

# RESEARCH GUIDELINES AND TOOLS

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Guidelines for GOGLA and Members



- 1. Introduction**
2. General guidelines
3. Step-by-Step Approach

This document aims at sharing best practices and learnings from the Socio-Economic Impact Research

**The aim of this document is to provide guidelines for future research**

- Following the Socio-Economic Impact Research (SEIR) project conducted by GOGLA and Altai Consulting, this document aims to provide **suggestions** on the **best** and **most affordable** ways for companies to conduct follow-up research themselves
- The guidelines provided are based on research **best practices** as well as **learnings** from the SHS research conducted in 2017-2018
- Therefore, the steps, methodologies and tools are adapted to the contexts and capabilities of participating companies

**Methodological insights and practical tools and tips**

- The guidelines include:
  - General research guidelines
  - A step-by-step approach
  - Methodology and statistics focuses
  - Suggested tools
  - Tips and learnings based on the SEIR research

1. Introduction
- 2. General guidelines**
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Conducting surveys with off-grid customers poses several challenges but several options exist to help face these challenges

### Key challenges

- **Off-grid customers are hard to reach** for multiple reasons:
  - **Remote** locations mean face-to-face interviews are costly
  - **Poor mobile coverage** means customers may be hard to reach
  - Many customers are actually **paying for the service for other family members** in remote areas
- Questions requiring customers to provide **exact figures** are always particularly **tricky**.
- **Income figures are particularly hard to collect in emerging markets** due to customers having **multiple and irregular revenue streams**. In some countries, questions about money are also perceived as intrusive

### Suggested solutions

- Having multiple phone numbers for clients whenever possible is key, as is updating phone numbers when they change
- Instead of asking customers for exact figures, ranges can be used as they may help customers estimate
- This is also true for income figures. Ranges may also make the question feel less intrusive. Expenses can also be used as a proxy as customers may feel more comfortable sharing these than income. Alternatively, in countries where the methodology is recent, the Progress out of Poverty Index (PPI) can be used to assess a population likelihood of being below the poverty line

### Companies can leverage their relationship with their customer to gain additional insights and/or facilitate data collection

#### Existing insights and data

- Leverage the **customer knowledge available within the company**: sales agents, customer services staff have specific knowledge that can help better frame research projects
- **Many PAYG providers** have access to the following categories of data:
  - **Socio-demographics** data is often collected when signing up: gender, age, location, occupation, etc.
  - Due to the PAYG relationship, PAYG providers have **data on payment** of fees: on-time/delayed, regular/irregular, default risk, etc.
  - In certain cases the software provides large amounts of **data linked to usage**. Through data analytics categories of customers can be described based on usage patterns (business, back-up, etc.). For example, business profiles can be identified by use of the system during certain times of the day corresponding to local business hours

#### How to leverage the data

- **All these data points can be used to classify customers and create segments**
- These segments can be used at prisms when understanding data collected for specific projects. E.g. Understanding the differences in reasons for purchasing a SHS between urban and rural customers.
- Segments can also be used when designing research projects. Key segments may be the only customers targeted for data collection. E.g. understanding the impact of SHS on businesses using only customers identified as business-users through analysis of their usage data.
- Leverage existing points of contact between the company and customer to collect data that would enrich your analysis. E.g. Asking customers what they were using as a source of light previously when they sign up for availability for impact research

Quantitative research aims at giving an accurate picture of behaviors among a population while qualitative targets to understand the reasons behind behaviors

	Quantitative Research	Qualitative Research
Definition	<ul style="list-style-type: none"> <li>The collection of statistically large samples of quantitative data to conduct some form of statistical analysis</li> </ul>	<ul style="list-style-type: none"> <li>The use of unstructured exploratory techniques, such as group discussions and in-depth interviews, that are based on small samples in order to understand a problem further</li> </ul>
Objective	<ul style="list-style-type: none"> <li>Gather data of statistical significance, i.e. provides an accurate picture of a given population's characteristics and behaviors</li> </ul>	<ul style="list-style-type: none"> <li>Gather detailed insights on individuals' reasoning to better understand the "why?" behind their choice</li> </ul>
Questions	<ul style="list-style-type: none"> <li>Close-ended (pre-existing set of dichotomous answers or ranking-scale response options)</li> </ul>	<ul style="list-style-type: none"> <li>Open-ended (respondents are encouraged to explain their answers and reactions)</li> </ul>
Sample size	<ul style="list-style-type: none"> <li>Large</li> </ul>	<ul style="list-style-type: none"> <li>Small</li> </ul>
Interviews	<ul style="list-style-type: none"> <li>One to one</li> </ul>	<ul style="list-style-type: none"> <li>Group (usually)</li> </ul>
Can	<ul style="list-style-type: none"> <li>Get mathematical data on a large scope of people as to represent the entire population or customer base, etc.</li> </ul>	<ul style="list-style-type: none"> <li>Gather explanations and specifics on participants' behaviors and point of views</li> <li>Obtain new insights via open questions</li> </ul>
Cannot	<ul style="list-style-type: none"> <li>Gather the reasoning of each individual interviewee (since questions have to be close ended)</li> </ul>	<ul style="list-style-type: none"> <li>Get mathematical data on a sample large enough to be significant</li> </ul>

Quantitative research should be chosen when the objective is to measure something while qualitative should be privileged to understand the meaning of something

### When to use quantitative research

- There is a very **clear picture of what needs to be measured**
- **Questions** can be **direct** and **short** and there is no need for long explanations from interviewers
- **Clear methodologies** are identified to ensure data **neutrality** in the context of the research

#### *Examples*

- Assessing customers' satisfaction
- Measuring brand perception

### When to use qualitative Research

- **The meaning of something needs to be found** (cf. the importance of the question “Why?”)
- Thus, what needs to be measured is not perfectly clear so:
  - **Research design is flexible** as the focus of may become more apparent as time progresses
  - **Participants have more time** to express their view and precise their thoughts by confronting them to other

#### *Examples*

- Testing potential new products
- Understanding the success or not behind ads

There is not one type of research intrinsically better than the other and both types are **complementary**. The question to ask when planning a research project, therefore, is: “Do I want to count or measure something, or do I want to find the meaning of something, and describe it? Which comes first?” This is sometimes a chicken-and-egg question but if no one has investigated the topic before, qualitative research is used first to try to tease out ideas, which can then be turned into questions - that can be used in quantitative research



No form of data collection is intrinsically superior. All have different strengths but also different drawbacks and costs to conduct

What kind of information needs to be collected on the population considered (whether actual or potential customers, general population, experts, etc.)?

### Quantitative research

Figures giving a picture of the frequency of behaviors, feelings, desires or needs

#### Field-Based

*Advantage:* both mobile users and non-users can be interviewed with direct face-to-face contact

*Bias:* specific locations have to be designated and may introduce a bias in the results

#### Phone-Based

*Advantage:* more representative by design, thanks to a more random selection process

*Bias:* only mobile users can be reached and thus interviewed

#### Datamining

*Advantage:* gives an exact picture since based on real data collected from the company

*Drawback:* need to collect great amounts of data. Technically challenging

### Qualitative research

Explanations on the rationale behind behaviors, feelings, desires or needs

#### FGDs\*

*Advantage:* insight from individuals chosen among the population of interest

*Bias:* profile groups need to be well-defined and may not be representative

#### KEIs\*\*

*Advantage:* insights from experts chosen according to their field of knowledge

*Bias:* experts may have very personal views on the subject of study

#### Ethnographic

*Advantage:* deep understanding of behaviours such as product usage through observation

*Drawback:* Limited breadth of information. Poor vision of the big picture

Notes: (\*) Focus Group Discussions. (\*\*) Key Expert Interviews

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Clearly defining the objectives will allow the research process to proceed smoothly from defining the scope to analyzing the data is most useful way

#### Definition of research objectives

- In order to provide an answer to the issue(s) raised, the **topic** of the analysis, the **kind of information** that needs to be collected and the **population** the research will have to target must be determined
- This will also inform the **type of research** and **data collection tools** that will be needed

#### Definition of research scope

- Determine precisely the **geographic and socio-demographic scope** of the research (*In what area will individuals be chosen for interview and how many interviews should be conducted?*)
- If applicable, define the **study sample, quotas and regions** (or any relevant geographic/administrative divisions)
- Required information:
  - List of geographic divisions and general information about the market in the considered area
  - Figures about the market and actors to assess statistical significance
- Further information on statistical significance and sample sizes is available in the following slides

#### Leverage available data

- Off-grid solar companies, especially PAYG providers can **leverage data they already have** on their customers to **target specific customer profiles**
- This is all the more true for companies with access to **usage data** through the system as customer profiles can be made through analysis of the data to create customer profiles
- **Customer relations staff** and **sales agents** can have **vital inputs** on how to reach and best address customers

### Quantitative research can imply the use of quotas

#### Definition

- A **quota** is a fixed number of **elements that need to be selected** among a subpopulation defined by a common characteristic. Quotas are typically set on
  - Gender
  - Geographic division (administrative divisions, urban vs. rural areas...)
  - Product/product category
- Example: in the socio-economic impact research on solar home systems, quotas were set by participating company

#### Why quotas?

- **Quotas are meant to ensure that the results for each subgroup have robust statistical significance**, i.e. that enough elements are selected in each targeted subpopulation
- **By design, the quotas defined do not always match the proportions of the different subgroups in the whole population**
- To understand why, it must be remembered that statistical significance is not a function of the overall population size but of the actual sample size
- Therefore, **even when a given group is hardly represented in the whole population, it makes sense to pick up a “high enough” number of its members to compose the final sample, should we wish to extend detailed analysis down to the level of those elements**

# Margin of error and confidence level tells us how well the sample represents the entire surveyed population

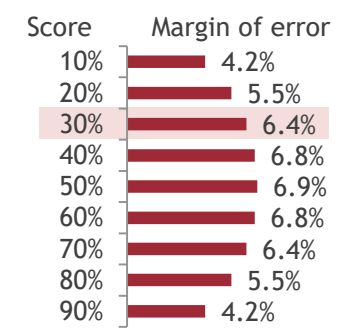
## Definition

- The margin of error is the range above/under which the real value is expected to be. It can be assessed given an accepted confidence level
- In market research, the margins of error are usually calculated with a **95% confidence level**: this means that if the same survey was conducted 100 times, the results will fall within the margin of error at least 95 times

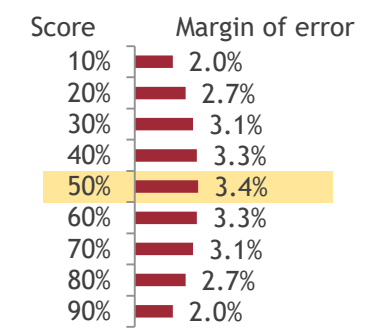
## Calculation

- The margin of error depends on: the **sample size** (N in this presentation), the expected **confidence level** (95%) and the **score** on which the margin of error is assessed
- Even though counter-intuitive, the overall population size has a meaningless impact on the margin of error (e.g. two surveys covering China and Rwanda with the same sample size will have the same margin of error, despite very different population sizes)

N = 200 - Regional splits



N = 844 - All users



For a score of 50% on a sample of 844: « *There is 95% probability that the actual value falls between 46.6% and 53.4%* »

For a score of 30% on a sample of 200: « *There is 95% probability that the actual value falls between 23.1% and 36.9%* »

## Role in defining the sample size

- The largest acceptable margin of error for the most granular quota (e.g. regional split above) of the population for which results are studied will define the sample size (see following slides)

Statistical significance is defined relative to a desired margin of error and confidence level. Sample sizes need to be chosen accordingly

- The sample size question is paramount since:
  - It strongly impacts the cost of a project: the more interviews, the higher the accuracy but also the cost
  - It is not intuitive as having a sample proportionate to the population is not appropriate in most cases:
    - » *For instance, interviewing 2,000 individuals out of a population of 20M will provide very sound results*
    - » *Conversely, interviewing only 20 individuals out of 400 will provide results with a higher margin of error though the proportion of individuals interviewed is higher than in the first case*

Typical questions:

*How large does the sample have to be for my results to be generalizable?*

*Is a sample of 200 large enough for a population of 10,000?*

These questions cannot be answered in general. Indeed, what is called **statistical significance** (i.e. “accuracy” of the generalization) can only be understood respective to a desired **margin of error (e)** and **confidence level (X)**. Those values permit statements like:

**“There is a X% probability that a given value/proportion for the whole population is equal to that calculated over the sample +/- e%”**

*e.g. there is a 95% chance that the average income in the population is that for the sample +/- 5%*

In the general case, when the object of study is a proportion (i.e. the prevalence of a certain behavior or characteristic within the population), the following formula should be used to estimate the required sample size given a desired margin of error and confidence level :

$$n = \frac{t^2 p (1 - p)}{e^2}$$

Where:

- t is a constant linked to the confidence level, e.g. t = 1.96 for X=95%
- p is the share of people showing the chosen behavior/characteristic
- e is the desired margin of error (written as a decimal, e.g. 0.05 for 5%)

In research, it is common to choose to have a 95% confidence level with a 5% margin of error, which can always be provided by a sample of 400

For a level of confidence of 95%,  $t=1.96$  and we thus have the following table (right).

The sample size depends on the proportion. However, in many research projects, sample sizes have to be chosen BEFORE any information about proportions are available, since they are precisely the output of the research

Therefore, it is safer to assume the worst, placing ourselves in the most pessimistic case:  $p = 50\%$

By using  $t = 1.96$  and simplifying the formula, we then have:

Proportion (p)	Margin of error (e)				
	1%	5%	10%	15%	20%
90%/10%	3,458	139	35	16	9
80%/20%	6,147	246	62	28	16
70%/30%	8,068	323	81	36	21
60%/40%	9,220	369	93	41	24
50%/50%	9,604	385	97	43	25

$$n \cong \frac{1}{e^2}$$

For a 5% margin of error, an appropriate sample size therefore is: 400

**How to read:** For a desired margin of error of 5%, when the proportion is  $p=50\%$ , the minimal required sample size is 385

The relationship between sample size and accuracy is not linear. Accuracy depends upon sample size, but not on the ratio sample size to population size: acceptable sample sizes do not depend on the size of the whole population. However this is only true when the whole population is considered “infinite”, i.e. when its size (N) is very large compared to that of the sample ( $n \ll N$ ). Generally, it is not considered to be the case when  $N < 10,000$ . Then, a reduced sample size can be calculated:

$$n' = \frac{n}{1 + \frac{n+1}{N}}$$

Where n is the acceptable sample size calculated from the previous formula

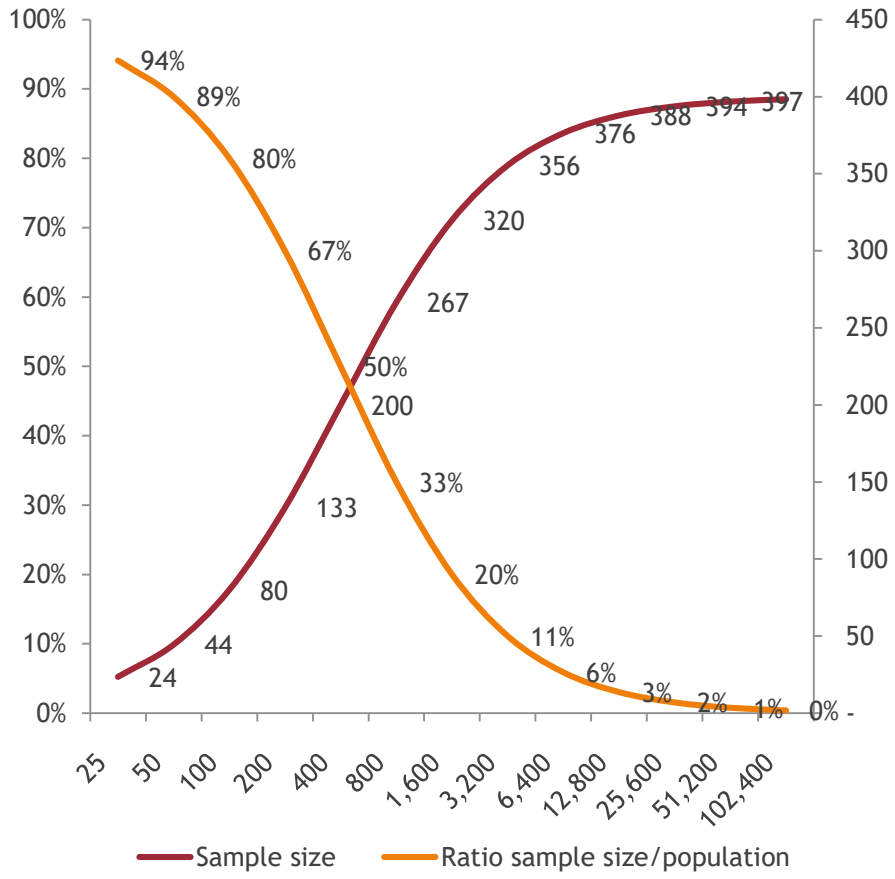
## Key take-aways on sample size

**Sample sizes will be defined by the quotas and margins of error**

**Sample size is not proportional to population size**

- All the above formulas apply to the smallest possible division ultimately considered in the sample
  - E.g. if customers are split between solar lanterns and solar home systems and then between urban and rural, each sub-division will need to be treated as a sample
- Therefore it should never be concluded that the overall sample size never needs to be superior to 400
- On the contrary, multivariate statistics need large samples and may require oversampling
  
- The smaller the population, the larger the needs in sample size in relative terms (see chart)
- The acceptable sample size DOES NOT decrease linearly with the population size
- Sample sizes above 400 are generally useless

Acceptable sample size by population size (log-2 scale)





Field work tools comprise all documents that will be used to collect data in the field

- Produce the documents that will serve to collect data on the field
- Get approval from stakeholders on those documents

### Definition of fieldwork tools

#### Quantitative research

1. Writing the questionnaire
2. Stakeholder validation
3. Translation
4. Prepare tools for data entry

#### Qualitative research

1. Writing the **FGD and/or interview guidelines** (or “discussion guide”)
2. Stakeholder approval
3. Translation
4. Prepare moderator

### Fieldwork

1. Interviewer training
2. Interviewers are expected to conduct their interviews and record their answers in the agreed manner (paper, tablet, etc.)
3. If the research is phone-based, a *Tracking Sheet* is filled in to monitor all calls made

1. The moderator looks for relevant individuals to interview (eligible FGD participants or experts), contacts them and settles on an interview or FGD time
2. The moderator conducts the FGDs or interviews, which are recorded on tape to allow for data entry

### Monitoring

- *For quantitative research only:* ensure the field work has actually been carried out as expected, checking on the way whether respondents have actually been interviewed and whether the answers collected for them actually reflect their opinions

Questionnaires favor close-ended questions with single unprompted answers and the way they are structured is key

Surveys must be well structured and short....

- A questionnaire must be built so that there is a **logical order for interviewees** (e.g. general to specific) and questions should be gathered by relevant themes. It must be **kept relatively short**, targeting interviews of 15mn max - interviewees might otherwise get bored and this can impact the quality of the data - and questions should:
  - **Avoid bias:** interviewers and respondents must not have the feeling that there is a “right” or “wrong” answer (all answers must be equally acceptable)
  - **Avoid misunderstanding:** questions must be worded in a way that makes it easy for both interviewer and interviewee to understand without ambiguity
- **Socio-demographics questions**, easy and quick to answer, are kept for the end when interviewees are less willing to spend time on each question

....focusing mainly on close-ended questions with single non prompted answers for most of them

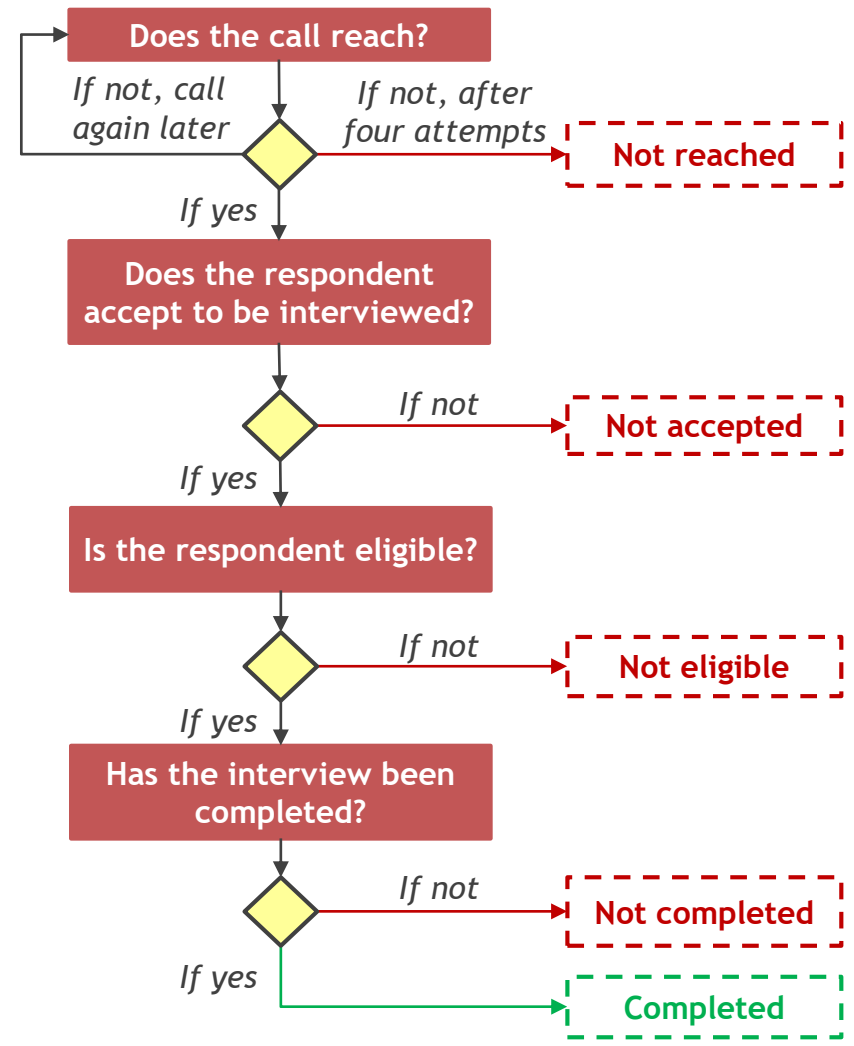
- A questionnaire comprises a **list of open- and close-ended questions**
  - **Close-ended questions tend to prevail to allow for the statistical analysis**
  - Also, open-ended questions are time-consuming to deal with and harder to analyze
- **Single answers are more straightforward to analyse** but multiple answers are sometimes necessary
- **Unprompted answers are more spontaneous** and make the questionnaire easier to conduct. They are **adapted when the range of possible answers is finite and unambiguous**. In particular, not prompting answers serves to get top-of-mind answers from respondents. Even if answers are not prompted, answers can be pre-coded
- **Prompted answers are appropriate when the way answers are formulated could vary a lot**. If prompted, the number of proposed answers should be limited so that the respondent can easily remember them and make an easy, “instinctive” pick

### General phone call approach

1. The numbers to call are randomly picked up from the list
2. In theory, those numbers are divided among the different call centers and interviewers so that two interviewers cannot end up calling the same number
3. Each interviewer calls the numbers allocated to him  
*-If no one answers, the number will have to be called again until a definitive answer is obtained (see possible answers to the right)*
4. When a user is reached, the interviewer starts with a few filter questions to check whether the respondent i) is eligible to the research and ii) does not fall in a category for which the required quota has already been reached
5. If the respondent doesn't verify at least one of the previous conditions, the interviewer hangs up and selects another number to call. If the respondent is eligible, the interviewer can proceed with the interview

A Tracking Sheet is used to monitor the phone call campaign: every time a call is made, information on the call should be entered in the sheet, whether the user is reached or not, and whether the definitive answer is “Completed” or not

### Call process and definitive answers



It is important to ensure the data offers a high enough level of quality, consistency and integrity to allow for a wide array of calculations and analyses

#### Data Cleaning & Checking

- Ensure that the data is mostly consistent and ready for intensive analysis, especially in the case of statistical analysis (quantitative research)

#### Quantitative research

1. Run checks on a copy of the database, ideally column by column
2. Any question, mistake or discrepancy is cleared through immediate correction or discussion with the interviewers

#### Qualitative research

1. All transcripts are re-read to ensure all the topics mentioned in the guidelines were tackled and gave rise to a good level of discussion
2. Any mistake or misunderstanding is cleared through immediate correction or discussion with the moderators

#### Data Processing

- Process and prepare relevant data to allow for the direct creation of a presentation

1. Apply a weighting to the database (if applicable)
2. Make all useful calculations on the data to generate interesting results and graphs

Extract all interesting quotes from FGD or interview transcripts using XSight

- Suggested tools:
  - Database and calculations: Excel, SPSS
  - Geographic data: QGIS
  - Qualitative data: XSight

A database should be checked and cleaned keeping in mind the kind of analysis that will be run on its data. Data should thus be complete, consistent and easy to use

Once the work of the interviewers has been monitored, a number of checks can be run to ensure that the data is mostly consistent

The monitoring serves to check *external factors* (mostly related to the interviews themselves): were the interviews carried out properly?

**The database check verifies *internal logic*** (mostly linked to data entry): is the data input in the database acceptable as it is?

The following checks can be run (from the most general to the most specific):

***Existence of duplicates:*** do some interviewees (customer ID, phone number, etc.) appear more than once in the database?

***Quotas:*** have quotas been respected?

***Blanks:*** ideally, there should be no empty cell in a research database

The problem with empty cells is that they can have different meanings (was the question forgotten by the interviewer? Or skipped? Is it that the interviewee didn't know the answer? Or did he refuse to answer?)

Ideally, a numeric code should be input in all empty cells in order to give the correct interpretation of the blank (e.g. 98 "Do not know", 99 "Do not wish to answer", -1 "jumps")

***Jumps:*** were the questions that had to be skipped after a jump really skipped properly?

***Value limits:*** for each variable that can take numeric values, it is useful to check the limits reached by the variable to assess consistency (e.g. minimum age of the interviewees, price of key products, etc.)

***Consistency:*** cross occupation with gender, level of education with revenue, number of children with age, etc.

Weighting research responses is a way of adjusting data results to overcome sampling bias and/or ensure the results for the sample reflect those of the target population

Weighting research answers is meant to improve accuracy of the generalization by ensuring all research answers are not counted the same way

#### Overcoming sampling bias: weighting related to the probability of selection

**Objective**

In order to come up with a representative enough sample, weights must be applied to avoid distorted results when the selection process has caused unequal probabilities of selection. This is notably the case:

- When quotas were used
- When a person could be reached at more than one number, as is the case for a multi-SIM user (in a phone-based research) or when households had different numbers of eligible adults (in a field-based research)

**Application**

In quota sampling, selection of interviewees is conducted within the quotas given per subgroup (e.g. by operator and/or region). For each unit of analysis, the probability of inclusion will be:

$$p_{inc} = \frac{\text{size of the quota (with a feature)}}{\text{total size of the pop. with the feature}}$$

Every unit in the quota will then have a weight computed as the inverse:  $weight = 1/p_{inc}$

#### Post-weighting to make the results better project the target population

Research answers can also be “corrected” so that the prevalence of a certain characteristic in the sample population reflects more closely that of the actual population. For this method to be applicable and relevant, it is required that:

- Some characteristic be known for all people in the population and all people in the sample
- That characteristic be correlated with the behaviors that the research wishes to study

For example, if it is assumed that there exist differences in usage behavior between age groups, it can be interesting to post-weight research answers so that age class proportions in the sample reflect that of the whole population

Here, weights are computed such that:

$$weight = \frac{\text{share of pop. with the feature}}{\text{share of sample with the feature}}$$

## Statistics presented should always refer to a target population

### Using the results of a study

- Results must always be presented in reference to a target population:
  - E.g. Among purchasers of a 10W solar home system, 10% started a new business
- Be wary of the sample size and margin of error when analyzing data. If the margin of error is 10%, a difference in proportion below 10% will not have statistical significance:
  - E.g. For a margin of error of 10%. If 56% of 10W solar home system users have more than six hours of light per day and the result is 62% for 20W system users. Being assertive about the fact 20W system users have more light does not make much sense

### The benefits of regular research efforts

- Conducting a type of study once, can provide valuable insights but it only provides a snapshot
- Regular research has several benefits:
  - Validating results
  - Improving accuracy of results
  - Allowing for comparison
  - Enabling to deep-dive on certain topics
  - Improving data collection tools