From Experimental Testing To Reality: Outcomes From Mixed-mode Implementation of the 2014 Rural Establishment Innovation Survey

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Abstract

The Rural Establishment Innovation Survey is a non-mandatory government (ERS USDA) sponsored survey designed to reach small to medium size businesses. The purpose of the survey was to contribute to a better understanding of how international competition and increasing knowledge intensity of economic activity in the U.S. are affecting the vitality of rural areas. The survey results combined with administrative data will be used to gauge the adjustment to these pressures and will allow measurement of the prevalence of innovative activity in rural businesses and will also allow for comparison to urban based businesses. Previous administration of a nonfarm business survey, nearly 2 decades earlier (in 1996), was conducted and focused on rural manufacturers. In 1996 the survey was designed to expand past traditional all mail survey data collection for businesses to include CATI and the result was a significant portion of completions were successfully obtained through telephone interviews. Fast forward to 2014, the survey effort was much larger with sampling expanded to reach a broader base of businesses in all tradable sectors. The survey administration was designed to be much more complex, implementing a "best practices" approach utilizing mixed survey modes (mail, web, and telephone) and implementing enhancement strategies to increase the likelihood of success. Multiple methods were used to test the questionnaire and improve survey design including: cognitive interviewing, pretesting, and an experimentally designed pilot test. Experimental testing included tests of mode sequencing, use of token cash incentives, and a refusal conversion short form. Response, nonresponse, and mode effects are analyzed. This paper will discuss and demonstrate the outcomes of testing and the use of multi-methods with a discussion of the benefits and limitations. Recommendations and confirmations towards criteria for best practices and future business surveys will be provided.

Key words: establishment surveys, mixed mode surveys, mode sequencing.

1. Introduction and Background

Researchers and survey designers after many years are still grappling with how best to survey businesses and achieve acceptable levels of measureable response overall and at the item level. We reiterate particular past survey and business survey research that has raised these issues in the literature and that are issues that needed to be addressed in the non-mandatory 2014 Rural Establishment Innovation Survey (REIS) which was a national survey sponsored by the Economic Research Service (ERS), United States Department of Agriculture (USDA) and addresses business competitiveness. As early as 2000, Dillman

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addressed the debate over the Total Design Model approach, which is a prescribed set of survey procedures, derived for household surveys, which some argue as not applying to business surveys. In this discussion, Dillman argued that a shift from a "one size fits all" survey design to more tailored design for establishment surveys was warranted and this was evidence of a major shift in thinking. He went on to make the case that a set of procedures (he described 10 features) for government business surveys however had evolved over two decades into what was coined a minimum cost, Cost-Compensation Model. In particular, the minimum cost approach in terms of business surveys by government has influenced questionnaire length, questions designed as matrices, use of separate instruction books, and the reluctance to change formatting as cost saving. Basic to this description is that agencies that do many business—particularly where several sub-agency units are involved in survey processing--have a vested interest in retaining design and processes to avoid cost and error. He describes this approach as reliant on government authority and or mandated reporting to compensate for survey features associated with lesser response. He concluded this is also a "one size fits all" approach that is focused on lowest costs at process steps.

Moore and Tarnai (2000) also during this time presented considerations for varying survey procedures to include mixed mode surveys as an important way to penetrate organizational business environments and effectively gain cooperation. They summarized and distilled research from the 1990's (Edwards and Cantor, 1991; Beimer and Fesco, 1995; Petrie, Dillman, and Moore, 1998; Willimack, et al. 2000) that still resonate today. The seven features outlined as influencing the effectiveness of survey strategies are recapped here as they are the crux of understanding the nature of the business survey problem and what we needed to address in designing REIS: 1) selecting and reaching an authorized knowledgeable representative for the business for personalizing communication and follow-up; 2) acknowledging that the respondent's task increases and response burden is significant and complicated by the need for accessing, retrieving, and understanding business records and reinterpreting to answer survey questions; 3) respondents' characteristics--individually and as within a business--influences their ability to provide a response; 4) there is a respondent-questionnaire interaction which is influenced by respondents' characteristics and questionnaire characteristics; 5) unit and item response are impacted by the respondent acting as an intermediary between the questionnaire and the characteristic of the business' records and information; 6) the business's organizational environment, culture and policies towards survey requests influences the response process; and 7) businesses' special circumstances and situations during a given survey period can challenge survey success. Case level examples were provided of non-governmental, non-mandatory surveys with empirical evidence of differences of particular business sub-populations (physicians, manufacturing, agricultural producers and business industry and size) where the particular combinations and sequencing of survey modes, survey design features were implemented to address business populations' peculiarities in relation to the survey, which led to reaching business respondents and gaining survey completion. Since this time, a number of authors—Dillman et al. (2014); Snikers et al (2007); deLeeuw (2005; 2008) and others—have advocated that mixed mode surveys, tailoring to survey situations, and responsive design using survey paradata can lead to improved response.

As much as technology and businesses have changed since 2000, the added complexity associated with integrating web as a survey mode for data collection presents challenges for garnering business survey participation. As recommended in Snikers et al. (2013) and Dillman et al. (2014) referring to Dillman, (2000), an important part of the planning for business surveys is to identify risks and uncertainties in the survey process, to pre-identify

a set of survey design features, and to plan for mixed mode from the beginning. The quality of data from statistical surveys is driven by many considerations. In 2006, OMB published standards and guidelines for statistical surveys, which outline 7 main sequential processes and 21 subtopics. Standards 1.2 (survey design), 1.3 (survey response rates), and 1.4 (pretesting survey systems) advocate practical, realistic methods for ensuring all components function as intended through pretesting. This paper shows the outcomes of following these standards of practice demonstrating what was found to be practical and realistic.

2. REIS Implementation

2.1 Goals of Pilot Study and Pretesting.

Particularly for the REIS business survey, one goal was to determine the impact of sets of designs on accrued cost of implementing the survey and the effectiveness of elements such as offering a web mode and how to sequence survey modes. In 1996, a precursor to REIS was conducted with rural manufacturing businesses and utilized a mixed mail and telephone survey. A necessary component of planning and pretesting was to estimate and forecast the number of completed questionnaires that would be obtained in the full study implementation so final study estimates would prove adequate sample sizes by strata (industry and firm size categories) for economic analyses. A main desire in redesigning this survey, twenty years later, was to take advantage of collecting responses by web as this has some advantage and reduces costs associated with data coding of returned mail questions, data entry, data cleaning, and interviewing. However, when designing the survey we did not know if web completion would be viable or effective with respondents. We had strong motivations for wanting to include and encourage respondents to use the web as additional questionnaire responses on the web have the least cost. In redesign of this survey and using mixed survey modes, we desired to play to the advantages of each mode for not only penetration but also for reducing respondent burden and for reducing errors. Table 1 summarizes the pros and cons we considered. Web entry by respondents on questions may also have less error as the web questionnaire functionality places some control on entering of item responses and there is not any other intermediary interpreting and recording responses such as commonly occurs with mail returns requiring coding and data entry and telephone interviewing where an interviewer enters responses into a CATI. Experiments and testing were used to explore the feasibility of survey designs, to guide decision making about survey mode sequencing, to evaluate the use of cash incentives and postage levels, and to use methods found to improve response rates in this business survey. When possible para data from survey operations were collected to monitor and gauge effectiveness and make decisions. An example of para data use is presented for telephone operations.

The topic of a survey and its saliency to respondents is one of the factors that influences survey response (Groves, et al 2000) and can interact with the survey methodology and design. The principal aim of this study's content was to examine the challenges businesses face in today's economy, and contribute a better understanding of how increasing international competition and the increasing knowledge intensity of economic activity in the U.S. are affecting the economic vitality of rural areas (Moore et al. 2015). This national study explores conditions associated with businesses making effective adjustments to these pressures and measures of business innovation, with an emphasis on evaluating self-reported innovation measures and the composition of establishments attributes correlated with substantive innovators, nominal innovators, and non-innovators (Wojan, 2014). The main purpose of the survey was to collect data in a mixed mode survey for up to 53,000

businesses in tradeable business sectors such as manufacturing and professional services. This was primarily a rural business survey, however, urban (metropolitan) make up a quarter of the sample for comparative purposes. Pretesting and piloting occurred in late 2013 and main data collection occurred April to November 2014. This paper's primarily focus is to recap survey methods and outcomes of strategies implemented. We present results of pilot testing, pretesting, and full study implementation as appropriate and discuss the outcomes associated with various strategies.

2.2 Pilot Study Methods, Testing and Experiment

The pilot study was implemented with a nationwide sample of businesses with the purpose of testing the questionnaire and survey procedures and to test elements of survey design components. Before the pilot survey the questionnaire was pretested using a cognitive interview approach with 9 businesses. Surveys were completed on paper questionnaires and one telephone CATI interview followed by face to face debriefing as allowed by OMB. Revisions were made to questionnaires based on these interviews prior to the pilot survey testing. Table 2 shows the goals of pretesting and the pilot study that were used in REIS for evaluation and the aspects considered in experimental testing. The 5297 cases in the fielded sample were randomized to five treatment groups. The goal of pilot testing and experiments was to evaluate combinations of the mixed mode sequence and use of token cash incentives to maximize responses and to select the most effective protocol. The pilot study outcomes were needed to forecast the final sample size requirements to estimate if the most effective multi-mode sequence could stay within cost parameters for the full study and if there existed a best set of methods to gain web survey responses. Some key questions to be tested and evaluated were: 1) could a representative for the business and email be obtained in pre-screening phoning?; 2) could email augmentation and delivery of a web link in communications encourage web response to create cost savings?; 3) how should emails be timed and used?; and 4) does there exist a better mode sequence for main data collection? The pilot study was implemented over a 12-week period. Table 2 displays the experimental protocol and response. Figure 1 and Figure 2 show the outcomes of pilot testing.

Two survey samples were used in the pilot study. Of the pilot study 5,297 fielded sample, 2,804 randomly selected business were obtained by ERS from the Bureau of Labor Statistics (BLS). The other portion of the sample included 2,493 businesses which were previous responding rural manufacturing businesses from the 1996 implementation of a similar survey that served as the baseline for this 2014 study. In this second portion of sample, cases were initially generated from a random sample of businesses which ERS obtained from the proprietary Dunn & Bradstreet commercial frame in 1996. The overall pilot sample was pre-screened by telephone. Eligible businesses for the study were those with more than five employees in tradeable industries including mining, manufacturing, wholesale trade, transportation and warehousing, information, finance and insurance, professionals/scientific/technical services, arts, and management of businesses. The survey focused on businesses in nonmetropolitan (rural) counties. Firms were selected based on facility physical location.

Questionnaires were mode unified (Dillman et al 2014) and designed in three modes—mail paper self administered questionnaire, computer assisted telephone (CATI) questionnaire, and web questionnaire self administered. For the mail mode component, the survey questionnaire was 16 pages. The mail paper questionnaires were printed in color and included a graphical cover and a last page for comments. The main text in the body of the

questionnaire included black text questions on a white background. The telephone interviews averaged 34 minutes and the median web completion time was approximately 23 minutes. These versions included for questionnaire content approximately 254 data points with some open-ended questions. The data collections for each treatment group included all survey modes. The treatment groups are described in Table 2.

All businesses were called in an initial pre-screening effort to determine: if they were in business and eligible for the study with greater than five employees; identify whether the appropriate respondent was contacted, and update their contact information, gaining mailing addresses if missing. A significant portion, 18%, of cases were updated with information during the pre-screening effort, with the largest category of updating associated with the business mailing address. After pre-screening 5,210 eligible businesses were randomly assigned to 5 experimental treatment groups. The Office of Management Budget oversight required that respondents in all treatment groups receive all survey modes and elements in survey design to prevent loss of respondents to the study and this hampered the experiment designed to isolate treatment effects.

All pilot study sample cases were randomized to five experimental treatment groups for the next data collection procedures (Table 2). The common elements across groups are telephone pre-screening implemented, first, with no collection of survey content, but inclusive of contact information updates. The second common element was a pre-notification postal letter mailed to all businesses in the sample. The groups varied as to whether the pre-notification letter included a web link or not.

The treatment designs also varied by whether primary survey data collection was telephone implemented first or whether mail data collection was implemented first. Other elements were varied and these included: the use of two-day priority mail postage (applied once, twice or not at all) in questionnaire mailings; use of $2 cash incentives (implemented once or twice or not at all); whether email reminders including a web survey link were offered; and the use of a short (9 questions) refusal aversion questionnaire. All treatments included all survey modes and almost all elements. There was no statistically significant difference between the first four treatment groups for response rates. However, all four of these groups were significantly different than treatment group 5. Treatment group 3 varied from other groups in that it offered the internet survey web link early in the pre-notification letter along with the $2 token cash incentive. Table 2 is colorized to show the mode sequencing with yellow associated with telephone data collection as the main mode and blue associated with mail data collection as the main mode. Groups 1,3, and 4 are considered the mail first primary data collection groups. Group 2 and group 5 are the telephone first primary data collection groups. Treatment group 3 was designed to assess if early offering of the web link and $2 token cash incentive in the pre-notice letter along with email augmentation would increase response and increase web responses. Treatment group 3 was the leading treatment for response rate, 32.1% and was statistically different compared to group 5 with 19% response (Table 2). Figure 1 displays the yield across data collection for the pilot study by treatment group and reinforces that group 3 treatment with an early offering of the web link in the pre-notification letter, followed by an email with the survey web link and personal unique access code, and sustaining a delay before more contacts by mail kept this group at a higher response level across data collection. Treatment group 5 had the least survey design elements and varied from the other groups in that no token cash incentive was offered, no priority mail postage was used with questionnaire mailings, and telephone was the first mode in the main data collection mode sequencing. Overall, the experimental groups were not distinctive enough to gain an appreciation for clear

superiority in mode sequencing. The results are suggestive that offering a mail mode data collection first in the mode sequence and offering the cash incentives earlier in the protocol may result in slightly higher response, but these differences were not significant statistically, .

The pilot study outcomes were very similar since across treatment groups. The survey treatment groups that showed the most promising sequencing for full study implementation were the mail collection first groups, with the leading treatment the group associated with the use of token cash incentive and the web link in the pre-notification letter, the provision of the web link in an email augmentation shortly after the letter mailing, and with the delay in the start of questionnaire mailings to help to drive respondents to the web. The pilot study showed email as effective for delivering the web link and that web completion could definitely be encouraged by study protocols. Overall, the pilot study showed that 44.9% response could be achieved with web completion (Figure 2). Approximately 41.3% of pilot study cases had an email by the end of the pilot study data collection. Overall, about a quarter of the sample cases that were completed had an email that had been sent with a web link. Figure 3 displays the five treatment groups with the respective levels of completion in each survey mode. Treatment group 3 protocol (Figure 3) garnered more web completions (62.8%), compared to the other treatment groups, and this outcome was statistically significantly different and larger compared to other treatment groups. It was also the group that had the least completions by telephone mode (3.2%).

Both response levels for each of the two sample groups, the 1996 and the BLS yielded similar levels of response when compared by treatment group. Table 3 shows the results of monitoring para data and logistic modeling of factors found as predictors of nonresponse. Factors considered were establishment size based on numbers of employees, time zone of facility location, establishment industry (NAICS) and state of location. The factor most predictive of nonresponse were having an eastern time zone with those businesses 3 times more likely to not respond, followed by industry 21 (mining) and larger establishments with more than 100 employees. Time Zone as a factor may also encompass survey operations as calling eastern US time zone located firms required running interviewer shifts starting at 4:45am in Western US time to reach businesses in the early morning between 8:00am and 9:00am.

2.3 Full Study Methods and Outcomes

The full study used the same three questionnaire mode versions: mail, CATI, and web questionnaires as the pilot study with the same length (16 pages) and same expected completion time averages (30 minutes CATI and 23 minute, web). The pilot study projections provided that a much larger sample size was needed to offset the low response and that cost reparation was needed in the survey strategy to compensate for the increase in costs associated with the larger sample size.

 A nationwide sample of 53,234 establishments in rural tradeable sectors was fielded for the full study. The frame for the full study was provided by the Bureau of Labor Statistics for the majority of states included (46,395 establishments). Four states, that were not included in the BLS frame were covered by a supplemental sample (6,821 establishments) that was purchased from a commercial sampling company. Business were selected at random from strata defined by establishment size categories, industry codes (NAICS), and metropolitan and nonmetropolitan status.

A major change from the pilot was scaling back prescreening calls to the commercial purchased sample and those BLS cases with no mailing addresses, with 9,431 cases called. The full study protocol (mode sequence) implemented was main mail data collection (four contacts by mail) first followed by telephone mode to non-respondents. Token cash incentive was reduced to $1 and was used one time in the first mail questionnaire packet. Use of two-day priority mail postage was abandoned and replaced with lesser first class postage for all mailings. Eligibility was determined at the stage when contact businesses were reached. Email augmentation was not conducted since most cases were not prescreened. Refusal aversion strategies included a web link to a short 9 question web questionnaire and a refusal letter with web link following the telephone mode.

The final response rate achieved for this non-mandatory government sponsored survey was 10,952 completions with a response rate (RR4) of 22.4%, a refusal rate of 11.8% and a contact rate of 38.6%. This protocol achieved 62.6% web responses, 31.1% mail response and 6.3% response by telephone. We found statistically significant differences in response across industries by survey mode; however, we were able to achieve more than 50% of all industries' responses on the web and this was a higher rate than we experienced in the pilot study. Establishments that were part of multiple location firms demonstrated statistically different response (X^2 of 81.42, P<.0001) by survey mode relative to single location establishments (Figure 4). For web mode completions, 32.8% of responses were associated with businesses with more than one location and 67.2% with one location. This contrasts with mail survey completions which showed a lower (24.0%) associated with businesses with more than one location and 76.0% with one location. Telephone mode was in-between with 31.4% of businesses with more than one location and 68.6% of businesses with one location.

In terms of survey measure outcomes, we found statistically significant different levels of detection of innovation and specific types of business change across survey modes as shown in Figure 5 and Figure 6. Web business respondents, across every category of innovation or change showed much higher rates compared to mail and telephone respondents (Figure 5). When we look specifically at incomplete or abandoned improvement activities web businesses respondents exceed the rates reported by mail and phone business respondents (Figure 6).

3. Conclusions

In this study we share our experience with REIS to demonstrate the constraints faced and outcomes of testing procedures and the resulting full survey collection for a non-mandatory government sponsored survey for reaching business with varying characteristics. This study benefited by following the standards and guidelines for pretesting, testing, and piloting the survey protocol. After weighing testing results it was decided to combine survey modes and sequence them in the ways found to counter constraints and that we determined would increase the likelihood of participation of business respondents. Some of the most promising avenues for gaining cooperation we found were to: 1) use telephone pre-screening contacts directly to businesses to gain information if missing and determine eligibility, to liaison communications by finding out the correct person and their personal contact information, and to further redirect communications within the

business regarding the survey request; 2) use of a small token cash incentive with 3 mail contacts to enhance the importance of the survey request, motivate respondents, and invoke social exchange; 3) use of a telephone call as a follow-up to mailings to either interview respondents or as a refusal prevention to send an email link directly to a specific representative to do the web survey. The pilot study was an important forecast that response rates would be low and provided evidence that sample size would need to increase to obtain adequate responses for study estimates. This increase in sample necessitated invoking a strategy to compensate on cost. However, the pilot study variations in treatment allowed us to selectively pare survey components with some confidence in how it would effect outcomes. An example was to reduce the telephone pre-screening even though it was highly effective in the pilot it also increased costs and burden. We selectively applied telephone pre-screening to businesses missing address information and to the commercial sample where frame information was less complete. For the BLS provided sample with very up-to-date information, this action was projected to not have much impact. We found using multiple survey modes in conjunction with respondent driven intermediary contacts (requests for email to do the web survey or contact be made with another person in the business) improved our communications with respondents.

Our study confirms that surveys of businesses have become much more complex with mail, web, and telephone survey strategies and when data collection is integrated. Overall our pilot testing proved that businesses would respond to the survey via the web and we found data collection methods that encouraged respondents to go to the web and complete the survey. More importantly we were able to identify and verify a mixed mode protocol in testing that helped "push forth" business respondents to the web and found that it took all modes of contact to contribute to the web completion. The ability to email businesses during the telephone follow-up contacts was especially appealing to respondents and to interviewers, and helped with response. An important aspect of the pilot study protocol was allowing a time delay before further contacts by other modes (mail questionnaire or interviewing). This study's outcomes align with findings of other research for businesses. We found balancing a business respondent-oriented approach with the need for survey process control in the form of staged contacts and mode sequencing helped produce plausible information on innovation and business competitiveness. We found mode differences in important survey measures and have provisional evidence that this may be associated with business characteristics such as size, industry, and other technological features. One question we ponder is whether offering web survey completion gained cooperation from businesses that were innovative that might not have responded otherwise. This is an important area for more analyses of this study's results and for other business studies.

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Table 1. Advantages and Disadvantage of Survey Modes for Business Surveys.

Advantages	Disadvantages
Mail:	**Mail:**
• Sent to targeted location (facility/site)	• Easily tossed/dismissed
• Directed to job title or personalized to key informant	• Data quality issues--Questionnaire branching not as effective reliant on respondent
• Needed to more effectively use incentives	• Difficult to reduce respondent burden in long questionnaires through branching
• Questionnaire can be passed between multiple respondents within the business	• Respondents enter information inaccurately or in incorrect placement in tables on form
• Can be carried to records or source of specific information.	• Respondents write extraneous information may interact with not answering question items
• Effective for using grids or matrix table items to reduce space	•
Telephone:	**Telephone:**
• Allows for multiple attempts to reach respondents	• Can't use incentives as easily; have to deliver incentives by mail or pay after survey completion
• Can remind or deliver a message about incentives to be sent or payment	• May not be as effective delivering importance messages
• Interviewer mediates questions and can improve data items if there are questions or definitions needed	• Difficult implementation and costly for grid/matrix design
• Better question branching to reduce burden and improve data quality	• Complex or repetitive questions are harder to deliver over the telephone eg commodities or financials with multiple related items or item coding
• Can intervene on missing items by offering a don't know, refused or provide an opportunity for open explanation on missing questions	• Can increase response burden as takes longer to deliver the amount of text compared to respondent reading
Web:	**Web:**
• Least costly once programmed; can add additional completions for low cost.	• Mail, email, telephone mode combinations needed for delivering web link
• Effective question branching to reduce burden and error	• Mail, needed for delivering incentives
• Web tools for improving visuals and function	• Intentional missing or lack of entry on items
• Web functionality controls question delivery and answer entry	
• Can deliver prompts for missing item responses or special design for calculations	

Table 2. Description of Five Experiment Assigned Protocols for Main Data Collection Mode Sequence and Treatments.

	Treatment 1	Treatment 2	Treatment 3	Treatment 4	Treatment 5
Description	Mail First: Double Incentive; Priority mail 1st Qstn	Phone First; Double Incentive; Priority mail Second Qstn	Web Push; Mail First-$2 early prior letter, weblink prior , priority mail early	All Options; Mail First; Double Incentive; 2x Priority Mail	Extended Phone First; No incentives No priorty mail
Phase 1	Phone prescreen	Phone prescreen	Phone prescreen	Phone prescreen	Phone prescreen
2	Prenotice Letter	Prenotice Letter	Prenotice Letter + Weblink+$2	Prenotice Letter	Prenotice Letter
3	1st Mail Qstn-web link; $2	Telephone	Email and weblink	1st Mail Qstn-web link; $2 Priority mail	Telephone
4	Email and weblink	Telephone		Email and weblink	Telephone
5		Telephone			Telephone
6	Mail PostCard	Telephone	1st Mail Qstn-web link; $2; Priority Mail	Mail PostCard	Telephone
7	2nd Mail Qstn-weblink $2; Priority mail	Telephone	Mail PostCard	2nd Mail Qstn-weblink $2; Priority mail	Telephone
8	Telephone	1st Mail Qstn-web link; $2		Telephone	1st Mail Qstn-web link
9	Telephone	Email and weblink	2nd Mail Qstn-weblink	Telephone	Email and weblink
10	Telephone	Mail PostCard	Telephone	Telephone	Mail PostCard
11	Telephone	2nd Mail Qstn-weblink $2; Priority mail	Telephone	Telephone	2nd Mail Qstn-weblink
12	Telephone	Refual mailing-Short	Telephone	Telephone	Refual mailing-Short
13	Telephone	Telephone	Telephone	Telephone	
14	2nd email web link; Telephone	2nd email web link; Telephone	2nd email web link; Telephone	2nd email web link; Telephone	Telephone
15	Refual mailing-Short	Telephone	Refual mailing-Short	Refual mailing-Short	2nd email web link; Telephone
16	Telephone	Telephone	Telephone	Telephone	Telephone
Response Rate (RR4)	30.6%	29.3%	32.1%	31.1%	19.0%

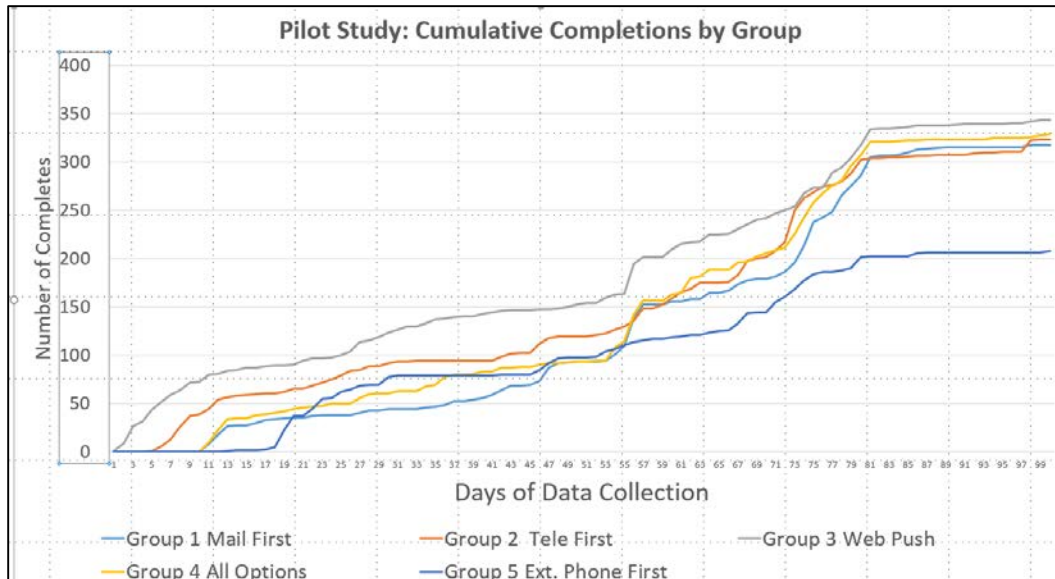Source: 2014 ERS Pilot Rural Establishment Innovation Survey.

Figure 1. Pilot study experimental treatment group yield over the course of data collection. Source: ERS Pilot Rural Establishment Innovation Survey.
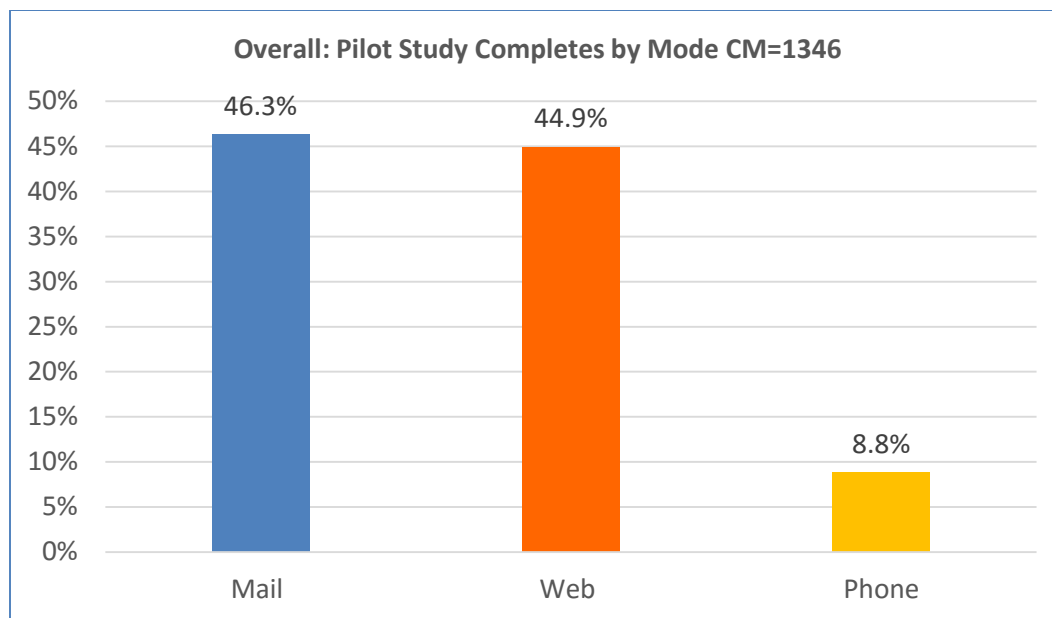

Figure 2. Percentage of completes obtained in each survey mode for pilot study. Source: ERS Pilot Rural Establishment Innovation Survey.
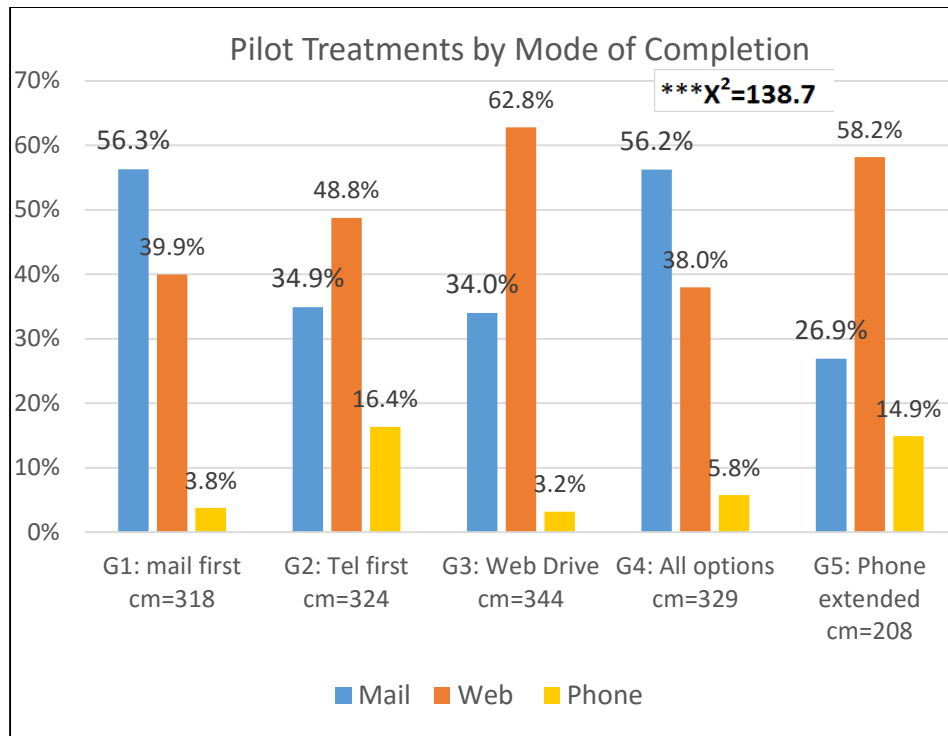
Figure 3. Percentage of pilot study survey mode completion associated with each experimental treatment group. Source: ERS Pilot Rural Establishment Innovation Survey.
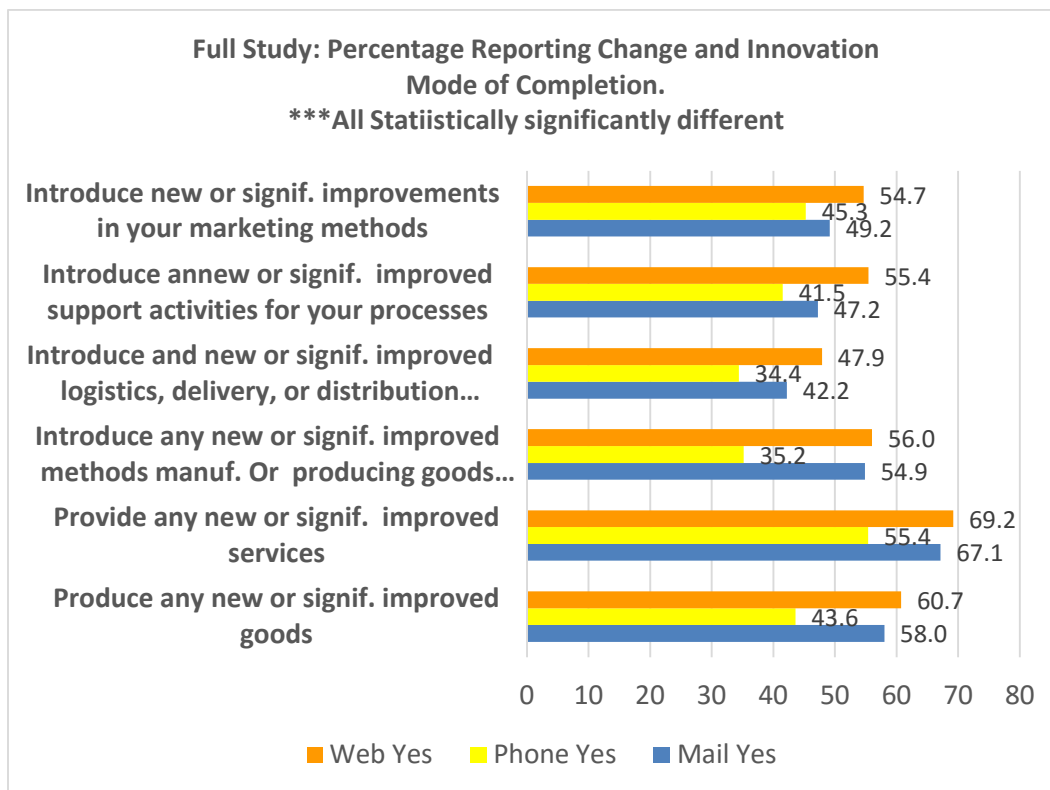
Table 3. Pilot Study Logistic Regression of Business Characteristics and Factors as Drivers of Nonresponse—Selected Parameter Estimates.

	Estimate	SE	Wald Chi Square	Pr>Chi Sq	Odds	Times More Likely to Not Respond
Establishment size >100 employees	-0.4894	0.06	77.92	<.0001	0.613	1.63
Eastern Time Zone	-1.3101	0.32	17.23	<.0001	0.27	3.70
NAICS 21	-0.5452	0.11	26.77	<.0001	0.58	1.72
NAICS 48	-0.2861	0.08	12.87	0.0003	0.751	1.33
NAICS 55	-0.237	0.10	5.75	0.0165	0.789	1.27
State Texas	-0.1894	0.11	2.75	0.0974	0.827	1.21

Source: ERS Pilot Rural Establishment Innovation Survey.

Full Study: Mode of Completion and Number of Establishment Locations

$X^2=81.41$ P <.0001
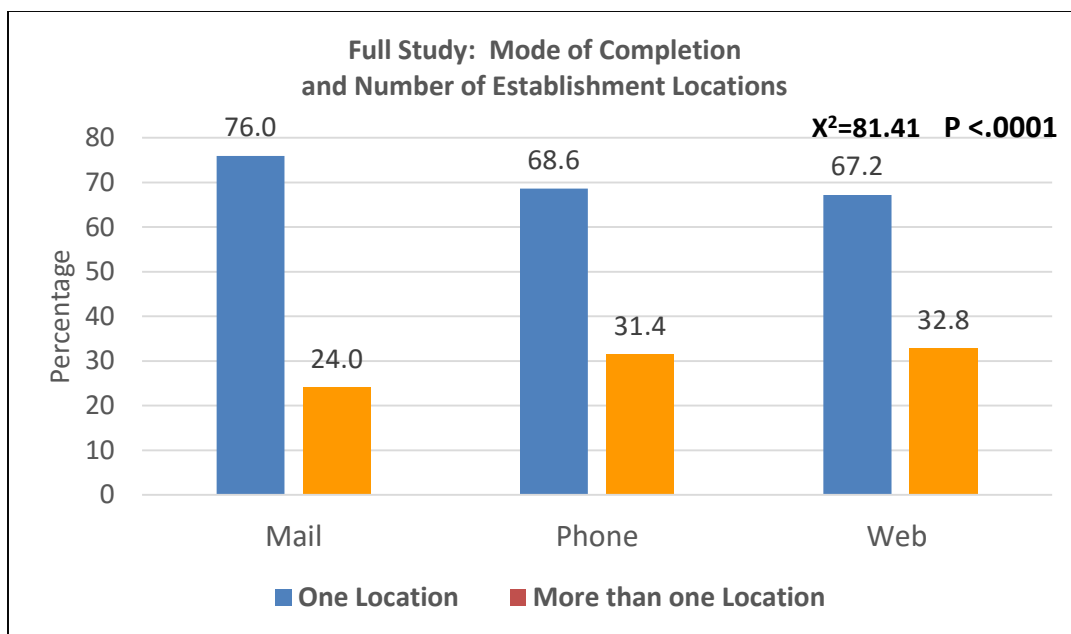
Figure 4. Percentage of full study responding businesses, by survey modes, with one location or more than one location as an indicator of business size. Source: ERS Rural Establishment Innovation Survey

Full Study: Percentage Reporting Change and Innovation Mode of Completion.
***All Statiistically significantly different

Figure 5. Percentage of businesses by survey mode reporting business innovation and change activities. Source: ERS Rural Establishment Innovation Survey

Incomplete and Abandoned Improvement or Innovation Activities

***Statistically Significantly Different

	Mail, Yes	Phone, Yes	Web, Yes
Incomplete	18.0	19.7	23.4
Abandoned	25.9	24.9	32.4
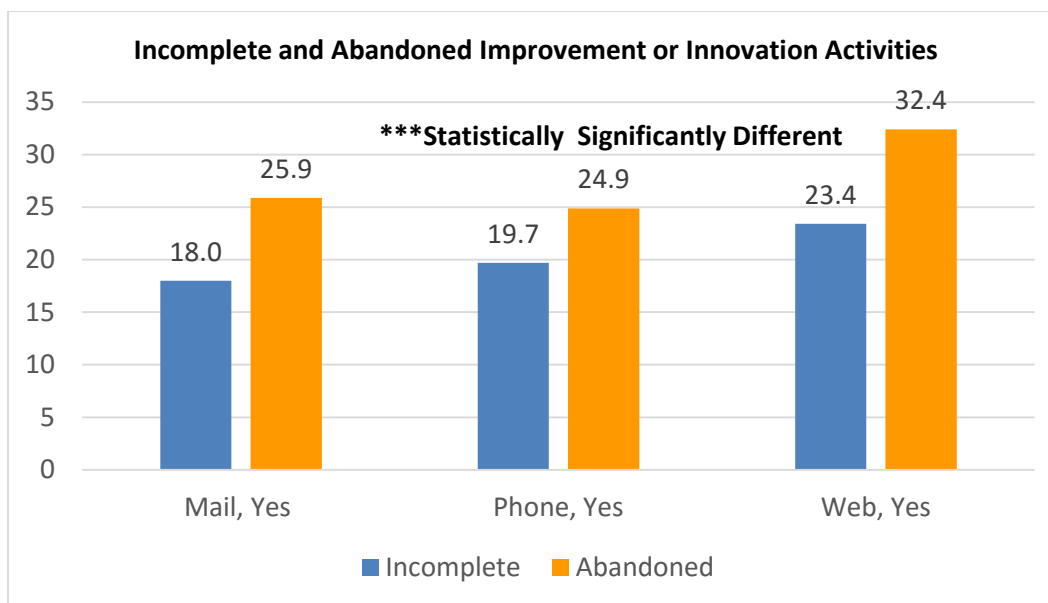
Figure 6. Percentage of business respondents, by survey mode, reporting incomplete or abandoned improvement or innovation activities. Source: ERS Rural Establishment Innovation Survey