Social Dynamics in Information Systems Survey Research: A Comparison of Administration Media

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ABSTRACT

Survey responses differ between direct paper and pencil (manual) administration and Internet-based (electronic) survey data collection methods. Social dynamics play an important role in influencing respondent participation. A review of the existing literature suggests that the medium and administration context affect differences in instrument performance parameters, i.e., response rate, participation ease, attractiveness of survey, novelty effect, administrative costs, response flexibility, response time, population size, sample bias, instrument validity, and the management of non-response data. This paper attempts to identify and describe the differences between survey data collection media as a function of selected social variables.

INTRODUCTION

Differences exist between electronically based and manually administered surveys. Responses to survey questions can be affected by the survey medium (Ayidiya & McClendon, 1990), and can result in response rate differences (Heberlein & Baumgartner, 1978). Response rates by data collection media exhibit high variance. Internet-based surveys can produce double-digit response rates (McCooey, 2000). Ease of use, as reported by Cook, Heath and Thompson (2000), is cited as a response enabler when answering Web-based surveys. Novelty effects of Internet-based surveys encourage participant response by attracting users to investigate available features (Dillman, Torora, Conradt & Bowker, 1998). Administrative costs for Internet-based surveys are less than those associated with paper administration (Parker, 1999). Greater response flexibility as a function of respondent options is increased in paper-based administrations (Matz, 1999). Web-based surveys offer reduced response time from initial distribution to time of reply (Oppermann, 1995). Large and geo-spatially dispersed populations of respondents are efficiently accessed through Web-based surveys (Mehta & Sivadas, 1995; Schmidt, 1997a). Respondents of Web-based surveys exhibit self-selection bias due to participation of only technology-active individuals (Gorman, 2000). Content validity maybe reduced through Internet data collection formats (Dillman & Bowker, 1996). Internet-based data collection permits greater response reliability (Quality Progress, 1999). Higher frequencies of non-response data are found with Web-based formats (Schmidt, 1997a).

This exploratory review provides a descriptive summary and comparison of the differences between paper and Internet-based survey administrations as a function of selected social dynamics.

Electronic Administration

Web-Based Surveys

Web-based surveys involve computer-to-computer communication via the Internet (Dillman, 2000), where information requests are made of individual users or groups of users. Bradley (1999, 390) suggests a three-category classification for Web-based questionnaires:
- "*Open*" – the survey is available to any user since access in non-restricted;
- "*Closed*" – the survey is only available to invited respondents with knowledge of the instrument's URL; and,
- "*Hidden*" – a 'pop-up' survey appears when triggered by a user's selection of linked information

Email Attached Surveys

Email attached surveys involve an electronic survey request made to a group of potential respondents within a given population. Electronic mail questionnaires appear in parallel with the advent of the Internet and email for communication purposes (Bachmann, Elfrink, & Vazzana, 1996). Bradley (1999, 390) suggests a three-category classification for email questionnaires:
- *Simple email* – An email message containing a list of questions on the computer screen;
- *Email attachment* – An email message containing a cover email message with the questionnaire provided as a message attachment; and,
- *Email URL embedded questionnaires* – An embedded URL within an email requesting recipient participation.

Manual Administration

Paper Based Surveys

Non-electronic surveys are divided into two broad classifications: questionnaires and interviews (Singleton, Straits, & Straits, 1993). Paper and pencil questionnaires seek information from the respondent on a hardcopy document using a marking implement. Interviews are completed by an individual or group of researchers via telephone or face-to-face. Paper based surveys are limited to text questions and lack the dynamic capabilities of response bridges. (A response bridge facilitates the sequencing from an initial question to the appropriate follow on segment). Like Internet surveys, both open and closed ended questions can be employed in paper-based surveys.

Comparison of Web-Based Versus Paper-Based Administrations

Response Rate

Response rate is generally defined as the ratio of completed and usable instruments divided by the total number of distributed instruments. Scholars exploring response rate variance differ in findings regarding whether electronic-based or paper-based administrations yield higher response rates. Often response rate variance is attributable to sampling frame effects rather than actual differences in survey media. Shaw and Davis (1996) reported significant differences in responses between their electronic and paper groups – however attributable to demographic differences rather than differences in survey media.

Response rates for most American national surveys, regardless of type, have fallen over the last forty years (Cook et al., 2000). Response rates for sampled populations may vary based on a combination of factors (Turley, 1999). Turley suggests that response rates may differ depending upon topic relevance to the respondent and/or the respondent's socio-demographic characteristics.

Response rates appear to be lower for Web-based surveys than for equivalent mail surveys (Crawford, Couper & Lamias, 2001). Response

rates increase through proctored administration because respondents are monitored throughout the survey completion process (Krysan, Schuman, Scott & Beatty, 1994). Response rates for Web-based surveys can be increased through instrumentation design that accommodates ease of use and attractiveness.

Dillman (2000) suggests that many of the techniques used to increase paper-based survey response rates will not produce the same results with Web-based surveys. He further suggests using multiple contacts for e-mail surveys as a mechanism for increasing response rates. Personal contact through pre-notification, reminder emails or notices, and/or voicemail messages may contribute to higher rates (Fox, Crask & Kim, 1988).

Turley (1999) suggests that there are three influences to mail survey response rates: sponsorship, subject matter and population. Cook et al. (2000) report that recent research indicates that lower response rates may be more accurate than surveys yielding higher response rate. This suggests an inconsistency with a survey research standard that data quality (both validity and reliability) is improved through higher response rates.

Participation Ease

Participation ease is the subjective perception that the survey instrument is user friendly to the respondent. User friendliness may include ease of use or ease of completing the questions under inquiry. A review of existing research on ease of participation generally favors Web-based over manual survey administration. Web-based instruments enable keyboard based response devices or point and click mouse actions. A potential multi-sense stimuli process associated with Web-based administration supports simultaneous kinetic, auditory and visual understanding. Specialized feedback offered to Web-based respondents (Schmidt, 1997a) may assist participants in survey completion. The addition of help menus or tool tips can facilitate respondent inquiries in the absence of the principal investigator.

A disadvantage associated with some Web-based survey administration is the difficulty of returning to a previously unanswered question (Dillman & Bunker, 1996) or the need to complete the survey in a single sitting (Lippert, 2001). Serial-order constraints may impede participation ease and affect response rates.

Attractiveness of Survey

Attractiveness is generally accepted as a subjectively pleasant and visually stimulating presentation. Attractiveness of survey instruments combines clarity of content, balanced graphics and reading ease. What constitutes attractiveness, however, varies by respondent. A few general attractiveness features, such as message personalization and screen attractiveness, possess broad attractiveness appeal. Limited graphics and professional layout have been identified as attractiveness variables.

Couper (2000) suggests that a Web-based survey can vary from respondent to respondent based on different browser usage and/or settings. Web surveys enable dynamic interactions between the respondent and the survey (Dillman, 2000). Web questionnaires can incorporate invisible response bridges (Dillman, 2000).

Self-administered surveys, whether administered on paper or on the Web, rely on both verbal and visual information to communicate with respondents (Redline & Dillman, 1999). Smith (1995) found that differences in layout format affect both self-administered and interviewer-administered surveys. Formatting issues, such as typeface, the use of lines, and black ink, affect a survey participant's willingness to respond (Carroll, 1994).

Novelty Effect

Novelty effect is defined as the appeal of a new or unusual feature, which impacts the respondent's willingness to participate. For some respondents, participating in a Web-based survey for the first time may constitute a novel experience. Novelty effect has a short half-life and is only a factor when a new response technology is introduced or prototyped. The novelty of using a Web-based interactive administration appeals to those with moderate familiarity and frequent users of electronic media, both email and Internet. The over saturation of surveys within society (Marits, 1998) may offer a reverse novelty effect associated with paper and pencil surveys.

Administrative Costs

Costs vary greatly for survey instrument administration. Administrative costs include instrument development, survey dissemination, questionnaire follow-up, data entry and costs associated with organizing the results. Web-based surveys may contain multiple media elements – audio, video and animation – resulting in development costs exceeding those of paper-based instruments. The most cost efficient administration method (advantage) for large samples is Web-based, because of the speed and ease of accessing large and geographically dispersed populations. Web surveys offer opportunities for low-cost self-administered surveys (Cook et al., 2000; Cooper, 2000; Matz, 1999; Parker, 1999; Weible & Wallace, 1998; Schmidt, 1997a; Bachmann et al., 1999/2000).

Email based administration is also cost effective and fast, in both dissemination and data analysis. When compared to telephonic survey techniques, Web-based administration continues to be more cost effective, although far less flexible. Activities to increase response rates are more cost effective when conducted via email (Cook et al., 2000) rather than through telephone or snail mail follow-up (Weible & Wallace, 1998; Matz, 1999). Automatic data compilation obtained through Web-based collection means can dramatically reduce research costs (Dillman et al., 1998). Sample size decisions may influence the type of administration selected. Cost trade-off will always be a consideration in decisions on the use of Web-based vs. paper and pencil administration.

Response Flexibility

Response flexibility is the degree of individual control available in the design and completion of a survey instrument. Web-based administration provides for a variety of response formats – check boxes, radio buttons, slider bars, scroll bars, text boxes, and drop down alternatives – in the design of survey instruments. These response formats provide greater design control, thus limiting potential data type mismatches. The limiting of mismatch errors further reduces result compilation time, effort and costs.

Paper and pencil administration provides flexibility through a uni-mechanistic response process achieved via a marking implement. In Web-based administration, forced choice responses can be controlled through non-response defaults, in which the respondent is not permitted to go forward or to submit, when a question remains unanswered. In paper and pencil administrations, this control mechanism is unavailable. Response flexibility is an important variable in instrument design and a due consideration in the choice of survey administration.

Response Time

Response time refers to the time from the initial dissemination to the arrival of completed instruments, including the time necessary for actual administration. Response time is more efficient with Web-based deployment when delivery time is included. Internet surveys enable rapid return of completed surveys (Matz, 1999; Weible & Wallace, 1998; Schmidt, 1997a). However, when response time is broken down into actual respondent time for completion of the survey, paper-pencil and Web-based are virtually identical. When using the postal system, mail surveys are significantly slower than email based surveys (Oppermann, 1995). Overall response time increases as a function of the complexity of survey design (Dillman et al., 1998).

Population Size

Large sample surveys strongly favor Web-based administration. However, Dillman et al. (1998) suggest that a web culture has emerged that ignores the scientific underpinnings of survey design in favor of larger potential population access. An advantage of Web-based sur-

veys for large-scale administration includes ease of administrative management and direct recording of results. Additionally, geographically dispersed populations are addressed better in Web-based or email based (electronic format) administrations.

Sample Bias

Sampling bias is a type of sampling error that decreases generalizability of results. Sample bias can have a profound impact on survey administration. Different forms of sampling bias exist.

In Web-based administration, only computer literate users with technology access are reachable. Therefore, populations are parameterized without regard to respondents who choose not to use or access electronic media. Internet based surveys are likely to contain sampling errors since not all members of the frame population are measured (Couper, 2000; Basi, 1999). Couper (2000) suggests that Web-based surveys are plagued with external validity issues through a potential target population-frame population mismatch. Generalizability of study results may limit the effectiveness of Internet-based surveys.

Surveyphiles are individuals who find surveys/polls appealing. Incentives used to lure Web site viewers to an online survey may influence the type of respondents' surveyed thus biasing the responses (Tierney, 2000). Frequently, surveyphiles will be sophisticated in their ability to respond. They may be attracted to Web-based surveys; however, their identification is often difficult and expensive.

Instrument Validity

Instrument validity is equivalent between Web-based (electronic) and paper/pencil (manual) survey administration, since content and construct validity are based on survey design. Most survey designs can be accommodated in Web-based, email or paper/pencil formats. Improved instrument validity is marginally in favor of Web-based administration as a function of better response and completion rates.

Management of Non-Response Data

Non-response data are those data in which a survey respondent either provides no response, a spurious response or a clearly false one. Survey research convention typically ignores non-response data by discarding obvious erroneous or sabotaged answers. Lack of clarity of respondent's intent is also a potential issue of survey data management. Through the use of electronic techniques and the use automatic analysis routines, non-responses can be measured and provided as usable data. Electronic data collections can incorporate forced pauses, which will not advance until a response is provided (Schmidt, 1997a).

CONCLUSIONS

The outcomes of this paper are intended to:
• increase awareness and sensitivity of IS researchers to differences in survey administration; and,
• summarize the differences in instrument performance parameters that can be expected by survey medium.

The human-to-human interaction present in the paper-direct administration provides a significant operating dynamic. Internet-based survey administration tends to lack personalization and sometimes is characterized as remote, indirect or impersonal. The presence or absence of the human intervention may ultimately influence user behaviors and also responses to survey queries. Further empirical research into the effects of administration differences is warranted.

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Table 1: Summary comparison of Web-based and paper and pencil surveys

Source	Response Rate	Participation Ease	Attractiveness of Survey	Novelty Effect	Administrative Costs	Response Flexibility	Response Time	Population Size	Sample Bias	Instrument Validity	Non-Response Data
Ayidiya & McClendon (1990)	*					*					
Bachman (1999)	*+										
Bachmann, Elfrink & Vazzana (1996)	+					+				+	+
Bachmann, Elfrink & Vazzana (1999/2000)	*+				+	+	*				
Basi (1999)	+	+							+		
Bradley (1999)									+		
Carroll (1994)	*+		*+								
Cook, Heath & Thompson (2000)	+							*+	*+	*+	
Couper (2000)	+	+	+	+	+	+	+	+	+	+	+
Couper, Traugott & Lamias (2001)	*+		+			+				+	
Dillman (2000)	*+	*+	*+	*+	*+	*+	*+				*+
Dillman & Bowker (1996)	+	+	+	+		+			+	+	+
Dillman, Sinclair & Clark (1993)	*	*	*	*							
Dillman, Torora, Conradt & Bowker (1998)	+	+	+			+	+				
Fox, Crask & Kim (1988)	*	*			*						
Gorman (2000)	*				*				*	*	*
Heberlein & Baumgartner (1978)	*									*	
Krysan, Schuman, Scott & Beatty (1994)	*	*				*	*				
Lippert (2001)	*+	*+	*+	*+				*+	*+		
Marits (1998)	+			*		*+	*+			*+	
Matz (1999)	*+		*+		*+	+	*+		*+		
McCooey (2000)	+		+		+	+	+				
Mehta & Sivadas (1995)	*+	*+	*+				*+				
Miller, Daly, Wood, Brooks & Roper (1996)	+										
Oppermann (1995)	*+						*+				
Parker (1999)				+	+	+			+		
Quality Progress (1999)	+				+	+			+		
Redline & Dillman (1999)			*	*							*
Rockwood, Sangster & Dillman (1997)		*	*			*+					*
Rogleberg, Fisher, Maynard, Hakel & Horvath (2001)	*+	*+	*+	*+			*+				
Schmidt (1997a)		+			*+		*+	+		*+	+
Schmidt (1997b)			+	+		+					
Shaw & Davis (1996)	*+										
Smith (1995)		*+	*+	*+							
Stanton (1998)									+		
Tierney (2000)	+	+			+				+		+
Turley (1999)	*+				*				*	*	
Weible & Wallace (1998)	*+		*+		*+	*+	*+	*+			

* = Paper and Pencil Survey	+ = Web-based Survey

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