

Student Energy Awareness: Web-based and Paper-based Survey Results

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Abstract

Web-based and paper-based will measure both these attitude and knowledge. Although previous studies suggest that web- and paper-based survey results are comparable, authors argue that they are not. Web- and paper-based surveys with identical survey questions were distributed to Undergraduate Students of School of Business and Management of Institut Teknologi Bandung. Data collected from both survey methods were compared using chi-square test. The result of the study suggest 50% differences between the two modes that are possibly caused by sources of disturbance.

Keywords: Web-based Survey; Paper-based Survey; Students; Response Rate; Completeness; Comparability; Distribution of Responses

1. Introduction

In this era of Internet and mobile communication, survey is not only done on paper. Although paper-based survey is still tend to be chosen, the Web-based survey promises more practical advantages. It is no wonder that Web-based survey has been quite a popular way for market researchers to gather information they need nowadays. The Web-based survey is considered to be able to replace or complement the paper-based survey. Therefore, it is necessary to investigate whether the two methods produce an equal distribution of responses. The term "distribution of responses" refers to frequency of occurrence a certain choice in nominal multiple-choice survey questions.

2. Literature Review

Low response rate may introduce a survey into non-response bias, where an error is resulted from the probability of distinct differences between those who participate in a survey versus those who do not. In other words, the higher the response rate is, the lower the risk of non-response bias. A recent study found that over 99% of students used the Internet during high school. However, students were more likely to complete paper-based surveys, especially when distributed in class, rather than the Web-based survey (Karen L. Pielak, 2011). Avery, et al. (2006) found that the response rate of Web-based falls below that of the paper-based response rate, with around 50% being a commonly reported response rate.

Completeness of survey is essential to record data and information that could be well analyzed. A study by Spark (2014) found that data completeness was greater for sexual behavior surveys delivered with computer-assisted survey instrument (or equal to Web-based survey) compared with paper-based surveys. Previous literature had examined completeness in the field of sensitive matter, like sex, but there was no evidence of study assessing completeness of neutral matter surveys, such as course evaluation or awareness assessment.

Comparability is important to collect interchangeable or equivalent result when conducting survey through different administering methods. Several previous studies were contradicting. A study by Norman, et al. (2004), which used confirmatory factor analysis method, indicated that adolescents provided equivalent responses to a range of psychosocial construct measures when administered on either Web or paper. Norman’s finding was consistent with previous research, using bootstrap approach, by Miller, et al. (2002). Still supporting those studies, Fike, et al. (2010), with t-test method, did the comparative study on faculty evaluation and found that the scoring patterns between the Web- and paper-based groups did not differ in a statistically significant manner. In contrast, the findings of a study by Ross, et al. (2000) which used both t-test and chi-square test, showed inconsistency in responses from Web-based survey and paper-based survey.

This study aimed to produce recommendations for conducting both Web-based and paper-based survey. To that, examinations regarding response rate, completeness, and comparability of Web-based and paper-based survey were analyzed. Issues that newly introduced in this study are the assessment of the impact of reminder treatment to Web-based survey, identifying the definition of the term “complete” in both Web- and paper-based surveys, and sources of disturbance that may affect the comparability between both survey modes.

3. Research Methodology

This study measured the responses of survey administered through Web-based and paper-based method. Both surveys were distributed to the same population: Undergraduate Students of School of Business and Management of Institut Teknologi Bandung. With the annual intake of 200-300 students and current student body of 807 (2015-2016), the sample size of this study was 320 for the Web-based and 279 for the paper-based. Using Slovin method to calculate sample size, for the number of population of 807, 268 samples is sufficient. Therefore, both Web-based and paper-based surveys in this study were in an acceptable number of sample.

The survey questions asked to the respondents were mainly about the energy awareness, with additional issues of attitude toward online survey and survey method preference, in the form of multiple choices. To measure the comparability of surveys (categorical data) chi-square was utilized.

4. Discussion

The results yielded from both Web- and paper-based surveys are presented below. Data of distribution of responses were analyzed. Thence, the analysis illustrated insight on response rate, completeness, comparability, and sources of disturbances.

4.1. Response Rate

Table 1. Response Rate of Web-based and Paper-based Surveys

Survey Method	# of survey distributed	# of survey responses	Response Rate
Web-based	807	279	34.57%
Paper-based	374	320	86%

Table 1 shows that response rate of the Web-based and paper-based surveys had a quite significant difference, in which the response rate of the paper-based survey was much larger than the Web-based's. This finding was so much logical because there was possibility of the survey target (students) had been ignorant to the survey participation



request. In contrast, the paper-based survey was done in class. The presence of the surveyor and the teacher(s) might give the students a sense of obliged to fill out the survey forms.

Table 2. Frequency of Responses (#) and Percentage of Total Responses (%) of Web-based Survey Responses by Date (April 2016)

	19 ^P	20	21 ^R	22 ^R	23	24 ^R	25	26	27	28	29	30	01	02	03
#	72	39	79	55	5	24	1	2	0	1	0	0	0	0	1
%	25.8	14.0	28.3	19.7	1.8	8.6	0.4	0.7	0.0	0.4	0.0	0.0	0.0	0.0	0.4

^P) Day of survey link being published

^R) Day with reminder treatment

In Table 2, it can be seen that on the day of initial survey link distribution, 25.8% of responses had already been recorded. It is also obviously presented that reminders gave certain effect to the amount of response. The first and second reminders happened to give a quite strong impact to spur survey response (28.3% and 19.7%, respectively), whereas the third reminder did not seem to give meaningful impact (8.6%). It is important to note that April 24th, 2016 happened to be Sunday. Knowing the fact that, in this study, the first two reminders could bring as much as 48% of the total responses, it could be implied that two times of reminders may have been sufficient.

4.2. Completeness

Table 3. Completion Rate of Web-based Survey

# of clicks on link	→	# of survey responses	→	# of responses filled completely	Completion Rate
376		279		248	65.96%

Table 4. Completion Rate of Paper-based Survey

# of survey responses	→	# of correct responses	→	# of responses filled completely	Completion Rate
320		303		196	64.69%

Table 3 and Table 4 visualize that the conversion journeys of completion are clearly two different things for Web-based and paper-based survey. The completion rates of the two methods are not much different, in which for Web-based, it was amounted to 65.69% and for paper-based, it was 64.69%.

4.3. Comparability

Table 5. Comparability of Responses

Comparability of Responses	Question Number							
	1	2	3	4	5	6	7	8
Web-based vs Paper-based	D	✓	D	D	✓	✓	D	✓

✓ = no significant difference; D = significant difference

Using chi-square analysis, comparability of the survey methods were examined. As presented in Table 5, out of 8 questions, 4 questions present significant difference in response. A statement drawn here is that the results of Web-based and paper-based surveys were different in distribution of responses. This finding could be aligned to the fact that students reacted differently to monitor and paper.

4.4. Source of Disturbance

Disturbances in conducting survey, either Web- or paper-based, were analyzed through survey questions regarding attitude and preference toward survey. The presence of disturbances brings possibility of reduced reliability of the participants responses.

Table 6. Ability to Recall Answers on Web-based Survey

Ability to Recall Answers on Web-based Survey	Percentage
Can't remember what was filled	45%
Remember what was filled	55%

Table 7. Reasons for Responding to Web-based Survey

Reasons for responding to Web-based survey	Percentage
Requested by the researcher	37%
Happen to be familiar with the researcher	7%
Eager to help the researcher	45%
Interested in the research	7%
Others	3%

Prior to the distribution of paper-based survey, Web-based survey was conducted. Referring to Table 6, 45% admitted they did not remember what they filled in the Web-based survey. Since most of the questions in the survey concerned more on the principle of one's life, tendency to be failed at recalling should have been minimal. Therefore, it was most likely that the participants did not respond right and carefully.

Also, discussing reasons behind their willingness to participate in the Web-based survey, reasons of being "requested by the researcher" and "familiarity with the researcher" are not quite desirable reasons, in which it implied that the respondents were actually "don't want to, but they have to". In Table 7, those two reasons happened to take as large as 37% and 7% portions or equal to 44%. This event will illustrate a tricky situation to decide if the number of responses (sample size) was adequate. The problem is, when a number of responses are already sufficient, but if the reason of participating in a survey involves any "pressured feeling", the data obtained will more likely to be unreliable.

To sum up what is found in Table 6 and Table 7, "*absence of enthusiasm in participating in the survey*" was a major source of disturbance in survey. As 44% of the respondents were actually not enthusiastic in participating the Web-based survey, they tended to participate carelessly. The symptom of carelessness is also shown in Table 6, in which 45% of respondents of both survey modes claimed to fail at recalling what they filled in the Web-based survey.

Table 8. Survey Method Preference

Survey method preference	Percentage
Web-based	73%
Paper-based	5%
Neither	6%
Indifferent	16%



At a very clear sight in Table 8, the most preferred survey method from the respondent side was the Web-based survey. Another point to be inferred here is, what happened to the Section 4.3 related to Comparability, the unequal distribution of responses from the Web-based and paper-based survey may also be caused by different survey administering mode preferences. Alternatively, in another case, imagine that those who actually preferred the Web-based survey, were exposed to the paper one, or vice versa. They will be more likely to, again, be careless when filling the survey out. This finding might build an argument that “*personal preference of survey administering method*” was also a source of disturbance to survey.

5. Conclusion

Web- and paper-based surveys both had shown difference in distribution of responses. The response rate of Web-based survey mode fell below the paper-based one. Reminder treatments did their work effectively in term of increasing response number in the Web-based survey. After analyzing how differently students reacted toward participating in a certain mode of survey, a thorough look upon how they filled the survey out was analyzed. It was found that a significant percentage of the respondents were not filling the survey, either Web- or paper-based, in a correct manner and completely. Eventually, it was not surprising that the distribution of responses yielded from Web-based and paper-based surveys ended up to be not equal one another.

More than analyzing the pattern of responses, this study found students’ attitude and preference toward survey bring important insights. Both attitude and preference established disturbances that might affect survey results to be less reliable. From this study, it was known that the absence of enthusiasm in participating in the survey from the participants side and participants’ personal preference of survey administering method were the sources of disturbances. These disturbances happened to be the cause of two problems: (1) unequal distribution of responses between survey modes (related to comparability) and (2) not adequate number of responses, even though the actual number has exceeded the desirable sample size.

Hence, following are some recommendations derived from this study. First, Web-based and paper-based surveys are not interchangeable. Second, unenthusiastic participants prone to be careless when participating in either Web-based or paper-based. So, it is suggested to increase the standard of sample size at least by doubling the usual standard. Moreover, to attract more interest in participating in a survey, dissemination of survey results and active supports from school or department would be a good. Third, in the effort of increasing the number of responses, reminders are a good option to use for Web-based survey. From this study, it was found that two times a reminder is enough. Last but not least, good questionnaires design are important.

To enhance the findings found from this study, some important points can be discussed for further study: (1) reason behind the willingness of respondents to participate in a survey and/or (2) a study on Web-based survey reminder.

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