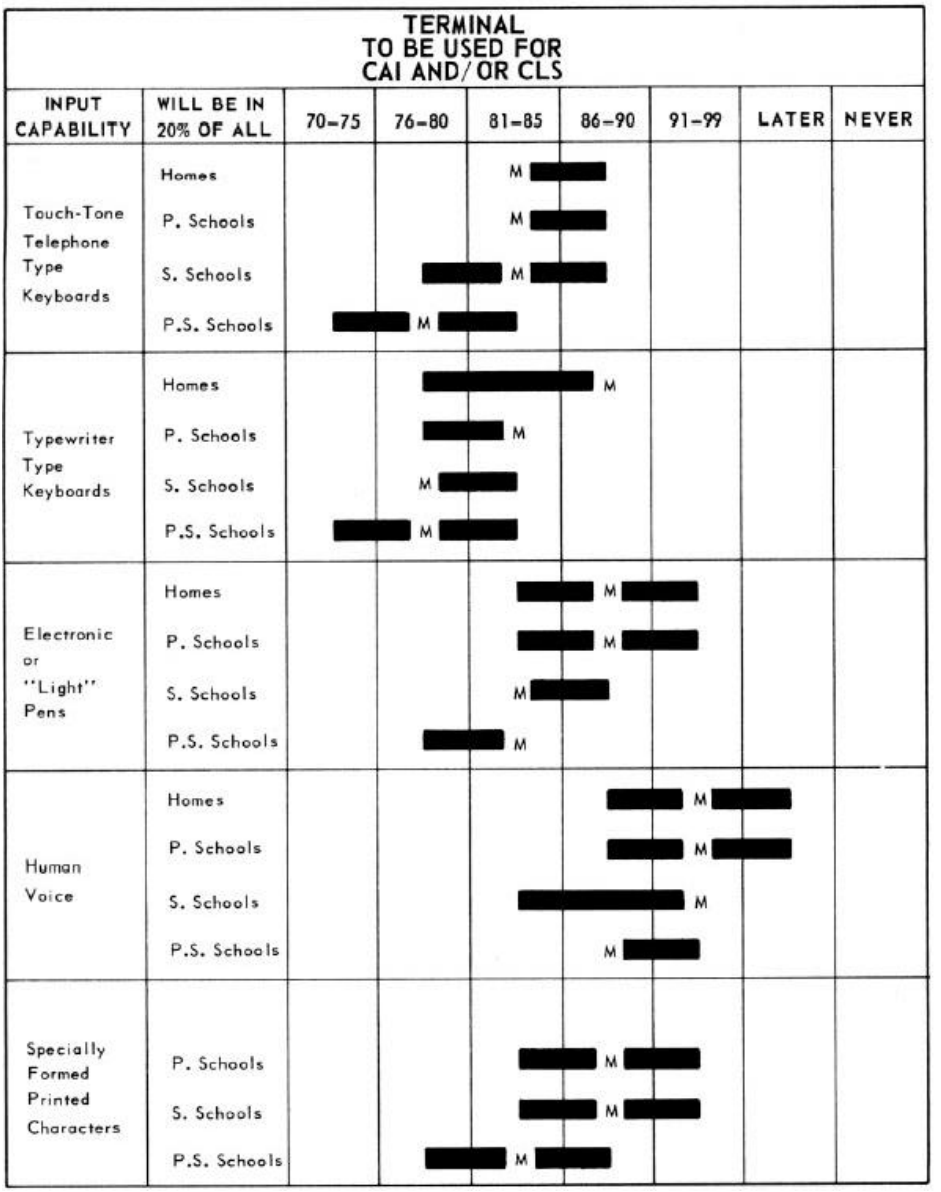
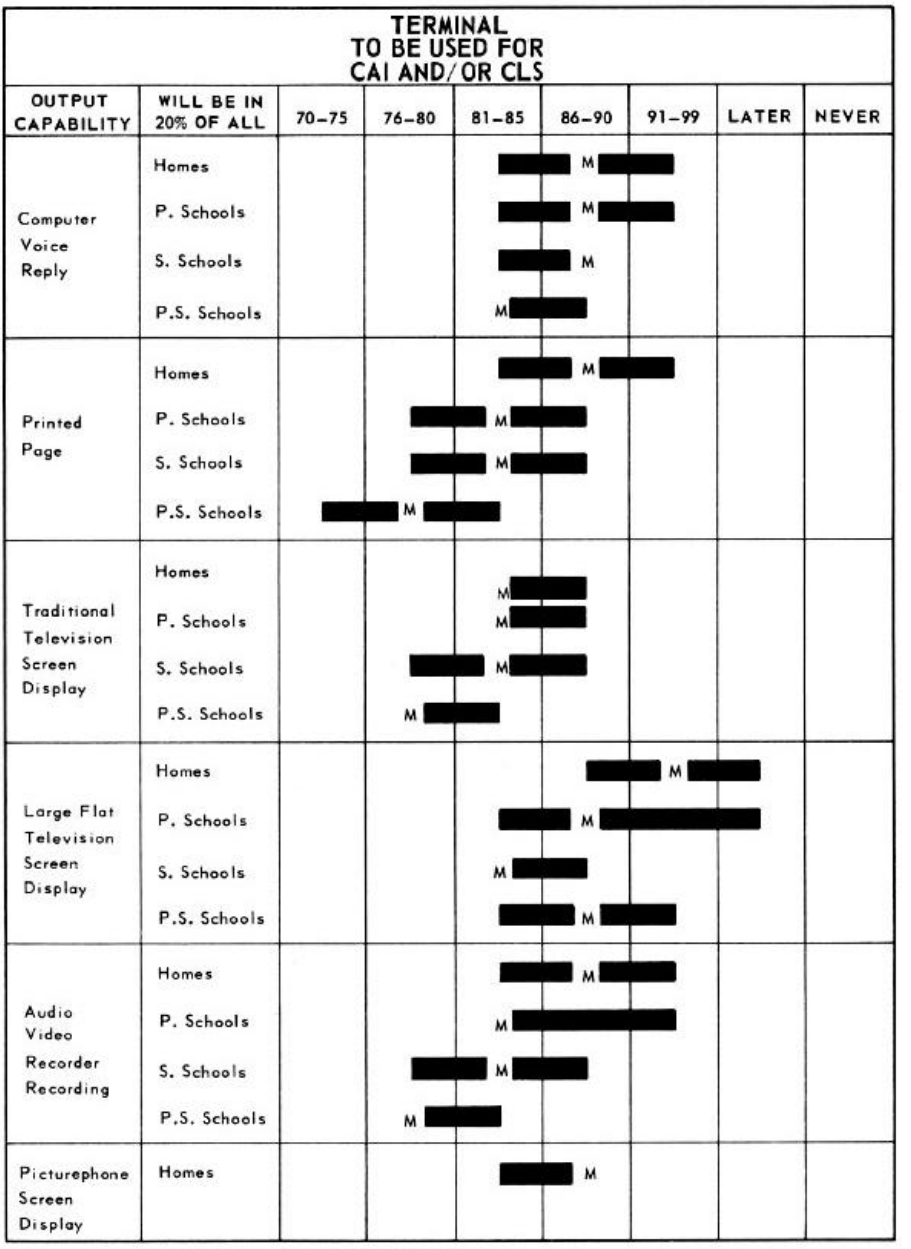

TERMINAL TO BE USED FOR CAI AND/OR CLS
INPUT CAPABILITY
WILL BE IN 20% OF ALL
70–75
76–80
81–85
86–90
91–99
LATER
NEVER
Touch-Tone Telephone Type Keyboards
Homes
P. Schools
S. Schools
P.S. Schools
Typewriter Type Keyboards
Homes
P. Schools
S. Schools
P.S. Schools
Electronic or "Light" Pens
Homes
P. Schools
S. Schools
P.S. Schools
Human Voice
Homes
P. Schools
S. Schools
P.S. Schools
Specially Formed Printed Characters
P. Schools
S. Schools
P.S. Schools
M

Table 4 (continued)



P. SCHOOLS = PRIMARY SCHOOLS
S. SCHOOLS = SECONDARY SCHOOLS
P.S. SCHOOLS = POST SECONDARY SCHOOLS

Source: Doyle and Goodwill, Educational Technology, P. 41–2

Table 5

PERIOD OF SYSTEM REFINEMENT AND EARLY ADOPTION OF TECHNOLOGICAL SYSTEMS (20% UTILIZATION)

INSTITUTION	TECHNOLOGICAL SYSTEM	70–75	76–80	81–85	86–90	91–99	LATER	NEVER
Physicians in Solo Practice	MS			M				
	CAD			M				
	CLS			M				
Physicians in Group Practice Who Share Facilities Only	MS		M					
	CAD			M				
	CLS			M				
Physicians in Group Practice Who Share Records & Incomes etc.	MS		M					
	CAD			M				
	CLS			M				
Acute General Hospitals	MS		M					
	CAD			M				
	CLS			M				
Occupational Medicine	MS		M					
	CAD			M				
	CLS			M				

MS– ▬ – MULTIPHASIC SCREENING
CAD– ▨ – COMPUTER ASSISTED DIAGNOSIS
CLS– ▩ – COMPUTERIZED LIBRARY SYSTEMS

Source: Doyle and Goodwill, Medical Technology, P. 60

Table 6
An Exploration of the Future in Business Information Processing Technology

DEVELOPMENTS*	1970–75	1976–80	1981–85
THE WORK LOCATION (WHERE WHITE-COLLAR AND CLERICAL EMPLOYEES WILL PERFORM THEIR JOB DUTIES)		OFFICE CENTER	
MANAGEMENT INFORMATION SYSTEMS		MIS FOR LARGE FIRMS	MIS FOR MEDIUM FIRMS INTEGRATED MIS
MINI AND SMALL COMPUTERS		FREE-STANDING COMPUTERS COMMUNICATION COMPUTERS DUAL-PURPOSE MACHINES	
TERMINALS		T-T TELEPHONE (BUSINESS) TYPEWRITER KEYBOARDS (BUSINESS) COMPUTER VOICE REPLY (BUSINESS) PRINTED PAGE (BUSINESS) TRADITIONAL TV SCREEN (BUSINESS) ACOUSTICALLY COUPLED TERMINALS (BUSINESS) PLUG-IN PORTABLE TERMINALS (BUSINESS)	T-T TELEPHONE (HOMES) PICTUREPHONE FOR FACE-TO-FACE COMMUNICATION (BUSINESS) TOUCH-SENSITIVE INPUT (BUSINESS) OCR (BUSINESS) 2-WAY LARGE SCREEN COLOR TV (BUSINESS) AUDIO-VIDEO RECORDERS (BUSINESS) PICTUREPHONE DISPLAY (BUSINESS)
DATA PROCESSING	MEDIUM-SIZE FIRMS IN MANUFACTURING AND SERVICE INDUSTRIES WILL BE UTILIZING D.P. FACILITIES	SMALL-SIZE FIRMS IN MANUFACTURING INDUSTRIES WILL BE UTILIZING D.P. FACILITIES	SMALL-SIZE FIRMS IN SERVICE INDUSTRIES WILL BE UTILIZING D.P. FACILITIES
TECHNOLOGY IN THE HOME			ONE-WAY (INCOMING) AUDIO-VISUAL COMMUNICATION

DEVELOPMENTS*	1986–90	1991–99	LATER
THE WORK LOCATION (WHERE WHITE-COLLAR AND CLERICAL EMPLOYEES WILL PERFORM THEIR JOB DUTIES)	NEIGHBORHOOD R.W.C. THE MOBILE WORKER	HOME REMOTE WORK CENTER	
MANAGEMENT INFORMATION SYSTEMS	MIS FOR SMALL FIRMS DISTRIBUTED MIS		
MINI AND SMALL COMPUTERS			
TERMINALS	LIGHT PENS (BUSINESS) HUMAN VOICE INPUT (BUSINESS) PICTUREPHONE FOR FACE-TO-FACE COMMUNICATION (HOMES) PICTUREPHONE FOR DATA INPUT (BUSINESS) HANDWRITTEN INPUT (BUSINESS) COMPUTER VOICE REPLY (HOMES) TRADITIONAL TV SCREEN (HOMES) AUDIO-VIDEO RECORDERS (HOMES) FULLY PORTABLE WIRELESS TERMINALS (BUSINESS)	PICTUREPHONE FOR DATA INPUT (HOMES) SCRIBBLEPHONE (HOMES) SCRIBBLEPHONE (BUSINESS) PRINTED PAGE OUTPUT (HOMES) LARGE FLAT COLOR TV DISPLAY (HOMES) LARGE FLAT COLOR TV DISPLAY (BUSINESS) PICTUREPHONE DISPLAY (HOMES)	TYPEWRITER KEYBOARDS (HOMES) LIGHT PENS (HOMES) HUMAN VOICE INPUT (HOMES) HANDWRITTEN INPUT (HOMES) TOUCH-SENSITIVE INPUT (HOMES) OCR (HOMES) 2-WAY LARGE SCREEN COLOR TV (HOMES)
DATA PROCESSING			
TECHNOLOGY IN THE HOME	TWO-WAY AUDIO-VISUAL COMMUNICATION		

*THE RESULTS INDICATE WHEN THE DEVELOPMENT WILL REACH A 20 PERCENT LEVEL OF ACCEPTANCE BY THE APPROPRIATE UNIVERSE. THE MEDIAN "EXPERT" RESULTS ARE PRESENTED.

The important steps that are different from normal Delphi studies are 7 and 8 in Table 7. The results should stimulate debates between the panels if this approach is going to derive the maximum benefits from both panels. Table 8 shows a typical two-page feedback and question set from the Home Communications Delphi [30]. The importance of obtaining feedback comments from the panelists is illustrated in the table.

This study examined future acceptance of electronic shopping from the home, remote banking, electronic home security services, and electronic programmed education in the home. The study also explored the future of ten types of information retrieval services that may be offered to homes. Table 9 illustrates some summary results of the study [31].

Summary: Bell Canada Delphi Studies

Business Planning efforts in the six studies outlined above have resulted in an important increase in the availability of qualitative data for planning purposes. Experience with the technique resulted in significant modifications from the original RAND approach, especially with the emphasis on analyzing the panelists' comments and establishing threshold levels of acceptance. The use of Delphi to evaluate the marketability of services by users rather than predicting the median dates of potential technological development was also helpful. An analysis of completed studies has also revealed comparison information on the use of internal panels vs. external panels. Thus, Business Planning has learned much about the technique while obtaining useful information. This three-year intensive involvement with the technique has also given Business Planners a realistic view of some of the issues that arise when operating with Delphi in the corporate environment.

Delphi in the Corporate Environment

The issues discussed below are based upon Bell Canada experience and on discussions with individuals who have conducted similar studies in other corporations. "These issues will probably be faced by any group in industry that launches a serious attempt to conduct professional quality research in this area.

Should Corporations Pay for Basic Delphi Research?

This, of course, is the fundamental question that must be answered. The emphasis here is on in depth research, since this will often result in a significant allocation of time and money resources in an area where immediate payoff is not clear to senior management. Other forms of business research (market research, operations research, economic research, etc.), have more precise goals and utilize more understandable techniques. The benefits of Delphi research will not be reiterated here, but the corporate planner has to recognize that this is one area not easily understood by busy executives.

Table 8

SHOP–FROM–HOME SERVICE

In predicting which types of products will be purchased through a Shop–from–Home system, the housewives and experts disagreed on a number of items. The summarized answers are presented below with the answers for the expected costs of such a service. Some typical comments are presented on the facing page. There appear to be significant differences in such items as produce, small and large appliances.

TYPE OF PRODUCT:

E / H	% YES	% NO	over 20% more	5–20% more	0–5% more	same	0–5% less	5–20% less	over 20% less
meat	48 / 58	52 / 42			E	H			
produce	**52** / **75**	**48** / **25**			E	H			
other perishables (dairy, bread, etc.)	100 / 83	0 / 17			E	H			
groc. dry goods	100 / 96	0 / 4			E	H			
clothing	58 / 48	42 / 52			E	H			
small appliances	**74** / **96**	**26** / **4**			E	H			
drugs and cosmetics	90 / 75	10 / 25			E	H			
large appliances	**47** / **79**	**53** / **21**			E	H			

NOTE: Shaded area represents significant differences between panels

E = Expert Panel: median or percentage response.

H = Housewife Panel: median or percentage response.

Do you wish to change any response? Could you comment on the differences between the two groups? Do you have any concluding comments

ROUND II COMMENTS

(Cont'd.)

Table 8 (continued)

SHOP-FROM-HOME (CONTINUED)

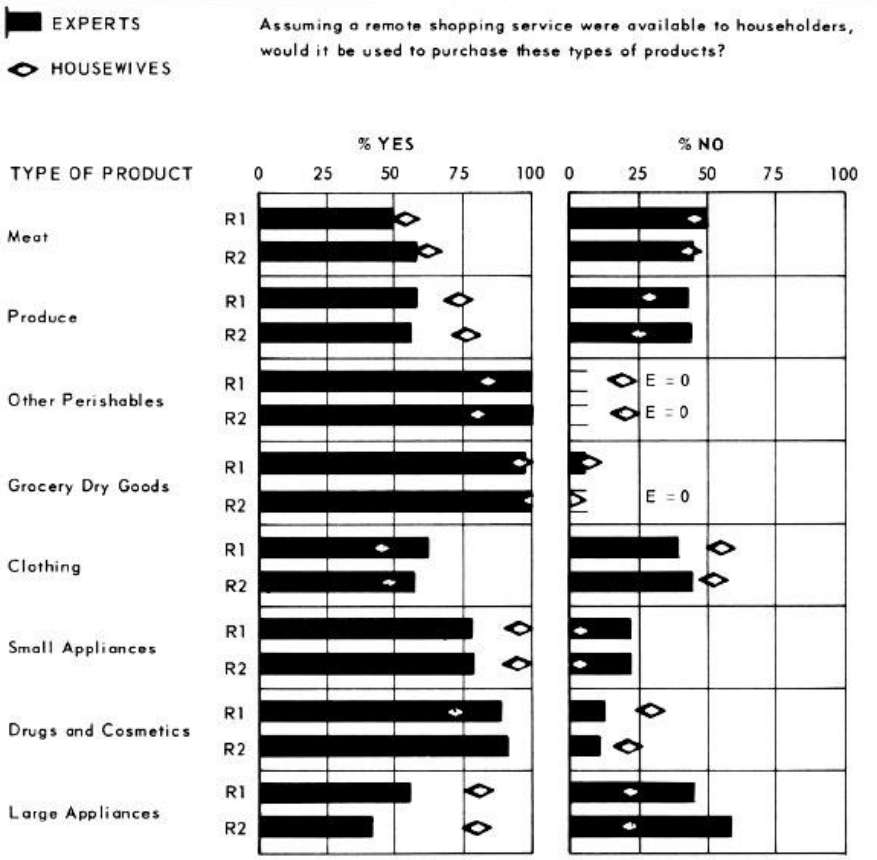
EXPERTS	HOUSEWIVES
The panelists had the following generally favorable comments on the service and its expected costs.	
1. "Will succeeds only if it offers an economic advantage (savings on sales people, expensive store space, electricity and display, etc.)"	1. "A useful service for those living in suburbs or remote rural areas whose access to cities and stores is difficult, also for elderly people."
2. "Assumption – meat and produce supplied from a familiar supplier and good previous experience."	2. "I don't think it should cost any more because it would not need a huge store or many salesclerks, and certainly shoplifting would be a thing of the past for anyone participating in the service."
3. "Better price and product comparisons can allow the purchaser to save money as well as time."	3. "Small or large appliances (if brand name is known) present no problems for Shop-from-Home."
These comments reflect some of the typical reservations about the service:	
1. "Meat, produce – these items are bought by feeling, smelling, and seeing the specific items in question and comparing them to the others available in the display. This cannot be done remotely, hence the continued existance of meat markets, fruit stands, etc."	1. "For most housewives, shopping is a diversion and a break in a routine."
2. "Insuring quality will raise the price of perishables above attractive cost."	2. "Meat and produce – Individual specific quantities required; bult packaging not always desirable."
3. "People will expect large cost reductions for appliances in return for not being able to see the merchandise. . .Several visits to warehouses will be typical even with home shopping."	3. "The cost of these items in our daily living budget is expensive enough as it is; if it would cost more to buy these things at home, not many people would take advantage of it unless they were unable to get out of the house. . . Clothing and large appliances would be difficult with this service; with clothing you like to examine the fabric to see how well it is made; with large appliances you would want to discuss with the salesman the pro's-con's of the appliance."

Source: Bedford, Questionnaire, pp. 2-3

Table 9

SHOPPING FROM THE HOME

How will it be used?



While there seemed to be general agreement between panels that grocery dry goods and certain perishables would be purchased through a remote shopping service, the housewives believed that a number of other products would also be purchased with the aid of this service. The comments reinforce this pattern ("that housewives would 'trust' the store . . . . but experts have a smaller trust"). At the same time however, the comments reflect the feeling that this service would eliminate a significant element in housewives' social activities. It seems that if remote shopping is to become widely accepted, housewives will need to have recourse to alternate modes of socializing.

There did not appear to be any major change in panelists' attitudes between rounds. The largest shift was the decrease in the number of experts expecting large appliances to be purchased from the home.

(Cont'd.)

Table 9 (continued)

COMMENTS

EXPERTS	HOUSEWIVES
ROUND ONE	
"Meat, produce – these items are bought by feeling, smelling, and seeing the specific items in question and comparing them to the others available in the display. This cannot be done remotely, hence the continued existence of meat markets, fruit stands, etc."	"A useful service for those living in suburbs or remote rural areas whose access to cities and stores is difficult, also for elderly people. Clothing would be difficult in my opinion as there would be no way of trying on and fitting. Endless returns and exchanges would defeat the original purpose of the shop-from-home service. Otherwise, most things could conveniently be bought from the home."
"In regard to meats, the consumer will always want hands-on experience. The butcher has a very poor public image. Consumers will want to see how much fat the steak has."	"Small or large appliances (if brand name is known) present no problems for Shop-from-Home."
"It's not a function of the product but rather how a given purchaser perceives the product. The gourmet thinks of food as an art form, and wants to be there. The cafeteria operator couldn't care less. Since many stores are our contemporary art museums, the process of shopping is quite complex."	"For most housewives, shopping is a diversion and a break in a routine."
	"Clothing and large appliances would be difficult with this service; with clothing you like to examine the fabric to see how well it is made; with large appliances you would want to discuss with the salesman the pro's-con's of the appliance."
ROUND TWO	
"I still don't accept the idea that housewives will buy meat, produce, and large appliances via shop-from-home service. The first time the housewife gets burned using S-F-H (ie. a poor steak, unfresh meat, etc.), she will go back to using the store."	"Change my response for meat, produce and clothing to **NO** because one of the main reactions to the product is through a confrontation with it which results in the buying or rejecting of it."
"My 'NO' responses were based on the belief that an intelligent housewife would wish to carefully choose meat and produce herself unless her butcher and grocer were intelligent people who knew her states and preferences well."	"It is rather amusing that housewives would 'trust' the store for meat and produce but the experts have smaller trust. Go with the housewives – we do most of the shopping."
"Experts tend towards **NO**, probably because they buy these products as men with a technical bent."	"I still don't like the concept of shopping on a larger scale from home. It strikes me that this system is geared to the larger chain stores which already offer catalogue service as a type of shop-from-home feature (with regard to clothing, appliances, etc.) But I wonder how such a service would affect smaller businesses and specialty stores which definitely couldn't operate such a service themselves."
"Experts seem to ascribe greater weight to first hand observation of product in buying decision than do housewives. Husbands may be more similar to experts in this propensity."	

Source: Bedford, Future of Communications Services in the Home, pp. 28-29.

This is part of the more basic question on the value of long-term planning in business. Generally, long-term planning has become an accepted part of business today. Delphi research is most needed in the long-term planning function where the conditions of uncertainty are the most evident.

Basic research of this nature is beginning to fall into the general area of corporate social responsibility. Many corporate decisions made today will have important secondary effects for decades to come. The rapid rise of interest in government, academia, and business in what is termed "`Technology Assessment" [32] is one reason for considering this as a part of corporate social responsibility. Delphi study results can be used as corporate inputs to the development of technology assessment equations [33].

The North American telecommunications industry is generally privately owned but regulated by government agencies. Recent studies in the U. S. [34] and Canada [35] have noted and projected an accelerating trend on the sharing of planning data between the regulators and the corporations. While many industries are not formally regulated, none can escape the growing governmental and public scrutiny of the consequences of their actions and plans. Sharing of basic planning information such as Delphi study results can help develop a common assessment data base on both a corporate and a public basis.

The social/ political reasons outlined above are especially important when evaluating the cost/benefit analysis of undertaking corporate Delphi research. However, this is a more obvious reason for doing this type of research: the results can be used to help make business decisions.

Using Delphi Results in Business

Many corporate Delphi studies conclude with the publication of a report to the panelists and management outlining the study findings. The problem of recognizing the value of this research develops if that is where the Delphi studies end. These basic Delphi reports are important as:

(1) Educational tools to inform senior managers of the panelists' views of potential futures or various areas of interest to the business.
(2) Trading documents with other planners and researchers.
(3) Environmental trend documents that can help technological planners in research labs

The use of the Delphi results must then become more directed. One useful way of using the specific results is to regard them as a data base to be drawn upon when preparing corporate recommendations in specific topic areas. The Delphi forecasts should be combined with other relevant material (trend extrapolations, multiclient study results, market research data, etc.) in order to present a comprehensive estimate of the impact of a forthcoming decision [36]. These combinations may be in the form of cross-impact matrices, scenarios, market analyses, etc. The use of the Delphi data with other material helps create

confidence in the overall package. It is rare that the Delphi results alone can help resolve an issue when preparing a recommendation. Of course, this approach is useful in the nonbusiness environment as well.

The Bell Canada Delphi study results are regarded as part of a data base. Each of the Delphi forecasts has been abstracted, key-word indexed, and stored in an on-line computerized information retrieval system. Other items in the data base are also stored in the same manner. These items may be forecasts from trend studies, material from other internal research, appropriate forecasts from studies available from government institutions, policy research institutes, corporations, etc. The data base is used in the creation of several types of Business Planning outputs (Note: the Delphi material is an *input*, not an output). These outputs include:

(1) Specific Service and Business Proposals designed to exploit identified opportunities.
(2) Environmental Outlook Reports that identify trends and potential future events which may impact on the company or a specific corporate function (i.e., marketing).
(3) Targeted Outputs designed to present selected material to various government commissions, task forces, as well as other research organizations.
(4) Subject Sourcebooks and Information Packages which combine all of the available information on a specific field of interest into an annotated document for use by other planners in the Bell Canada Group.
(5) Methodology Analyses that document what we have learned using a particular technological forecasting technique.

In all of the above cases, the Delphi research material has been combined, massaged, analyzed and placed in perspective vis-à-vis other future information.

Delphi research can also be used in obtaining certain types of information not usually available from normal marketing research activities. Statistical polling of consumers can only produce a limited base of attitudinal data. Feedback and interaction are not possible here. On the other hand, group depth interviews can run into many of the problems that the lack of anonymity produces. The modified version of Delphi used by Bedford enables the researcher to generate opinions and conflicts between potential consumer groups for new products or services. This controlled conflict with feedback produces valuable behavioral information that would not emerge using other techniques. This data can be used for product or service modification or redefinition of market opportunities.

Delphi research in business must be regarded as a means toward ends rather than as an interesting intellectual end in itself. Use of the technique as indicated above can result in an affirmative answer to the question: "Should corporations pay for basic Delphi research?"

Misusing Delphi Results in Business

Delphi study results can be used to advantage in the corporate environment. The reverse situation is also possible. One of the most common situations is for the results of the study to be viewed as representing a corporate position, policy, or forecast.

This is not the case for the results of the vast majority of Delphi studies which represent the combined and refined wisdom of the particular panel of experts on the study [37]. One of the recurring problems with the Bell Canada Delphi's has been the suggestion that the studies represent a corporate position even though this suggestion is explicitly refuted in the reports.

A related problem is the temptation of corporate public relations groups to distribute the studies as another P. R. tool. This can be especially problematic, since Delphi panelists are assured that their contributions are provided in confidence on a professional basis. The use of the study results in this manner could backlash on the study director, especially if he hoped to conduct future studies using panelists drawn from the same population. Of course, the value of the documents as trading vehicles would diminish as well if they were handled in this manner.

A further issue is related to the perceived precision of the study results. Many Delphi studies process the interim and final results using computers. This permits the presentation of statistical results that "appear" very precise to the casual observer or individuals accustomed to dealing with the results of economic and statistical research. The findings of Delphi studies are subject to more interpretation than are most research results. The planning group should try to ensure that others using the results as a data base are aware of the various strengths and weaknesses of the information.

In-House vs. Consultant-Conducted Studies

Another question that must be resolved is whether or not to conduct the study using in-house or consultative resources. This decision can be analyzed by considering the following factors.

(1) Single vs. Multiple Studies. There is a definite learning curve involved when conducting Delphi studies. Serious attempts utilizing the technique require an initial time and resource investment to learn how Delphi studies are effectively conducted. This investment will pay continuing dividends if a number of studies are planned. These rewards include the development of a more knowledgeable planning staff that fully understands the strengths and weaknesses of the data obtained from the studies. On the other hand, conducting a single study with a planning group unfamiliar with the use of the technique may be a costly venture that produces mediocre results.

(2) Study Sophistication. The corporation may be dealing with a subject matter that is changing rapidly and is very complex (e.g., computer technology). The firm may also want a large number of factors considered in the study. In this

case, the use of outside consultants who have considerable experience in conducting large complex Delphi's (i.e., I.F.F.) may be more productive. The use of these consultants will also ensure that the best modification of the technique is applied to the company's problem. Experienced consultants are constantly learning more about the technique and are modifying it as a result of that experience. The time delays that occur before this experience is reflected in the professional literature may mean that the corporate researcher is using a somewhat less than optimum version of tile. technique.

(3) Proprietary Research. The problems involved with proprietary research that are discussed in the next section are also factors to consider when choosing between in-house and consultant conducted studies.

Proprietary Nature of *Delphi in the Corporate Environment*

One of the usual descriptors of corporate market research is that the results are considered proprietary. Many studies are conducted to further a competitive advantage. Corporate Delphi research is often conducted in this environment with similar objectives. In these instances the results of the studies are not designed for outside consumption. This creates problems if external expert panelists are used in the study. The usual contract with the panelist is a full or partial payment with a copy of the study results. This usually attracts high caliber panelists who are interested in adding the study results to their own store of information. The presence of the report in turn results in dissemination of its contents to the panelist's professional colleagues, either by photocopying or by requests to the study director for additional copies. This process of information dissemination through "invisible colleges" usually means that proprietary studies are not too practical with external panelists.

One solution to this situation is to utilize in-house experts. Of course, this is practical only if there are a significant number of internal experts in the subject matter of interest. The penalty of using this approach is the loss of the independent outside viewpoint.

The use of mixed panels of in-house and external experts creates another potential problem, The in-house panelist may have access to confidential corporate market or technological research and use this in making and justifying his projections. The study director may have to edit this data out of the panelist feedback material unless the company is prepared to let the corporate information out to the external panelists. This situation can create some intellectual dissonance for the study director, since the secret data could help resolve specific questions under consideration by the panel. The best solution in this case may be to try in advance to avoid subject matter in the study where confidential company research is underway.

Conclusions

The preceding list of issues that must be considered when conducting corporate Delphi research is not exhaustive. The main purpose of this section was to

examine some of the common or most important issues that the business planner must face when deciding whether or not, or how, to use Delphi research. As with many situations, a heavy application of common sense when planning Delphi research will avoid some of the potential problems outlined above.

Future Use of Delphi in Corporations

The near future should see continued rapid expansion of the Delphi technique in business. The methodology appears to be currently reaching the "faddish" stage. Many low-quality studies (which may be mislabeled "Delphi") will be conducted. This could result in a credibility gap with those trying to use the technique to its best advantage. If this credibility gap does occur, there may be a numerical decline in the number of studies conducted, but a general improvement in the overall quality of corporate Delphi research.

Widespread use of the methodology will result in continued rapid modification of the original RAND design. Mini-Delphi's will be used to develop specific forecasts or evaluate potential policy changes. The latter area will receive further attention with the continued development of interest in technology assessment. The use of on-line Delphi techniques will spread, especially as corporate management information systems and remote access terminals become widespread [38]. The availability of standard packages that permit any researcher with access to an on-line Delphi system to act as a study director will also encourage further use of the technique [39].

Delphi will become popular for certain types of market research studies. This will probably occur more as a result of the promotional activities of market research firms than from the conscious decision of corporate researchers or marketing academics. This opinion is held since there is little overlap between the current professional literature of the marketers and the long-term planners [40], whereas consultants are presently indicating interest in the technique.

In conclusion, Delphi has a healthy future in the corporate environment. This is a future for a whole family of Delphi-inspired techniques in a broad range of applications. Use of the term "Delphi" to describe a monolithic technique has rapidly become obsolete in this environment. This expanding family of techniques will be the property of the market researcher, market planner, policy planner, systems researcher, etc., as well as the long-term business planner.

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