

CONSUMER AND OPINION RESEARCH

Consumer and Opinion Research

THE QUESTIONNAIRE TECHNIQUE

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CONSUMER AND OPINION RESEARCH

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**To
My Wife**

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Preface

DURING the past few years there has been an increasing emphasis upon questionnaire surveys of various publics. The opinion polls have inquired on subjects ranging from attitudes towards management of the war to acceptance of birth control. Less known to the public are the commercial surveys, although these outnumber the publicized polls.

Both commercial and opinion surveys use the same basic technique—the questionnaire. Criticism of opinion polls has been offered both by popular writers and technicians in the research field. Criticism of commercial polls and their techniques has largely been limited to those within the field. Instructors in sociology, psychology, marketing, advertising, political science and statistics have been interested in both of these developments.

The entry of our country into war has sharply increased the importance of both commercial and opinion surveys. Our national government has entered the survey field in order to have public guidance for some of its decisions. Since the questionnaire survey has become more important, there seems a need for critical summary and discussion of the techniques employed.

The present volume is intended to meet this need. It should therefore have its uses in college classes. It is not intended as an exhaustive analysis, but rather as a running narrative, the more complete elements of which can be filled in by supplementary reference. At the same time it is hoped that the volume will prove to be a convenient reference for practitioners in the survey field. It should help the business man to obtain a clearer concept of the steps in conducting a survey.

The emphasis throughout is upon techniques. The book con-

centrates discussion on the "formalized" sort of questionnaire, where a specific set of questions is used.

Many individuals have contributed directly and indirectly to the publication of this volume. Those whose work is quoted are acknowledged by stating the reference. Mr. J. M. Wallace and Mr. W. B. Ricketts, both of N. W. Ayer & Son, gave many hours of time in critical reading of portions of the manuscript. Lieutenant-Commander John G. Jenkins, U.S.N.R., gave many valuable suggestions. Drs. Paul F. Lazarsfeld, Director of the Office of Radio Research, Columbia University; Sydney Roslow, Director of the Pulse of New York; and Lucien Warner, Office of War Information, gave unstintingly of their time to make suggestions on the manuscript. Mr. Harry H. Field, Director of the National Opinion Research Center, made many useful suggestions. Mrs. Marion Walker, my sister, was kind enough to read proof.

In many places throughout the book there are discussions of studies without any description of the source. Most of these were conducted by the staff of N. W. Ayer & Son, and the writer is indebted to this organization for permission to use such examples. Naturally, however, the writer alone is responsible for any errors or arguments in the volume.

Albert B. Blankenship

N. W. Ayer & Son, Inc., Philadelphia

contribution offered by the commercial survey, there is one charge that requires a little consideration.

9. *Are too many surveys a waste of time and money*, thus hurting our social system? A number of questionnaire surveys are a waste of time and money, and any such waste cannot be considered an asset to our social system. There are many "promotional" types of surveys which are attempting to sell goods or services. Not infrequently one sees a promotion piece sent out by an advertising medium that reports survey results which are misleading and meaningless. Many other commercial studies are a waste of effort.

This fact is probably due to two reasons: Business has probably been oversold on surveys, and many surveys are conducted by persons inexperienced in research work. Some questionnaire studies have been so startling and revealing that there is a tendency on some sides to regard the survey as a "cure-all," an end in itself. The survey is never an end in itself, but merely an agency to learn facts.

The tendency for inexperienced personnel to conduct surveys will probably disappear with time. It is hoped, at least, that this book may have pointed out so many dangers in the technique that an inexperienced reader would not attempt to conduct such a study.

Summary. There seems every reason for surveys to continue their progress. The first chapter has shown the many values of the business survey in the world of today, and the present chapter has demonstrated the many advantages of the public opinion poll. Because of the survey's contributions to democracy and business, and its probable improvements in technique, the questionnaire survey seems destined to increase in importance as a part of our way of life.

REFERENCES

- (1) ALLPORT, F. H. "Polls and the Science of Public Opinion," *Public Opinion Quarterly*, 1940, 4, 249-257.
- (2) AMERICAN MARKETING ASSOCIATION. *The Technique of Marketing Research*. New York: McGraw-Hill, 1937. Chapter 19.
- (3) ASPLEY, J. C. (Editor) *The Sales Manager's Handbook*. New York: Dartnell, 1934. Pages 175 and 225.
- (4) BLANKENSHIP, A. B., AND MANHEIMER, D. I. "Whither Public Opinion Polls?" *Journal of Psychology*, 1941, 12, 7-12.

- (5) CHERINGTON, P. T. "Opinion Polls as the Voice of Democracy," *Public Opinion Quarterly*, 1940, 4, 236-238.
- (6) CHICAGO ROUND TABLE DISCUSSION. Election and results. November 6, 1941.
- (7) CHICAGO ROUND TABLE DISCUSSION. Testing public opinion. November 5, 1939.
- (8) GALLUP, GEORGE, AND RAE, S. F. *The Pulse of Democracy*. New York: Simon and Schuster, 1940. Chapters 18, 19, 20, 21, 22, and 23.
- (9) GALLUP, GEORGE, AND RAE, S. F. "Is There a Bandwagon Vote?" *Public Opinion Quarterly*, 1940, 4, 244-249.
- (10) HARTWELL, D. J. "Business Asks the Public How It May Serve Best," *Nation's Business*, May, 1940, 26-28.
- (11) HOVDE, H. T. "Recent Trends in the Development of Market Research," *American Marketing Journal*, 1936, 3, 3-19.
- (12) LEWIS, G. F. "The Congressmen Look at the Polls," *Public Opinion Quarterly*, 1940, 4, 229-231.
- (13) LYND, R. S. "Democracy in Reverse," *Public Opinion Quarterly*, 1940, 4, 218-220.
- (14) MCGUIRE, O. R. "The U. S. Constitution and Ten Shekels of Silver," *Public Opinion Quarterly*, 1940, 4, 232-235.
- (15) ROBINSON, C. S. "Recent Developments in the Straw-Poll Field," *Public Opinion Quarterly*, 1937, July, 45-56; October, 42-52.
- (16) ROBINSON, D. E. "In Agency Research, Results May Be Better if These Pet Don'ts Are Heeded," *Printers' Ink*, March 15, 1940, 61.
- (17) ROPER, ELMO. "Three Weaknesses of Market Research," *Market Research*, 1938, 8, No. 6, 16-19.
- (18) ROSLOW, SYDNEY, HOCHSTIM, JOSEPH, AND MANHEIMER, D. I. "Voting Behavior and Pre-election Polls." Unpublished Manuscript. 1941.

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APPENDIX—Table 1

ACCURACY OBTAINED (EXPRESSED IN TWO STANDARD ERRORS) WITH VARIOUS SAMPLE SIZES AND PERCENTAGES*

Size of Sample	Expected or Observed Per Cent				
	10% or 90%	20% or 80%	30% or 70%	40% or 60%	50%
100	6.00	8.00	9.16	9.80	10.00
200	4.24	5.66	6.48	6.92	7.08
300	3.46	4.62	5.30	5.66	5.78
400	3.00	4.00	4.58	4.90	5.00
500	2.68	3.58	4.10	4.38	4.48
750	2.20	2.92	3.34	3.58	3.66
1000	1.90	2.52	2.90	3.10	3.16
1500	1.54	2.06	2.36	2.52	2.58
2000	1.34	1.78	2.04	2.20	2.24
2500	1.20	1.60	1.84	1.96	2.00
3000	1.10	1.46	1.68	1.78	1.82
4000	.94	1.26	1.44	1.54	1.58
5000	.84	1.14	1.30	1.38	1.42
6000	.78	1.04	1.18	1.26	1.30
7000	.72	.96	1.10	1.18	1.20
8000	.68	.90	1.02	1.10	1.12
9000	.64	.84	.96	1.04	1.06
10000	.60	.80	.92	.98	1.00
15000	.48	.66	.74	.80	.82
20000	.42	.56	.64	.70	.70
30000	.34	.46	.52	.56	.58
40000	.30	.40	.46	.50	.50

* Adapted and computed from H. C. Link, "How Many Interviews Are Necessary for Results of a Certain Accuracy?" *Journal of Applied Psychology*, 1937, 21, 1-17.

APPENDIX—Table 2

SIZE OF SAMPLE REQUIRED TO BE PRACTICALLY CERTAIN OF ACCURACY
(i. e., ON THE BASIS OF TWO STANDARD ERRORS)
WITHIN PREDETERMINED LIMITS*

Range of Error (%)	Expected or Observed Per Cent				
	10% or 90%	20% or 80%	30% or 70%	40% or 60%	50%
.1%	360000	640000	840000	960000	1000000
.2	90000	160000	210000	240000	250000
.3	40000	71111	93333	106667	111111
.4	22500	40000	52500	60000	62500
.5	14400	25600	33600	38400	40000
.6	10000	17778	23333	26667	27777
.7	7347	13061	17143	19592	20408
.8	5625	10000	13125	15000	15625
.9	4444	7901	10370	11852	12346
1.0	3600	6400	8400	9600	10000
1.5	1600	2844	3733	4267	4444
2.0	900	1600	2100	2400	2500
2.5	576	1024	1344	1536	1600
3.0	400	711	933	1067	1111
3.5	294	522	686	784	816
4.0	225	400	525	600	625
4.5	178	316	415	474	494
5.0	144	256	336	384	400
6.0	100	178	233	267	278
7.0	73	131	171	196	204
8.0	56	100	131	150	156
9.0	44	79	104	119	124
10.0	36	64	84	96	100
15.0	16	28	37	43	44
20.0	9	16	21	24	25
25.0	6	10	13	15	16

* Adapted from T. H. Brown, *Use of Statistical Technique in Certain Problems of Market Research*. Cambridge: Harvard University Press, 1935.