SURVEY DEVELOPMENT & ADMINISTRATION CHECKLIST MANUAL

Abstract

The following document was prepared as an organizational guide for survey development and administration. The guide includes steps to create a survey plan, item writing, pre-test items, sampling of population, data collection, data cleaning, analysis, and results reporting.

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Survey Overview

Benefits of Survey Design

Even with the best statistics, there is no replacement for a good survey design. Effort on the design of the survey helps moving the project from abstract to concrete.

Overview of Components of Design and Administration

Purpose and Objectives

The survey design must fit its purpose. For a clear understanding of the survey's purpose:

- Give a sense of the target population
- Give us a sense of possible response bias
- Informs future choices in respect to implementation of the survey
- Gives expert reviewers a framework

When planning, don't forget to set a budget for the survey project.

Target Population and Sampling Frame

The target population is whom we try to study, the population the survey is trying to describe. This population informs the sampling frame which sets parameters about the people from this population that would have a chance to participate. After knowing the resources that we have to reach some people from the population, we can think about sampling design.

Sampling design and Sample Size

The sampling frame is large. It includes almost all of the target population. The sampling design is useful to select a few people in the sampling frame to be the survey respondents. The total number of people selected is our sample size.

Implementation

Implementations respond to how do we collect the data. For example[1]:

- What is the mode of data collection (how do they collect data)?
- How will you contact potential respondents? "Contact mode" – web, e-mail, phone, etc.
- In what media will the survey be given? "Survey or response mode" – web, e-mail, phone, etc.
- How will you follow up with non-respondents? "Follow-up mode" – web, e-mail, phone, etc.
- How to maximize response rates? Is it an ongoing survey or a one-time survey?

Survey Design Example Survey of Consumers[2]

One of the purposes of the Survey of Consumers was to measure changes in consumer attitudes. Customers (target population) was defined as adults in the U.S. most U.S. adults have a phone number thus the sampling frame use all telephone databases of several area codes. The numbers where screen to randomly select one number in the household. A randomized sampling plan was conducted by selecting the phone number of 500 adults. The interview was administered through the phone by a computer assistance program. Data was collected in two waves. The second wave was a follow-up interview 6 months after the survey.

Survey Steps Overview

Planning (purpose, objective, sample population) >> Item writing >> Pre-test>> Sampling (sampling frame, sampling design) >> Data collection >> Data analysis>> Report results
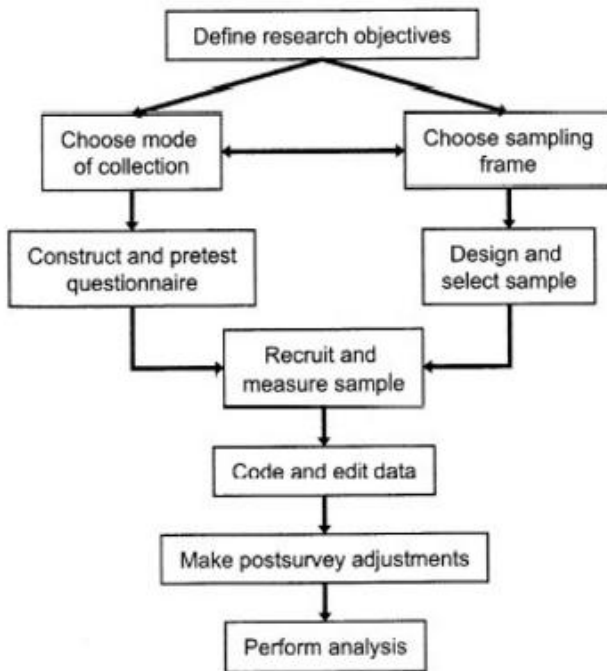

Figure 2.4 A survey from a process perspective.

Planning[3]

- ☐ Yes, the survey is the best option
    - ☐ Consider test-taker reactions
    - ☐ Other organizational needs and competing priorities (Survey fatigue, problem salience, time is money, etc.)
    - ☐ Surveying and testing can alert test takers of organization interests and possibly concerns (i.e., it may increase the salience of a problem or spread concern unless another reasonable explanation is offered)
- ☐ Set the budget
- ☐ Check if there are existing surveys that could be used
    - o If yes, see the existing measure section
    - o If not see the item writing section and the pre-test section on page 7
- ☐ Create a timeline of the projects
- ☐ Set project's limitations

Sampling

- ☐ Who will take the survey? E.g., Trainees at completion, Community members, etc.
- ☐ Check for possible sampling bias (see sampling bias section)
- ☐ Check for potential precision issues (see precision section)
- ☐ Choose the appropriate sampling method (see sampling methods section)
- ☐ Decide on a sampling size (see sample size section)

Sampling Bias[4]

Sampling bias when there is a constant discrepancy in the way the sample is selected. For example, when selecting every third person in a list, when surveys are online but the online people clicking are of a certain age, the list from where the sample is drawn is incomplete, inaccurate, or out-of-date, when selected participants are unavailable or do not response.

If sampling bias is a concern, identify and find ways to reduce it. For example, is a list is incomplete evaluate some of the important characteristics of the ones missing in the list. Assess what could be the bias effect if not having them in.

Precision[4]

Precision is affected by the sample size. Large samples reduce power but minimizes standard error. Lack of power is a concern with non-significant results. On the other side, small sample sizes will be a concern because of the large standard error. A supplemental sample frame could maximize precision.

Sampling Methods[4]

Simple Random
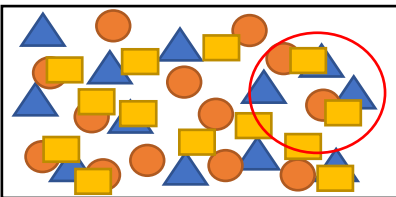
We select a sample hoping that on the randomization the sample will end up being somewhat representative of the actual population

Convenience Sample

Convenience samples are used for practical reasons, e.g. the sample may be the people walking nearby. Unfortunately, sample self-selection may add bias, e.g. people that choose to participate may do so because they are already interested in the survey topics.

Systematic

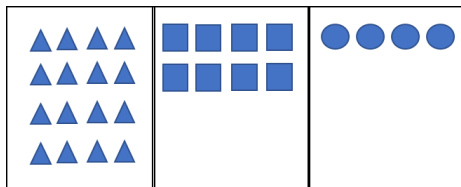Systematic sample more ideal when the population of interest is similar.

Systematic sampling will be problematic when the population lists resemble something like this:
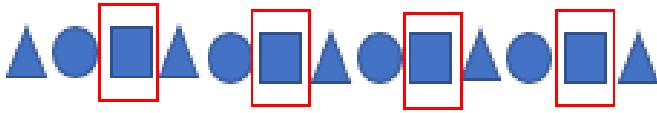
Cluster

Stratified

Stratified proportionate
The same proportion (eg. ¼) of each group is selected for sampling. In this example, 4 triangles, 2 squares, 1 circle.

Stratified disproportionate
Groups are not sample using the same proportion. In this example can be, 4 triangles (25%), 4 squares (50%) , 4 circles (100%).

Sample Size[4]
- ☐ Determine the level of precision (larger sample sizes reduce sampling error)
- ☐ Determine the confidence interval (smaller interval requires more participants and leads to greater certainty about an effect) usually 90% to 95% is selected
- ☐ Analyze heterogeneously of population (if the population of heterogenous a larger sample size is needed)
- ☐ Consider practical implications
- ☐ Consider generalization

Generalization
Generalization is a concern when criteria or cutoffs scores where use for selection of participants. For generalizations also consider cross-validation through regression weights or equation, effect sizes.

Individual Differences[5]

Remember that our ideal is to see individual differences among participants in the sample regarding the topic. Those differences among individuals can inform our decisions. When setting up a purpose, think about the areas that we can realistically make change in response to individual differences and other results.

The Role of Data[5]

When drafting the project objectives. Be aware of potential "hypothesis" we may have about what the data would tell us. This would be an informative step when we compare responses to our pre-survey assumptions. Were our assumptions valid?

Existing Measure[6]

- ☐ Evaluate the quantity and services will you need? This could be participants, computerized administration, scoring and interpretation services
- ☐ Ask for a quote
- ☐ Ask if the consulting firm can modify a measure to fit your needs. How much would this cost?

Item Writing and Pre-Test

- ☐ Determine the content of the survey (determine, define, operationalize)
- ☐ Determine the expected length of the survey
- ☐ Write items (very important or broader areas may require more items than moderately important, narrow areas)
    - o Write 3x as many items as needed
    - o [See tips for writing items section]
- ☐ Define the construct(s), categorize items into categories
- ☐ Check for measurement challenges ([see measurement challenges section])
- ☐ Determine the number of items per area
- ☐ Determine how the items will be scored
- ☐ Determine response format (see scale of measurements)
- ☐ Write question's instructions
- ☐ Collaborate with SEMs to tailor the items (see section SEMs section)
- ☐ Add attention checks
- ☐ Pilots test the survey
- ☐ Do initial statistical analysis (e.g., confirmatory factor analysis)
- ☐ Revise items
- ☐ Repeat last pilot testing, statistical analysis, and revision on new items

Example

Our survey is created to measure Job engagement. Job engagement is defined as vigor, dedication, and absorption at work. We except the survey to take no more than 7min (15 questions/items). Respondents will indicate their response in a 5 Linkert-scale going from "strongly disagree" =1, to "strongly agree" =5. We write 45 possible items (some of those to reverse score) and categorize them under either vigor, dedication, or absorption. We gather SEMs to conduct a cognitive interview and eliminate/revise problematic items. We would pilot the job engagement survey and conduct a confirmatory factor analysis. Through this process we aim to get the final survey but if something is not working, we may have to go back to revision and pilot testing.

Measurement Challenges[5]

- ☐ Consider potential demand characteristics
- ☐ Consider social desirability effects
- ☐ Check researcher's biases
- ☐ Consider score sensitivity (measure must be able to make meaningful distinctions between levels of a characteristic of interest, within an appropriate range.)
    - o The survey is designed for expected score variabilities
    - o The potential of floor and ceiling effects has been considered
- ☐ Consider confound variables – is when other factors affect the measurement (check out some sources of measurement contamination on the problems with data section)
- ☐ Consider using multiple measures to minimize effect of confounds
- ☐ Consider gathering data at different times
- ☐ Consider gathering data from multiple raters
- ☐ Check potential concerns of validity and reliability (section below)

Problems with Data[5]

- <u>Life data:</u> for example, joining high school clubs as a measure of extraversion is contaminated by other factors like whatever or not the student worked through high school.
- <u>Observers</u>: Depending on who are we asking the perspective about a topic, opinions will be different. Managers and subordinates see different perspectives on the same topic.
- <u>Tests:</u> There are individual differences in reading level, language/culture, comprehension that may impact the way test takers respond to items.

Reliability[5]

When a measure is consistent, across time, across tests…etc. (check as they apply to the project)

- ☐ Reliability over time (Test-retest reliability)
- ☐ Reliability across items (Internal Consistency)
- ☐ Reliability across raters (Interrater reliability)

Validity[5]

- ☐ Evaluate the degree to which the measure actually measures what is set to measure (construct validity).
- ☐ Evaluate if the measure predicts what it is expected to predict, for example, is having employees work in the office predict performance? If not this measure of performance, it lacks criterion-related validity
- ☐ Are we measuring the same thing twice? Are two measures similar to each other? (Convergent validity and discriminant validity)

Scales of Measurement[7]

Collaborating with SMEs[8]

- ☐ Determine the role of SMEs
    - o They would indicate what is important and give us ideas about content
    - o They would provide references or be a source of knowledge
    - o They would check how items have been categorized (usually an IO)
    - o Review items for concerns
- ☐ One way to collaborate with SMES is through cognitive interviewing
    - o Concurrent think aloud (their thoughts whale they solve the problem)
    - o Retrospective think-aloud (respond to how they solved the problem)

- o Confidence rating (how confident are you in your response)
- o Paraphrasing (restate the question in their own words)
- o Definitions
- o Probes (responding follow-up questions to reveal their strategies)

Item Writing Tips
- ☐ Use the words that responded would understand
- ☐ Keep test items short and direct
- ☐ Avoid tricky response options or tricky wording
- ☐ Avoid double-barreled items ("I like to attend conferences and network with colleagues.")
- ☐ Avoid non or un
- ☐ Add positive and negative items
- ☐ Avoid assumptions e.g., assuming they are familiar with a policy
- ☐ For multiple choice items avoid "all of the above" or "none of the above"
  - o Each alternative should be approx. equal length
  - o Randomized correct responses

Adding Attention Checks
Depending on the length of the questionnaire, consider adding attention checks. Example question:

attentioncheck

Please select "strongly agree" to show you are paying attention to this question.

○ Strongly disagree

○ Disagree

○ Neither agree nor disagree

○ Agree

○ Strongly agree

Examine the responses of those participants that failed the attention check and optimally delete them from the data set.

Data Collection

- ☐ Determine the most appropriate method to choose for a particular research question (see modes section)
- ☐ Consider the impact of choosing a particular method on survey cost and accuracy
- ☐ Consider the cost of the mode
- ☐ Consider the timeliness of the mode
    - o from instrument **design** through **analysis**
- ☐ Consider the accuracy of the mode
- ☐ Consider participation incentives
- ☐ Establish either a follow-up plan, or a statistical plan to account for non-respondents (see non-respondents' section)
- ☐ Consider other ideas to engage potential respondents (see multiple contact section)
    - o Announce the survey publically
    - o Notify potential participants about the survey in advance
    - o Consider incentives
    - o Keep survey short/brief (no more than 150 items, no more than 15min)
    - o Keep easy questions first, demographics last
    - o Don't repeat instructions, use a matrix
    - o Send reminders (without being too persistent)
    - o Do not limit availability to the survey to just one day or week
    - o Track response rates by groups for follow-ups
    - o Link survey topics to participants interests
    - o Provide respondents with results and associated actions

Example

Elite Finishing is conducting an employee satisfaction survey. Employees have limited access to computers, or they are not used to utilizing them. Thus, the company decided it would be better to utilize a mixed modality. Selected employees will fill out the survey either through their phones or paper-pencil, using a respondent code to prevent multiple entries from one employee. Having two methods makes the survey available to all possible participants. Mix modes allow cutting expenses and efforts in digitalizing most paper-pencil surveys. The software cost is low ($100/annually). The self-administered survey will minimize sensitivity bias.

Survey Modes

- • Mail or Website
    - o Paper questionnaire sent to respondents
    - o Self-administered and mailed back
        - ▪ Less subject to sensitivity bias
    - o Low cost
    - o If website, consider coverage issues
    - o If mail consider the labor to digitalize results, and printing cost
- • Telephone
    - o Interviewers call respondents on telephone
    - o Interviewer-assisted
    - o Moderated cost

- In-person
    - Interviewers go to respondent's home or office
    - Interviewer-assisted
        - Less prone to error
    - High cost
    - Most effective
- Multiple Modes
- Administrative records

Non-Respondents[9]

- Why did people not respond to the survey? What was their perceived importance or motivation?
- Was there a lack of ability, understanding of directions and questions?
- Was the time limitations or convenience?
- See N-Bias section on some options for non-responses.

N-Bias Techniques[12]

Archival Analysis

- ☐ Use an archival database that contains the members of the whole survey sample (e.g., personnel records)
    - Usually, archival data contains demographics
- ☐ Identify non-respondents in the records.
- ☐ Part records demographics such as 1) data concerning respondents; and 2) data concerning non-respondents.
- ☐ Assess response bias (e.g., if all non-respondents belong to one group)
- ☐ Interpret results in accordance

Follow-up Approach

- ☐ Identify respondents and non-respondents
    - Randomly select a portion of non-respondents to resurveying (could be through another mode e.g., phone)
- ☐ Consider a short, email embedded survey for non-respondent, for example:

If you are unable to participate, please select your main reason:

Lack of time

Survey did not seem important

Survey requested sensitive information

The purposes don't seem legitimate/SPAM

It was too inconvenient to fill out – Survey was too long

It was too inconvenient to fill out – Difficulties with the website

Did not understand the directions and/or questions

I am not aware about what this is about

Other

Is there anything else that you would like to tell us? Do you have any suggestions for future survey studies?

- Cannot identify non-respondents?
  - Select a random small sample and ask whether they responded or not to the initial survey.

Wave Analysis
- The initial survey must have a deadline. Send a reminder after the deadline.
- Compare responses before deadline and after deadline

Passive Non-response Analysis
- Were non-respondents willing to take the survey? E.g., they would have taken if they had time.
  - May not have received the survey
  - Might have forgotten about it, mislaid it, or were ill
  - Just did not get around to doing it because of other commitments: "I didn't fill it out because I had other priorities-school work and other things that needed to get done. Sorry…hope this helps!"
- Include questions in the survey related to time available, conscientiousness, or others

Interest Level Analysis
- Include a few items that examine respondents' interest toward the particular topic. e.g. How interested are you in the topic of work/life balance in general?

- Assess the relationship between responses to these items and responses to the actual survey topic(s). If there is a relationship, bias exists

Active Non-response Analysis
- Estimate the magnitude of anticipated active nonresponse to a proposed survey effort through interviews or focus groups. Ask employees their intentions to the specific survey in question
- If the proportion of active respondents is greater than 15%, generalizability may be compromised

Worst Case Resistance
- Simulated data to the existing data set to explore the most resistant outcome that non-respondents could have added

Demonstrate Generalizability
- Triangulate with results from a sample collected using a different method

Multiple contacts[10]
- Pre-notice letter
- Survey (with cover letter)
- Thank you, card
- Reminder/Re-send and survey to non-respondents
- Final attempt with a different mode
- Results associated actions

Data Analysis

- ☐ Can we assume that the scores come from a normal distribution? Most statistical procedures assume normal distribution. If the distribution is not normal reconsider a different statistical plan
- ☐ Computing central tendency
  - o Mean scores (divided by number of scores)
  - o Standard deviation. Variance = s2= sum of (X - X-bar)2, often referred to as the sum of squares or squared deviations from the mean, divided by N; Standard deviation = s (just the square root of the variance)
- ☐ Evaluate the effect of outliers
- ☐ Evaluate effects of the representativeness of the sample and the size
  - o Example: Annual income– consider a small sample of 10; What happens if Bill Gates or Oprah Winfrey is part of that sample?
- ☐ Consider interpretation difficulties when using/comparing scales
- ☐ Is there any evidence of response bias?
  - o Acquiescence Bias (Yes! Or Just Say No.)
  - o Extreme and Moderate Responding
  - o Social Desirability
  - o Malingering
  - o Careless or Random Responding
  - o Guessing
- ☐ Is there any missing data? What type? Define a plan to account for missing data
  - o Unit non-response (see missing data section)
  - o Item non-response
    - ▪ Case wise deletion
   - ▪ Imputation (see imputing data section)

Missing Data[10]

- ☐ Consider error from nonresponse surveys
- ☐ Investigate the effect to sample size, means, power, representativeness
- ☐ Determine how to classify missing data[11]
 - o Missing Completely at Random (MCAR)
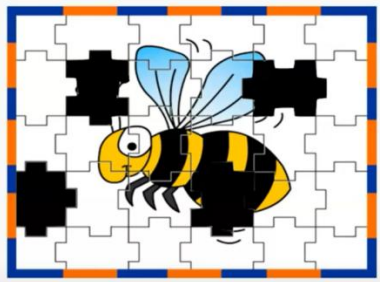
    Data is missing at random such as puzzle pieces are missing at random. Missing is completely independent of the observed data.
  - o Missing at Random (MAR)
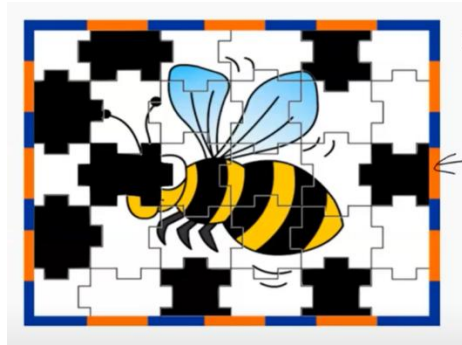
Missing pieces are only at the end of the puzzle except for one. Missing depends on where the piece is located (in the border or not). The missing data is dependent on the observable data. Although the data is missing you can determine what group the missing is coming from. Among the border pieces the missingness is at random. We can estimate it based on the other border pieces data.

- o Not Missing at Random (NMAR)
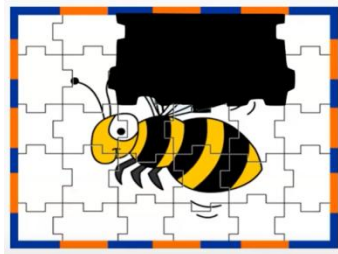
Only the winds pieces are missing. All the data from one group is missing thus it is not possible to recover any.

Inputting Data[13]

Mean value imputation

Replacing missing values with the sample average for the item. It works if there are not many missing responses on the item since doing so will affect standard deviation and standard error. Mean value imputations can also be done using subgroup averages.

Regression imputation

Using a regression model to predict the missing values. Data from multiple variables is needed.

Hot deck imputation

- ☐ Sort data by important variables
- ☐ Start at the top and replace any missing data with value of the immediately preceding observation
- ☐ If the first one is missing, replace it with appropriate mean value

Multiple imputation

- ☐ Create multiple imputed data sets
- ☐ Using the data sets, estimate the overall variation

Qualitative Data Analysis[13]

- ☐ Prepare reviewers
  - o Limit survey information to avoid bias

- o Conduct bias training
- o Train with examples
- Review of patterns and themes
- Independently develop categories
  - o This could be either content (ideas, themes), emotional indicators, or time sequences
- Meet with SEMs to review categories and coding
- Developed independent coding categories
  - o Add a notes column for coders to point out ambiguities
  - o Consider codes for missing data
- Code the data
- Check coding agreement
  - o Resolve questions, errors
  - o Calculate the percentage of agreement
  - o Reconciliate disagreements
- Calculate quantitative content
  - o Number of respondents reporting the same theme/topic
  - o Frequency of the mention of a topic
  - o Severity of the issues mentioned

Report Results

Presentation

Information to be included in the presentation[13]:

- ☐ Sponsoring information
- ☐ Sampling plan: sampling frame, sampling procedure
- ☐ Response rate
- ☐ Follow-up procedure
- ☐ Number of respondents/data points
- ☐ Possible bias in the final sample (because of non-response
- ☐ Degree of potential error (confidence intervals)
- ☐ The survey
- ☐ Reliability and validity information about the measures
- ☐ Other factors
- ☐ Visualization (see section)

Structure[14]

1. Overview and organizational context
2. Begin with basic data (percentages, categorical data)
3. Make a comparison, if possible
4. Identify themes and/or trends
5. Visually display results
6. Provide interpretation
7. Summarize, recommend the next steps
8. Lead discussion, if necessary
9. Ask for commitment to action, if appropriate

Visualization[13]

- For trends over time: Line graphs
- For comparing groups: Bar graphs
- For percentages: Pie charts
- Additionally add tables, verbal summaries, anecdotal examples as needed and permitted

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