INTERNET SURVEY RESPONSE BIAS:
AN EXPLORATORY WAVE ANALYSIS APPROACH

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ABSTRACT

Internet survey response bias is examined in an exploratory study using wave analysis. Questions examining characteristics were developed through depth interviews with individuals who do and do not answer surveys. A commercially available email list was used to contact individuals to complete the web-based survey. Those who answered without prompting were placed in the first wave. Those who needed prompting were placed in the second wave. Second wave individuals are considered surrogates for those who do not answer surveys. Four potential social integration variables emerged from the analysis suggesting that those who answer Internet surveys may be different in psychological and sociological characteristics.

INTRODUCTION

Internet research appears to offer marketers speed, efficiency and cost benefits. Thus, the growth of Internet research by marketing practitioners is not surprising, especially as the online population approaches the same demographics as the off line population. Yet, many of the same basic methodological questions that face traditional marketing research also face online researchers. As Yoffie [21] suggests, sample representation, either through non response or demographic characteristics, is one of the most significant of these issues. Marketers can do little to change the demographic characteristics of a population, but they can understand non response better. This issue is important because respondent non response represents a potential bias that can limit research generalizability, reliability, and the validity of survey results.

We define response bias as those consumer responses to Internet surveys that are systematic in nature [4]. The potential for very low response rates and the difficulty in having information about the differences between responders and non responders in an online format has made this a great concern among researchers. For example, because of privacy and computer/Internet literacy issues, it is not uncommon for a web site survey to have a very low response rate [6]. In addition, while the characteristics of responders are often different from survey to survey, total survey response is accounted for by a minority of the population (i.e., coverage error or self-selection bias), meaning that some people have a greater propensity towards survey response than others [17]. Also Bickart and Schmittlein [1], who examined past survey participation, found that in a one-year period between 2023% of the population of adults responded to most for the surveys fielded in the United States. These findings suggest that, based on non representativeness in the population, the effects of non response (i.e., about 75 to 80% of the population) could be significant when calculating survey results.

The issue of response bias has been studied for over 60 years [14]. It is a very rich literature. Interested

readers should see Hawkins [5] for an early history of response bias research. Response bias effects studies include the reasons why non response exists, measuring the bias, and suggested methods to increase response rates. Of the many articles and studies related to this topic, most address the specific issue of non response bias measurement in some capacity. These studies focus on the differences that exist between responders and non responders with a focus on characteristics of non responders. We suggest the characteristics of responders are equally of interest, especially if such a small percentage of the population is actually responding to surveys. Non response has been examined across industries and populations. Examples of this diversity are studies designed to measure the smoking habits of female military recruits [20], cardiovascular diseases [8], consumer finances [10] and farmers [13]. Most non response studies examine specific industries, measuring related characteristics and focus on mail, telephone, or face-to-face non response. Studies concerning Internet surveys often discuss benefits to using email surveys, comparing them to Internet site linked questionnaire formats or other, non Internet methods. Their findings suggest a variety of demographic variables are associated with response bias such as age, race, health, and income. We could not find any marketing studies on response bias and web-based Internet surveys.

We choose wave analysis as our method of examination because of its compatibility with web-based surveys. Wave analysis uses traditional sampling methods to attract respondents and record their surveys. Then a second wave is fielded using the telephone, postcards or other methods to motivate non responders to respond. These late responders are assumed to have some characteristics of non responders. Like the alternate research methods for response bias, wave analysis suggests there are some differences among early and late responders for certain demographic characteristics and specific study related questions [11] [16] [10] [15] [18] [19].

One area of interest that is not demographic in nature is social integration, which appears to describe a human condition of detachment. Keeter, Miller, Kohut, Groves, and Presser [9], with few positive results, indicated it as a possible influence on survey response. We suspect that, if a consumer is detached from their social surroundings, they will also tend to detach themselves form various accepted consumer behaviors. This would include answering surveys. We suggest that responding to consumer surveys is one of these basic marketing behaviors with the possibility that response may be influenced by the level of social integration a consumer has with their societal system.

The purpose of this paper is to examine the differences between responders and non responders for a web-based Internet survey. Specifically, social integration characteristics of the individual will be examined for a better understanding of potential response bias. We use wave analysis as a method, with late responders as an indicator for non responders. We measure a number of respondent characteristics for differences between early and late responders. What follows is a brief review of the social integration literature. Next, we discuss our method and results. Last, we present a discussion of the problems encountered on fielding this research, the limitations of our study, managerial implications, and future research.

Social Integration

There is a rich history of academic research for social integration, mainly in the examination of social issues. Its roots go as far back as the late 1890s when Emile Durkheim examined links between social integration and the deviant behavior of suicide (see [3] for a brief discussion). Social Integration is defined as a level of involvement in a social system. Levels of involvement include living by social

norms, interaction and reliance on the social system, and a lack of alienation [7]. Sociologists examined links between them and what was called deviant social behavior such as teenage pregnancies [3], church attendance [12], and information seeking [7]. For example, Martinson, Wilkening, and Buttel [12] studied social integration and religion. They operationalized social integration as community orientation using community solidarity and community satisfaction as measures. In addition to linking religion to social integration, they also showed correlations to income, age, size of residence, informal interaction with friends and relatives, and membership in voluntary groups.

METHOD

Survey Website

A website, www.freeonlinesurveys.com, was used for the actual survey allowing for two identical surveys to be placed on the site with a separate address for each. This allowed us to see which request to participate in the survey was being answered and the subsequent differentiation between Waves I and II. The link included in each email allowed for respondents to click and go directly to the survey.

Survey question development

A series of depth interviews were conducted to examine responders and non responders for possible differences. One notion that emerged from our interviews was that non responders appeared to be different in their levels of social integration than responders. This suggested what earlier researchers had implied [9]. To examine this, we developed a list of 18 questions relating to social risk, compatibility, satisfaction, and activity based on what our interviewees said and the work of Keeter, et. al. [9]. The social risk questions examined the more stressful social activities such as changing a job or giving a speech. The social compatibility questions examined such issues as stability and contentment. The social satisfaction questions examined how one feels about oneself. The social activities questions examined the frequency of going out to such events as movies or plays. A 28 question survey was developed that included a variety of demographic, Internet usage, and the 18 social integration questions. To motivate potential responders to fill out the survey, our email solicitation was embedded with a link to the survey's website.

The Mailing List

A randomized list of 20,000 from a much larger list of email addresses was purchased from a list broker. After cleaning the list of all possible incorrect addresses, 10,644 remained. While a random sample of email addresses would be optimal, this is unavailable since there is no central directory of email addresses for the Internet [2].

Survey Invitation

Over three thousand (n = 3,548) email addresses, randomly selected (every third address) from the original list of 10,644, were contacted with an invitation to respond to the survey. After allowing 2 weeks to pass, a second invitation was sent out to those who did not respond to the first request. To distinguish the response waves, Wave II was linked to a different web address. These surveys were identical, but by using different URLs, it allowed for an effective means of tracking and distinguishing between the two groups of respondents. A $100.00 incentive was used as a prize for participating.

Responses to Wave I and Wave II

Over 30% of Wave I emails were returned because of nonexistent addresses. Thus, our initial Wave had 2484 potential respondents (n = 3548-1064). The actual number who responded was 90 or a response rate of 3.62%. While our initial plan was to send the second wave to all sample members who had not responded to the first wave of this survey, this process was stopped before completion because spamming accusations. In total, 1,718 were contacted who had not replied to Wave I. Of this number, 1678 were found to be valid addresses. Wave II had an overall response rate of 1.54% (n=26). Both the quality of the email list and the issue of spamming will be discussed later in this paper.

RESULTS

Our first step in this exploratory study was to examine the underlying structure of the 18 social integration questions using factor analysis with Varimax rotation. We then examined the reliability of each grouping of questions, eliminating four questions that had lowered the SPSS reliability alpha. We then factored the new group of 14 questions. As shown in Table 1, four factors emerged with an eigenvalue of over 1 and cumulative variance of 61.8%. Analysis suggests four possible factors that we have characterized with names based on the survey questions and our original nomenclature. Reliability and factor loadings are shown in parenthesis.

TABLE 1: Results of Varimax Rotated Factor Analysis

Factor I: Social risk (α = .80)

1. Walking into a crowded room of strangers? (.773)
2. Giving a speech? (.710)
3. Contacting someone via the Internet? (.697)
4. A great deal of activity taking place at once? (.675)
5. Participating in conversations with peers? (.611)
6. I am open to new experiences. (.608)

Factor II: Social compatibility (α = .52)

1. I am content with things remaining the same. (-.804)
2. I prefer stability in my life. (-.799)
3. How comfortable are you with changing jobs? (.601)
4. I am able to adapt to new environments/situations. (.515)

Factor III: Inner social satisfaction (α = .58)

1. I am happy with my life. (.840)
2. I have a hard time finding people that understand me. (.718)

Factor IV: Outer social satisfaction (α = .67)

1. I would like to change certain things about myself. (.865)
2. I have many things to accomplish in life. (.763)

Our goal was to examine the differences between Wave I and Wave II for the four potential social integration variables that emerged from the factor analysis. Wave I and Wave II results were examined using one-way ANOVA. Our ANOVA results show that Factor I: “Social risk” was shown to be different (F =4.565, Sig. = .035). Factor II: “Social compatibility” was shown to not be different (F =

1.380, Sig. = .243. Factor III: "Inner social satisfaction" was shown not to be different (F = 2.285, Sig. = .113). Factor IV: "Outer social satisfaction" was shown to be significantly different (F = 11.941, Sig. = .001).

DISCUSSION

Our exploratory work suggests two of the four social integration variables were found to be significantly different between Waves I and II: Social risk and Outer social satisfaction. Both of these variables can be characterized as outer directed. That is, responders tend to be more satisfied with the way their life is going and are not too concerned with new experiences while non responders tend to be less satisfied with their life and are not as comfortable with new experiences. Analysis of the demographic information did not find any significant differences between Waves I and II.

Clearly more work is needed. The results presented are interesting, but exploratory because of the limited responses associated with this study. In addition, wave analysis is not typically used to make generalities concerning characteristics of responders vs. non responders based on only two waves. The limitations/problems with this study involved the low quality of the email list and the accusations of spamming. Researchers should be cautioned that many of the email lists that are for sale use old addresses or have restricted addresses. The individuals at the restricted addresses are especially aggressive in their right to privacy. These individuals emailed to our web site management complaining that we were spamming them, even though the initial email clearly stated that it was an academic study. Thus, our web survey site was shut down for spamming before wave two was completed.

Hopefully, these obstacles will help to serve as a reference for future academic Internet research. While some of the problems encountered were certainly unforeseeable, in retrospect some things could have been done differently. However, these problems can all be generally attributed to the email list. To overcome this, we recommend that a list can be purchased from opt-in email list brokers, who provide the addresses of people that have agreed to receive emails regarding a variety of issues. Unfortunately, these opt-in lists are often expensive.

Last, managers and researchers should understand that, although web-based surveys appear on the surface to be cost effective, they have many potential problems. These include self-selection and non response bias.

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