

# Information Technology in Survey Research

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## INTRODUCTION

Data collection based on standardized questionnaires represents one of the central tools in many research areas. Early surveys date back to the 18<sup>th</sup> century (de Leeuw, 2005), while a major breakthrough came in the 1930s with the application of probability samples. By using surveys, today governments monitor conditions in the country, social scientists obtain data on social phenomena and managers direct their business by studying the characteristics of their target customers.

The importance of survey research stimulates ongoing efforts to achieve higher data quality and optimized costs. Early on researchers recognized the potential of technological advances for the achievement of these goals. In the early 1970s telephone surveys started replacing expensive face-to-face interviews. Computer technology developments soon enabled computer-assisted telephone interviewing ("CATI"). The 1980s brought new approaches based on personal computers. Interviewers started to use laptops and respondents sometimes completed questionnaires on their own computers. Another revolution occurred with the Internet in the subsequent decade. The pervasive availability of Internet access, and the growing number of Internet-supported devices, coupled with the advance of interactive Web technologies (like Ajax) are facilitating developments in contemporary survey research.

Internet surveys show the potential to become the leading survey approach in the future. According to the Council of American Survey Research Organizations ("CASRO"), the Internet already represents the primary data collection mode for 39% of research companies in the USA (DeAngelis, 2006). The rate of adoption is slower in academic and official research but it is far from negligible. These technological innovations have, however, created several new methodological challenges.

## BACKGROUND

Survey research can be performed using different modes like paper-and-pencil, mail or Internet surveys. Two characteristics of these modes (Groves et al., 2004) highlight the impact of modern technology on survey research: The

presence of information technology during data collection and the degree of the interviewer's involvement.

Computer-assisted survey information collection ("CASIC") is a term embracing various modes that rely on computer technology for data collection (Couper & Nicholls, 1998). Computerized questionnaires offer numerous advantages. Answers are entered directly into a computer, which eliminates transcription-related errors. Enhanced possibilities of standardization ensure higher data quality and a lower burden on respondents. For example, answers can be limited to predefined options, irrelevant questions are automatically skipped over, answers can be subjected to real-time control and so forth.

Some computerized modes require an interviewer to be present either physically or remotely (e.g., CATI). In others, respondents complete a questionnaire by themselves. Self-administration offers benefits to respondents and researchers. Respondents can complete a questionnaire at the time and place of their preference and might have an increased sense of privacy. Researchers benefit especially from the absence of interviewers which prevents interviewer-related biases and significantly lowers research costs.

The widespread computer technology allowed both aspects to merge into computerized self-administered questionnaires ("CSAQ"). The trend toward paperless (computerized) and interviewer-less (self-administered) surveying corresponds with the general cost-optimization efforts of the research industry. Table 1 summarizes the most important survey modes based on CSAQ. They rely on electronic networks which make data instantly available to a research organization (Nathan, 2001).

Information technology has introduced new input and output technologies. Questions can be presented not only textually but also as audio or video clips. Answers, on the other hand, can be provided and recorded either manually (e.g., using a keyboard) or automatically with speech recognition. Even more advanced technologies that recognize gestures, writing and touch are establishing new potential for surveying respondents with certain disabilities (Johnston, 2007).

Internet surveys are probably the most revolutionary mode. They were enabled by progress in transmission procedures, standardized Web browsers, e-mail clients and integrated technologies (Lozar Manfreda, 2001). E-mail

Table 1. Common survey modes based on computerized self-administered questionnaires

CSAQ survey mode	
Touch-tone data entry (‘TDE’)	A telephone survey where respondents answer prerecorded questions by pressing appropriate numerical keys on a handset.
Interactive voice response (‘IVR’)	A telephone-based approach supported by the computerized voice recognition of answers. Modern systems utilize advanced speech recognition to automatically record complex answers.
Internet surveys A	range of modes based on one or more Internet services (like e-mail or Web). Respondents access and answer a questionnaire using an Internet-enabled device, usually a personal computer.
Virtual interviewer	Largely an evolving mode that can integrate various technologies (Web, speech recognition etc.). A virtual interviewer, usually a video clip of a real person, poses questions to respondents. In the future, completely virtualized characters might be used.

surveys already offered faster and cost-effective data collection (Bachmann, Elfrink, & Vazzana, 1996; Sheehan & Hoy, 1999). However, they were soon replaced by more powerful Web surveys. Interactive Web surveys are based on a continuous interaction between the system and the respondents (Conrad, Couper, & Tourangeau, 2003). The advance of modern Web technologies, like Java, JavaScript and ActiveX, fostered the implementation of feature-rich and flexible Web questionnaires. The Internet has thus become a medium for survey research, enabling different combinations of input and output technologies. Internet surveys currently remain prevalingly based on textual questionnaires. Yet, some visual or audio elements, including multimedia, are already used as enhancements of textual contents.

The implementation of Internet surveys is simplified by dedicated software tools. They provide features of question-

naire design, respondent recruitment, survey administration and data analysis. According to the WebSM portal (2007), in 2007 there were more than 300 of such tools available. They range from simple tools for single-question daily polls to advanced integrated solutions for complex data collection (Berzelak, Lozar Manfreda, & Vehovar, 2006). Especially promising is the development of some open-source solutions that allow a high level of flexibility for deployment according to a researcher’s specific needs.

In the subsequent part, we focus on information technology’s impact on different steps of the survey process. The emphasis is on Internet surveys which are the most promising approach and integrate several IT-based modes.

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