

**SUPPORTING JUSTIFICATION – Part B**  
**Electronic Distraction Device (EDD) Survey; OMB No. 2130-NEW**  
**Form Number FRA F 6180.158**

**1. Description of sampling method to be used.**

The extent of electronic device usage in the railroad industry is currently unknown. However, data on the extent of electronic device usage in the railroad industry is urgently needed so that the FRA’s regulatory efforts can be data-driven decisions. Given that this is the first data collection effort of its kind within the railroad industry, there are many unknowns.

The purpose of this data collection effort is to learn about electronic device usage, attitudes about usage, and opinions about the efficacy of various countermeasures to usage. FRA is interested in collecting this qualitative data to help better inform the development of educational programs, targeted safety campaigns, and peer to peer interventions. FRA intends to collect this data annually so these interventions will reflect the current state of the rail industry as it relates to electronic device usage, attitudes, and opinions about countermeasures. As this is qualitative data, FRA does not intend to use this data to draw statistical inference. FRA has carefully considered its options for this data collection effort and has chosen a survey instrument rather than focus groups, case studies, or other qualitative measures for a variety of reasons. First, FRA intends to collect the same data annually. A survey instrument will allow for consistent data across years. Secondly, the information FRA is interested in collecting can be collected most expeditiously through a survey instrument. Other qualitative measures would require more processing to get data into a useable form. Thirdly, case studies and focus groups can provide more detail about a limited number of individuals. FRA is interested in information as it relates to electronic device usage for the purpose of designing educational programs, targeted safety campaigns, and peer to peer interventions. More in depth information would not provide additional value to these types of interventions. Lastly, the costs of focus groups or case studies would be greater than that of the proposed survey and this investment of additional funds would result in data that would not be as useful to FRA for the purposes outlined above.

The use of different types of electronic devices will impact the types of safety interventions developed. For example, if the majority of respondents report using cell phones as a means to keep in touch with family, targeted awareness campaigns could be developed to increase awareness of railroad programs that are in place to assist railroaders on duty who need to have contact with family members in emergency situations. Alternately, if it is found that the majority of usage is on company issued devices for company related activities, educational campaigns could be developed to instruct when and how to use these devices/applications safely. Finally, if it is found that a great deal of usage involves games or other applications because of boredom, this is best identified by rail peers and best addressed through a peer to peer program.

The population of interest is safety related railroad employees. The specific railroad crafts that are involved in safety-related activities were identified by means of interviews with FRA personnel and members of stakeholder groups who have an interest in the results. Once the railroad crafts of interest were identified, data from the Bureau of Labor Statistics ([http://www.bls.gov/oes/current/naics4\\_482100.htm](http://www.bls.gov/oes/current/naics4_482100.htm)), the American Association of Railroads (AAR), and the relevant labor organizations were used to determine the number of employees working in each railroad craft.

FRA is working with rail labor unions and rail management on this data collection effort. Since FRA, in conjunction with these groups, is seeking detailed information regarding electronic devices and railroaders have historically been a more guarded population, a subgroup of employees that have a history of active participation in these types of qualitative data collection efforts has been identified. This subgroup of rail employees comprises approximately 38% of the total railroader population. It is from this identified sub-population that the sample will be selected for this data collection effort.

This subgroup has also demonstrated evidence of regularly using electronic devices and already has some experience with electronic communication (i.e., those who are comfortable receiving information electronically via email). FRA, therefore, believes this subgroup is the best population from which to draw a sample for this qualitative data collection effort. FRA has worked closely with railroad management and the rail labor unions on this data collection effort. FRA has found that the unions have had much success with surveys administered to this group of individuals, reporting that this group of individuals tends to be very responsive and cooperative. FRA is interested in obtaining the highest quality data possible, and as such, is specifically targeting this group of individuals for this qualitative data collection effort. FRA, in conjunction with the railroads and related labor unions, has carefully considered the benefits and disadvantages associated with a 100% electronic data collection methodology. A web-based survey methodology will naturally exclude those individuals that may be less comfortable with technology. However, given that nearly half of Americans now own smartphones, this number is likely to be small and decrease further in subsequent survey years.<sup>1</sup> However, this is a minor point for the identified population of interest as they all have valid email addresses on file with their respective labor unions and have demonstrated proficiency with web-based applications.

For this data collection effort, FRA made several assumptions guiding sample size calculations:

- Survey Population consists of railroad employees (and their supervisors) whose duties regularly require them to work around railroad track and rolling equipment: engineers, conductors, trainmen, car inspectors, maintenance of way employees, signal maintainers, dispatchers, and machinists. The population of railroad workers is a known and finite population of approximately 160,000 individuals. The identified population for this qualitative survey data collection effort is approximately 60,000

---

<sup>1</sup> <http://pewinternet.org/Reports/2012/Smartphone-Update-2012.aspx>

individuals.

- Data from the sample will be used for qualitative purposes only. No quantitative analyses will be conducted on sample data.

The survey includes questions regarding age, years in craft, type of railroad operation (passenger/freight), and primary work region. These survey questions will help FRA in determining how close the sample represents the underlying railroad population. However, even in the case that the sample and population have are nearly identical, FRA must reiterate that its intent is not to make statistical inference but rather to collect qualitative data.

To avoid the potential of under or over representing a particular railroad craft of interest and since different railroad crafts are governed by different rules and regulations regarding electronic device usage while on duty, samples will be collected from each railroad craft. The reasons for this are twofold: First, one global sample of identified safety related railroad employees of interest would have the potential for under or over representing a particular craft since there is a great deal of variability in the numbers of employees in the different crafts of interest. Employees of a particular railroad craft can represent anywhere from less than 2% to 34% of the entire population. It is possible that if one global sample is used those railroad crafts with fewer employees may be underrepresented in the final sample. Secondly, different railroad crafts are governed by different rules, regulations, and performance standards. For some crafts, such as conductors and engineers, Federal regulations restrict electronic device usage while on duty. Individuals in these crafts who used electronic devices inappropriately would violate Federal regulations and could face disciplinary action or even termination of employment. Other crafts, such as machinists, may have different usage patterns because the nature of their work limits the opportunities to use electronic devices. Using a stratified random sample of the population was considered. However, since some crafts represent such a small percentage of the total railroad population, even stratification would result in very little data (in some instances less than 2 participants) from these crafts. Therefore, each craft was treated as its own unique population with a separate sample. These are discrete samples as, even though crafts are all part of a generic “railroad population,” comparing these crafts either through statistical inference or otherwise would be inappropriate for the reasons outlined above.

It was assumed that approximately 65% of potential respondents would participate in the survey. This number was based on information obtained from the labor unions as well as FRA’s previous survey experience. The labor unions contend that they typically received response rates of around 80% for this population of interest. However, when sampling from the entire population of railroaders (not just this subset of interest) FRA has found much lower response rates. Previous FRA human factors surveys have found response rates of between 21% - 50% for the different railroad crafts. The table below summarizes the response rates for select railroad crafts for a recent FRA survey. Links to the final reports for each of these surveys are included in the footnotes.

Occupation	Response Rate (%)
Train & Engine <sup>2</sup>	33
Passenger Train & Engine <sup>3</sup>	21
Signalman <sup>4</sup>	49.9
Maintenance of Way <sup>5</sup>	31
Dispatcher <sup>6</sup>	46

Given this, FRA is assuming a more conservative response rate. Therefore, the calculated sample was adjusted to reflect the additional invitations need to be sent to obtain the calculated sample size given a 65% response rate. FRA has never collected survey data regarding electronic device usage. Additionally, this is FRA’s first completely electronic survey data collection. As such, it was difficult to calculate a response rate with certainty. FRA assumed a 65% response rate based on a review of the relevant literature, discussions with other agencies that had experience with electronic survey data collection, and discussions with railroad union representatives. As stated previously, union representatives have had the most experience with electronic survey data collection from railroad employee populations. Their experience has been that response rates are quite high for these types of survey data efforts. If after the first year of this survey data collection effort it is determined that actual response rates are much higher or lower than anticipated, FRA will adjust its assumed response rates and sample sizes accordingly.

FRA has worked closely with both railroad management and railroad labor unions in the development of this survey. This multi-stakeholder effort has been recognized by both management and labor as an area where data is urgently needed in the rail industry. For each craft, out of the identified population of interest, 115 individuals will be chosen at random to receive the survey invitation. Assuming a 65% response rate (discussed in more detail above), this will be enough invitations to obtain a sample of 75 responses needed for each craft. This multi-stakeholder effort has been recognized by both management and labor as an area where data is urgently needed in the rail industry. All stakeholders have thus-far been supportive of FRA’s qualitative data collection effort. The success of this survey data collection effort is contingent upon the continued support of both railroad management and railroad labor unions. There is currently a great deal of stakeholder interest in obtaining this data. As such, FRA currently has a great deal of support and is hoping to capitalize on that momentum while moving forward with this survey data collection effort. Should FRA delay this qualitative data collection effort, it is possible that stakeholder interest and support would be lost or diminished making data collection difficult if not impossible.

Although data will be used qualitatively, FRA is asking for a slightly larger sample size than would ordinarily be necessary for qualitative data (75 responses) in an effort to ensure that in all crafts employees working in passenger and freight operations, all railroad classes (I, II, and III),

<sup>2</sup> <http://www.fra.dot.gov/eLib/details/L01507>

<sup>3</sup> <http://www.fra.dot.gov/eLib/details/L01305>

<sup>4</sup> <http://www.fra.dot.gov/eLib/details/L02537>

<sup>5</sup> <http://www.fra.dot.gov/eLib/details/L01638>

<sup>6</sup> <http://www.fra.dot.gov/eLib/details/L01616>

and nationwide will have the opportunity to respond.

In securing the support of both management and labor, FRA has agreed to conduct the survey under some constraints. FRA believes that the value of this survey data collection effort and the subsequent data it provides far outweigh any inconveniences imposed by these constraints. Furthermore, without the support and participation of management and labor, this or any data collection effort looking at electronic device usage in the railroad industry would not be possible. Without collaboration from all parties, this critically needed data would remain unavailable. One of the major constraints FRA is working with relates to sample size. The cooperation of both railroad management and labor unions is contingent upon the FRA conducting this qualitative survey data collection effort and any future survey data collection efforts using smaller sample sizes. Additionally, FRA has agreed to never directly compare crafts. FRA believes the sample size is more than adequate to provide the qualitative data it seeks.

<b>Craft/Position</b>	<b>Total Population</b>	<b>Population of interest</b>	<b>Sample Size</b>	<b>Number of invitations assuming 65% response rate to get sample</b>
<b>Conductors</b>	53,800	26,900	75	115
<b>Engineers</b>	37,500	15,346	75	115
<b>Signal Workers</b>	10,245	5,325	75	115
<b>Maint of Way Workers</b>	30,800	2,000	75	115
<b>Car Inspectors</b>	7,000	3,400	75	115
<b>Machinists</b>	10,227	1,200	75	115
<b>Dispatchers</b>	2,500	1,250	75	115
<b>Supervisors</b>	5,790	4,632	75	115

	157,862	60,053	600	920	
	(1) Source: <a href="http://www.bls.gov/oes/current/naics4_482100.htm">http://www.bls.gov/oes/current/naics4_482100.htm</a> and UTU, BLET, BRS, BMWED, TCU, IAM, ATD				
	(2) Sample size based on 95% Confidence Level & 5 Interval				
	(3) Workers obtained from rail labor unions (see fourth bullet point under answer to question 1 Part B for an expanded discussion regarding this number)				
	(4) Annual Burden based on 20 minutes per survey				

**2. Description of procedures for information collection, including statistical methodology for stratification and sample selection.**

Survey data will be collected once per year for a period of five years. FRA has considered the use of less frequent data collection periods and determined less frequent data collection would not be appropriate. Specifically, since FRA intends to use this qualitative data to help inform the development of educational programs, targeted safety campaigns, and peer to peer interventions and these interventions typically are employed for periods of three to six months at a time, if proposed collection of information were not conducted or conducted less frequently, these interventions would be based on no information or outdated information. Furthermore, without such interventions, there would be a potential for increased numbers of rail accidents/incidents and corresponding injuries, fatalities, and property damage caused by railroad workers and train crew members who were distracted by electronic devices from performing their normal rail duties in a safe manner. Minimizing the risks associated with electronic device distraction requires a set of choices concerning the specifics of regulation, education, social marketing, and collaborative programs with rail industry. Each of these approaches can contribute individually, and a coordinated set of all is needed to minimize a problem that has roots in technology, work process, rule-based behavior, psychology, peer group influence, and culture. Taking appropriate and effective remedial action requires more than guesswork as to which railroad employees are misusing electronic devices, exactly what devices are being used, the conditions under which such use/misuse is taking place, and how frequently use/misuse is occurring. For instance, is electronic device distraction mostly a problem with locomotive engineers who are away from home and need to communicate with their families? Or, is it most prevalent among shift workers who play electronic games because they are bored? Very different initiatives would be needed in each case. Presently, there are no available data to address these kinds of questions. Trustworthy qualitative data collected over a period of years are needed to ascertain the extent of the problem and to design potentially effective programs, and to redesign efforts as needed. Considering the time needed to design and implement programs, and budgeting and planning cycles, once-yearly data collection is appropriate.

FRA is working with rail labor unions and rail management on this data collection effort. Since FRA, in conjunction with these groups, is seeking detailed information regarding electronic devices and railroaders have historically been a more guarded population, a subgroup of employees that have a history of active participation in these types of qualitative data collection

efforts has been identified. This subgroup of rail employees comprises approximately 38% of the total railroader population. It is from this identified sub-population that the sample will be selected for this data collection effort.

This subgroup has also demonstrated evidence of regularly using electronic devices and already has some experience with electronic communication (i.e., those who are comfortable receiving information electronically via email). FRA, therefore, believes this subgroup is the best population from which to draw a sample for this qualitative data collection effort. FRA has worked closely with railroad management and the rail labor unions on this data collection effort. FRA has found that the unions have had much success with surveys administered to this group of individuals, reporting that this group of individuals tends to be very responsive and cooperative. FRA is interested in obtaining the highest quality data possible, and as such, is specifically targeting this group of individuals for this qualitative data collection effort. FRA will draw a random sample from this identified specialized population. FRA will only be using this data for qualitative purposes. FRA, in conjunction with the railroads and related labor unions, has carefully considered the benefits and disadvantages associated with a 100% electronic data collection methodology. A web-based survey methodology will naturally exclude those individuals that may be less comfortable with technology. However, given that nearly half of Americans now own smartphones, this number is likely to be small and decrease further in subsequent survey years.<sup>7</sup> However, this is a minor point for the identified population of interest as they all have valid email addresses on file with their respective labor unions and have demonstrated proficiency with web-based applications. The only inclusion criteria for the specialized population of interest are that the individual has a valid email address on file with the relevant labor union and has agreed to receive information electronically. However, this specialized population does not represent a random sample of the larger population of railroad employees. As such, this specialized population will not provide full coverage of the entire population. This further underscores FRA's reasoning to use this data qualitatively as it is unknown how this specialized population compares to the larger railroad population. As technology continues to become more ubiquitous, and since the only inclusionary criterion for the specialized population is that a person must have a valid email address on file with the relevant labor union and consent to electronic communication, FRA anticipates that as we approach subsequent survey years the sampling frame will expand and the specialized population will include more members of the larger railroad population. Although we anticipate that this specialized population will continue to grow in subsequent survey years, how that population relates to the larger railroad population will still remain unknown and data will continue to be used qualitatively.

### **3. Description of methods to maximize response rate and to deal with non-response issues.**

This qualitative survey data collection effort will be carried out in collaboration with the leadership of relevant craft unions and the management of the railroads involved. In addition, members of the FRA's Rail Safety Advisory Committee on electronic device distraction are

---

<sup>7</sup> <http://pewinternet.org/Reports/2012/Smartphone-Update-2012.aspx>

heavily involved in this project.<sup>8</sup> Their support of the effort and acknowledgement of the importance of the information will be of considerable assistance in eliciting railroad employee cooperation. They will be involved in initial requests for cooperation and in follow-up communications and reminders.

A standard introductory email will be created by FRA. This email will alert the population that they may receive an invitation to participate in the survey. FRA will also create and distribute to the labor unions the invitation email and the reminder emails – to ensure that all potential participants receive the same information. Additionally, unions may publicize the survey via union newsletters and at union meetings.

The survey invitations have been designed to enhance response rates by following suggestions given by Borg and Gall (1983). Specifically, introductory emails sent to respondents will come from labor union leaders using official email addresses. The introductory emails will explicitly state the purpose of the study and the estimated time to complete the survey. The letters will also stress that no special preparation is needed to participate. The survey has also been extensively pilot tested to insure that the questions use simple and straightforward language. Pretesting of 20 FRA employees and 9 railroad employees indicates that the average survey completion time is approximately 20 minutes to complete.

Union leaders will encourage participation by indicating that the survey data will be used to design educational programs, targeted safety campaigns, and peer to peer interventions. By completing the survey, railroad employees will be able to influence how these interventions are designed and implemented. The opportunity to influence these interventions should provide more than adequate motivation for participation. Additionally, having the request come from labor union leaders rather than from FRA or railroad management will increase the likelihood of participation.

Prior to the issuing of survey invitations, a pre-notification of the survey will be released. This pre-notification will be available on railroad intranets, union newsletters, and FRA's website. This pre-notification will explain the purpose of the survey including: when data will be collected, how data will be collected, they types of information to be collected, and why this information is being requested. FRA's Administrator Szabo has already recorded a public service announcement regarding electronic device usage by railroaders. A link to this public service announcement will be included in the pre-notification announcement.

---

<sup>8</sup> The importance of RSAC involvement can be understood from their history and mission. To quote from the RSAC section of the [FRA website](#) : *RSAC History*: "In 1996, FRA established the Railroad Safety Advisory Committee (RSAC) to develop new regulatory standards, through a collaborative process, with all segments of the rail community working together to fashion mutually satisfactory solutions on safety regulatory issues." regulations are necessary, the Committee shall take into account section 1(a) of Executive Order 12866 (Regulatory Planning and Review). *RSAC Purpose*: "The Committee shall seek agreement on the facts and data underlying any real or perceived safety problems; identify cost effective solutions based on the agreed-upon facts; and identify regulatory options where necessary to implement those solutions. In determining whether regulations are necessary, the Committee shall take into account section 1(a) of Executive Order 12866 (Regulatory Planning and Review)."

The pre-notification and survey invitations will contain contact information for both union representatives and FRA personnel who can be contacted for additional information about the survey including questions about how the data will be used and how a person's responses will be kept confidential.

The survey will be a web-based data collection effort. Prior to determining the survey delivery method, FRA reviewed the literature comparing web-based survey methods with traditional paper-based survey methods. Research findings revealed no significant differences in survey answers given by respondents regardless of the method of survey administration. However, studies by Tse (1998) and Shannon and Brandshow (2004) found a higher response rate for mail in surveys but a faster response rate for web-based surveys. Respondents will be invited to respond via an e-mail containing a hyperlink to an electronic form. FRA is asking for response by survey respondents within a few days of receipt of the information as e-mails tend to get lost and respondents may forget about the survey invitation. However, to alleviate forgetfulness, reminder notices will be sent two days, one week, two weeks, three weeks, one month, and 45 days after the initial invitation is sent (Borg & Gall, 1983). In an effort to increase response rates for this survey data collection effort, reminder email subjects will be modified based on recent research findings (Henderson, 2011). The Henderson study found that follow ups were more effective if the email subject was changed for each reminder. Additionally polite requests were more effective than subject lines with questions and final reminders with deadlines to respond were more effective than those that did not indicate a deadline. Respondents will be given the flexibility to respond at any time up to 60 days after the initial survey invitation is sent. These reminders should build in additional waves of data collection for those groups where response is inadequate. So doing will increase the number of respondents and also provide opportunity for checking data quality by comparing responses across waves of data collection.

If after 45 days FRA finds a low response rate, time to response will be extended out to 90 days and union leadership in conjunction with FRA and rail management will encourage those who have received an invitation to complete the survey within the new extended timeframe.

FRA is specifically targeting railroaders with a history of active participation in these types of qualitative data collection efforts and who already have some experience with electronic communication (i.e., those who are comfortable receiving information electronically via email) for this survey data collection effort. A 2001 study by Dillman, Phelps, Tortora, Swift, Kohrell, and Berck found success in getting initial non-responders to participate by switching to a second mode of communication to send a follow up invitation. Given this, in addition to email follow ups, a survey reminder will be printed in relevant labor organization newsletters, and union leaders will encourage survey participation among those members who have been selected to respond.

Although FRA anticipates a 100% electronic data collection rate, this may not be possible. FRA understands that some individuals may be more comfortable completing a paper version of the survey. The email invitation to participate will also include information regarding how to

request and complete a paper survey for those who are uncomfortable or unable to complete the survey online.

A printable electronic copy of the survey will be provided to all the participating unions. Participants who receive an email invitation to complete the survey but would prefer to do so via paper will receive instructions in that email invitation to request a paper copy from their union leader. Union leaders will collect the paper copies of the survey and return them to FRA for data entry/analysis. This will help to ensure that survey participants' remain anonymous.

A study by Lozar Manfreda and Vehovar (2002) compared mail and web based survey administration. Results indicated no major differences in responses. However, data did show that the web-based survey had a higher item non-response rate. In consideration of this, FRA has designed the web survey to require answers to all questions before moving to the next section of the survey. This has been done in an effort to avoid missed responses due to carelessness, inattention, or unintentional error. Each question in the survey has a "prefer not to answer" option for those questions where the decision by the respondent not to respond was intentional.

As this data collection effort is for qualitative purposes only, and the underlying sample represents one of convenience, further non-response bias analyses will not be pursued.

#### **4. Describe any test procedures for procedures or methods to be undertaken.**

The initial required pre-testing will have already been completed by the time of this submission.

The pre-testing process proceeded as follows:

- Key personnel at the FRA were interviewed to elicit their views on what topics were critical for the survey.
- Similar views were volunteered by key stakeholders representing the populations being sampled. (This information did not come from any formal survey development process. Rather, it emerged as discussions through the RSAC electronic device working group process proceeded about whether they would be willing to cooperate, and how the survey might best serve their needs.)
- Stakeholders provided input on potential questions, frequency of survey administration, the instructions provided to respondents, and the decision to conduct the survey as a web-based as opposed to a paper-based collection. It is based on these recommendations that the survey instrument and instructions were developed, and the data collection and analysis plan, the frequency of data collection, and the means to make data available to stakeholders were determined.
- Knowledge derived from the above was augmented by literature reviews of electronic

device distraction in the railroad industry, in particular and transportation, in general.

- A paper copy of the survey was developed and revised several times by a team consisting of contractor and FRA personnel.
  - i. These revisions included:
    - 1. Reviewing the impact of altering wording of questions for clarity and how that affected stability of responses,
    - 2. Combining questions where appropriate, and
    - 3. Organizing questions in a logical order.
  - ii. Each revision was then tested by FRA personnel not involved in this effort.
  - iii. Results of each revision were reviewed, and the questionnaire was refined as necessary.
- A draft final survey was created in web form and tested by FRA personnel to insure proper functionality.
- In an effort not to unduly place a burden on the public in the draft survey piloting process, 20 FRA regional inspectors were selected to complete the web-based draft survey based on their extensive railroad experience and recent interactions with the railroads as former employees. These pilot respondents received an email invitation similar to what will be used for the actual data collection and were invited to respond to the survey. After survey completion, each respondent participated in a detailed interview to discuss the survey and its validity for the railroad industry. These testers were asked a set of questions concerning: 1- overall impressions (length, layout, etc.); 2- questions content (vocabulary, etc.); and 3- content (should some questions be added, removed, changed, etc.) The survey was refined based on feedback from these interviews.
  - i. Five of these inspectors completed the survey after the initial survey completion date to insure response stability.
- Revisions were made and nine (9) non-federal employees were recruited to test the survey. They were debriefed as were the federal employee testers.
- The web survey was then finalized.

After the initial survey administration in year one, FRA plans to review the survey with relevant stakeholders prior to subsequent annual deployment. FRA will discuss any changes to survey questions, sampling, or administration strategy that emerge from these reviews with OMB and

resubmit the survey information to OMB for approval.

5. **Provide name and phone number of individuals consulted on statistical aspects of study design and other persons who will collect/analyze information for agency.**

Jonathan A. Morell, Ph.D. (734) 995-1795 Fulcrum Corp. (Consultant)

Amanda Emo, Ph.D. (202) 493-6413 Federal Railroad Admin. (Collect and Analyze)

Miriam Kloeppe (202) 493-6224 Federal Railroad Admin. (Collect and Analyze)

## References

- Borg, W. R., & Gall, M. D. (1983). Educational research: An introduction. New York and London: Longman.
- [Dillman, D. A., Phelps, G., Tortora, R. D., Swift, K., Kohrell, J., Berck, J. . \(2001\) . Response Rate and Measurement Differences in Mixed Mode Surveys Using Mail, Telephone, Interactive Voice Response and the Internet . The American Association for Public Opinion Research \(AAPOR\) 56th Annual Conference, 2001](#)
- Henderson, V.(2011). Increasing (or Decreasing) Response Rate by Changing the Subject of Email Invitations. Presented at: The 66th Annual Conference, of The American Association for Public Opinion Research (AAPOR).
- Lindner, J. R., Murphy, T. H., & Briers, G. E. (2001). Handling nonresponse in social science research. Journal of Agricultural Education, 43-53.
- Lozar Manfreda, K. & Vehovar, V. (2002). Do mail and web surveys provide the same results? Advances in Methodology and Statistics, 18, 149 – 169. (available at: [http://www.websm.org/uploadi/editor/Lozar\\_2002\\_Do\\_mail\\_and\\_web\\_surveys\\_provide\\_same\\_results.pdf](http://www.websm.org/uploadi/editor/Lozar_2002_Do_mail_and_web_surveys_provide_same_results.pdf))
- Miller, K. L., & Smith, L. E. (1983). Handling nonresponse issues. Journal of Extension, 45-50.
- Oppenheim, A. N. (1966). Questionnaire Design and Attitude Measurement. New York: Basic Books, Inc.
- Pace, C. R. (1939). Factors influencing questionnaire returns from former university students. Journal of Applied Psychology, 388-397.
- [Shannon, D. M., Bradshaw, C. C. . \(2002\) . A Comparison of Response Rate, Response Time, and Costs of Mail and Electronic Surveys . Journal of Experimental Education, 70, 2, pp. 179-192](#)
- [Tse, A. C. B. \(1998\). Comparing the response rate, response speed and response quality of two methods of sending questionnaires: e-mail vs. mail. International Journal of Market Research, 40, 4 pp. 353-61](#)