ENERGY
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Theme Guide: Measuring Impact

June 2020

UKRI Innovate UK

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Impact measurement is a process of understanding how much social change has occurred and can be attributed to an organisation's activities. Measuring social impact is becoming increasingly important for companies that are intending to have a positive impact on their customers. Incorporating end customer feedback early in the product or service design and consistently checking in with customers as they receive and start to use a product or service is crucial to success in today's market environment. It allows companies to target an existing product to a new market and can result in better sales figures. Besides an intrinsic motivation to measure impact, many investors, especially impact investors, are looking for evidence of what impact their investment has on end customers, especially when they are in marginalised communities, and are using these impact metrics to assess the investment's performance.

In this guide, we will go into more detail about what the impact measurement process should look like, what methods to use, what challenges to expect and how to resolve them.

How is impact measured?

In order to measure social impact, the following seven steps should be taken:

- **Step 1:** Decide on your overall approach to measuring social impact by developing an impact framework and theory of change.
- **Step 2:** Decide what to measure and select/develop indicators that will identify what has taken place as a result of running your activities, and to what extent.
- **Step 3:** Plan your data collection by selecting the right data collection method, taking a quality approach to sampling and finalising your indicator framework.
- **Step 5:** Develop data collection tools (we focus on questionnaires in this guide) to collect high quality data.
- **Step 6:** Collect and manage your data through effectively deploying data collection tools, ensuring the data you collect is high quality and secure, and selecting the right software for your organisation.
- **Step 7:** Use the data you collect: effectively analyse and learn from your data to improve the delivery of your activities, your fundraising and your accountability back to stakeholders.

An impact framework consists of defining your business, measuring direct and indirect impact, assessing your contribution to development and prioritising the management response. The theory of change is a roadmap that outlines step by step how your company is working towards achieving the impact you envision. As it breaks down the larger goals, called Impact (box on the right side of the below picture), into Outcomes (wider benefits) and Outputs (measurable effects of your work) and finally Activities required to achieve that impact, the framework helps identify potential risks by requiring you to think about the underlying assumptions of each step.

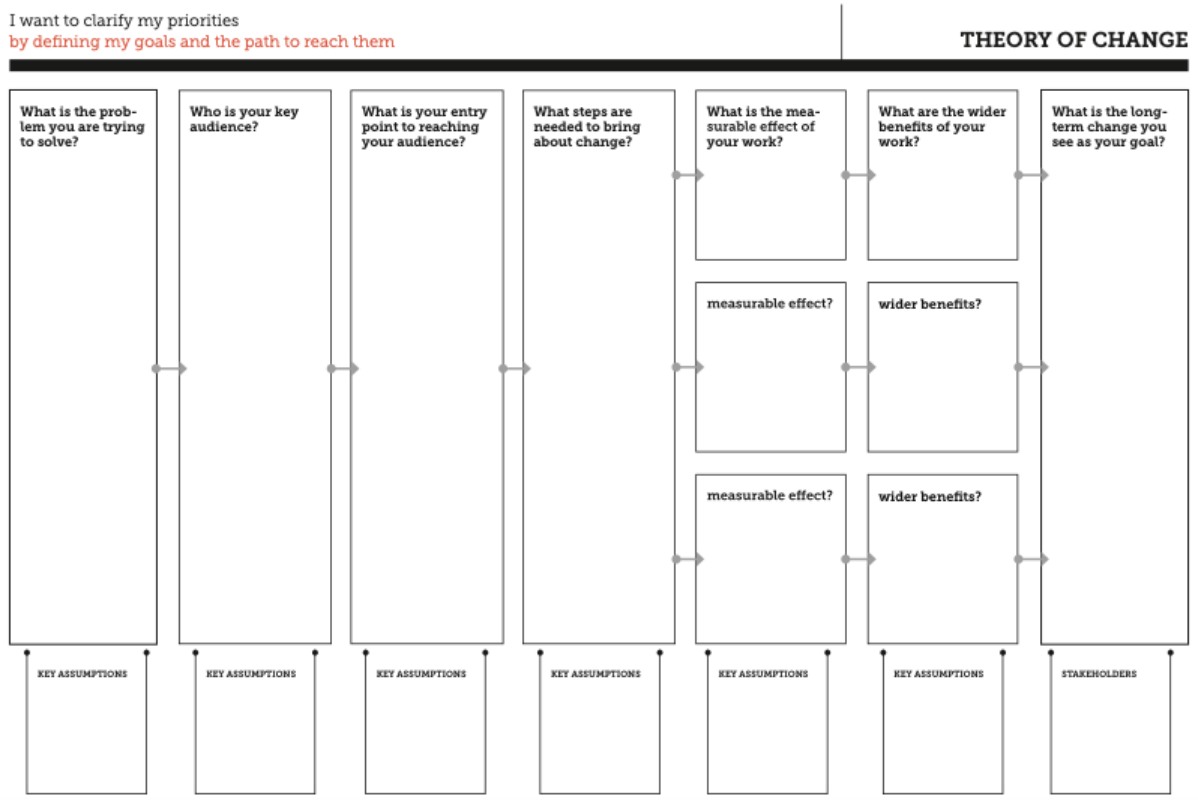

Figure 1. Theory of Change, Source: DIY Toolkit.

After defining these frameworks, the next step is to define what you need to measure. You can take your Impacts, defined above, as the Hypotheses and the Outputs you want to reach. You can then define concrete metrics that you want to measure, as shown by example in the table below.

Table 1. Hypothesis and metrics to measure for each

Hypothesis	Metric
1) Income generation & employment: Customers at treatment sites will report an increase in income generation, compared to customers at control sites, exhibiting: i. a 10% increase in the proportion of households operating businesses within the household ii. a 10% increase in the proportion of households using electricity to generate income iii. a 10% increase in spending of disposable income iv. a 10% decrease in the proportion of households for whom subsistence farming or casual labour is the primary source of income, or who are unemployed	• % change in proportion of respondents who report "yes" to the question “Does anyone operate a business from within the same compound, e.g. charging phones, selling snacks/drinks etc?” • % change in proportion of respondents who report “yes” to the question “In the last month, have you used electricity to generate an income in the household within the same compound?” • % change in average weekly airtime expenditure per customer • % change in proportion of respondents who report their primary source of income as ‘subsistence farming’ or ‘casual labour’, or who are unemployed
2) Education: Customers at treatment sites will report an increase in education investment among school-age children compared to customers at control sites, with customers reporting: i. a 25% increase in the number of hours spent on school work per child in school; ii. a 5% increase in expenditure on school fees iii. a 3% increase in the proportion of school-age children who regularly attend school	• % change in hours spent on schoolwork per week, per child in school • % change in average school fee expenditure per household • % change in proportion of school-age children in household who regularly attend school

3) Sources of energy: Customers at treatment sites will switch away from unclean, unsafe and expensive energy sources for household use compared to customers at control sites, with customers reporting a 10% reduction in expenditure on non-mini grid energy sources	• **% change in average expenditure on non-mini grid electricity sources in the last month per household (firewood, charcoal, briquette, kerosene, diesel, gas, disposable batteries, and rechargeable batteries)**
4) Customer well-being: Customers at treatment sites will derive greater well-being from their mini-grid service, with customers reporting greater satisfaction with their mini-grid service compared to customers at control sites, and access to electricity as having a more positive effect on their life	• Standardised version of response to the 0-10 "satisfaction with your mini grid" question • Standardised version of response to the 0-10 "to what extent do you agree with the statement that having access to electricity has had an effect on your life where 0 is v. negative and 10 is v. positive" question
5) Health: Customers at treatment sites will report fewer energy-related health complaints, with: i. 10% fewer customers reporting any kerosene accidents in the household in the last year ii. 10% fewer customers reporting any respiratory illness in the household in the last year	1. % change in proportion of households experiencing any kerosene accidents in the last year 2. % change in proportion of households experiencing any respiratory illnesses in the last year
6) Female empowerment: Customers at treatment sites will report an increase in female empowerment compared to households at control sites, with 5% more households at treatment sites reporting that a female person is either fully or partly involved in decisions on household expenses	3. % change in proportion of households where a female person is either fully or partly involved in decisions on household expenses
7) Access to financial services: Customers at treatment sites will report more access to financial services compared to customers at control sites, with 5% more households using financial services from formal institutions (commercial banks, SACCOs, MFIs, NGOs) than before	4. % change in proportion of customers that use financial services from formal institutions

The following step is to think through how to collect these metrics that you defined in the prior step. Collection methods can range from customer surveys, interviews and focus groups, to remote monitoring systems. The former is the most common method, and we will mainly focus on it here. However, where metrics (such as amount of energy used) can be collected from a remote monitoring system, it is better to use them, as they avoid subjective responses and human error.

When designing surveys, the following must be taken into consideration:

1. Whether to interview the entire target population or a sample of it. An easy way to calculate what is the appropriate sample size for the amount of statistical significance you want to achieve is by using this tool. You should account for attrition if it is relevant that you have a sufficiently large sample over several surveys to understand the customer journey. If you want to be very rigorous, you should also define a control group, that does not receive your product/services and help compare what changes can be attributed to your offerings and which changes can be attributed to external factors. In general, it is also useful to survey a few people who are not interested in your survey or product, to find out what the reasons for this are.
2. Whether you want to use in-person or remote surveys (via phone, SMS, Interactive Voice Response, or email). This depends on the reliability of mobile network, number and economic status of people owning phones, and other aspects, such as whether customers are willing to pick up the phone from an unknown number or whether customers are available at specific times of the day. Email often are not feasible in the off-grid energy sector given that most customers would not have access to a computer. In general, we see that the more personal the engagement is, the better the outcome.

3. Depending on that, it needs to be considered what tools and companies to use. Do you want to conduct the surveys yourself with an online tool such as Kobo Toolbox or Survey Monkey? Or do you prefer to hire professional enumerators? The latter often makes more sense for larger scale surveys, where several countries or regions are involved and translation into local languages and consistency in how questions are asked is required. Companies that can be used for these purposes include Ipsos and 60 Decibel.
4. What frequency of surveying will be required? Baseline surveys are crucial since existing national statistical data is too generic to draw assumptions about your specific target customers. Besides the baseline, which captures the status of your customers before they receive your product or service, you will want to follow up with more or less regular surveys depending on the type of questions asked and anticipated changes. At the start of designing your company offering, more regular surveys might be required. Later on, a yearly survey or survey depending on the start of your customer's journey with your product/service should be considered (e.g. three months after a customer bought the product).
5. Finally, the length of the survey is going to be determined by the surveying methodology (in-person and remote) and by the amount of time and concentration span your average customer is likely to have in order to avoid survey fatigue. We recommend that in-person surveys do not exceed 30-40 minutes in total and phone surveys 15-20 minutes. To make this possible, it is crucial that you work out which factors are most important for you to track, which will show highest explanation value, and what questions are easiest to understand for your customers.

After you have defined this, you can start putting together a questionnaire. For that you should consider the following:

- Ask easy to understand, straightforward and specific questions.
- Mix up quantitative and qualitative questions.
- Mimic the customer journey with the order of your questions.
- Randomise answer options by changing the order of answer options randomly between customers being surveyed so that you avoid selection bias of customers choosing the last question they hear and the first question they read.
- For questions that are reliant on the memory of the respondent, factor in that less accuracy is to be expected.
- Ask neutral, non-leading questions that don't have underlying assumptions or prejudices. For example, ask about expenditures before income to avoid under- or overstatement of income.
- Provide a timeframe for each question. For example: "how much did you pay for fuel in the last week?"
- Conduct training of enumerators so they understand the questions and the rationale for asking these questions.
- Have surveys translated into local languages by a trusted and certified translator and train local enumerators.
- Pilot surveys among target population and communicate to local communities before conducting the surveys (e.g. via SMS).

The last, but most crucial step, is to put processes in place, as automated as possible so that they requirs little time to clean, analyse and learn from the data you collect. Crucial cleaning steps for your data include the following:

- Align format and aggregate
- Remove duplicates
- Remove totalisers (This is only relevant for mini grids. They often use meters that act as aggregators at every generation source and are used to detect electricity theft, line losses, or metering errors. Hence, including them would imply higher than actual consumption levels.)
- Remove unclear outliers (Values that are too small or large to be realistic, e.g. payments of USD $10,000.)

- Remove sales accounts (Sales accounts are those in the payment file that do not correspond to a customer account, but to a sales agent or mobile money account.)
- Remove reverse payments (Reverse payments are those where the customer sends their payment to the wrong account code, e.g. electricity instead of appliances account. The developer then reverses the payment and re-routes it with the correct account code.)
- Check for missing data and interpolate if sensible
- Reconcile meters/customer numbers across data sets

The data could be filled in to an excel template or a script that performs the above cleaning steps and analyses the data based on what was defined as useful information. This can then be put into some kind of dashboard format with graphic representation of data points. It is important to keep in mind the audience for your data. If you need to report impact data back to your donor or board members, this might have to look slightly different than if the data is informing your own product or sales strategy.

Examples from Africa and Asia

In trying to understand the social impact of mini grid business model interventions (such as appliance financing or tariff subsidies) on end customers, we first developed a 30-40 minutes in-person survey that asked customers about their level of education, employment status, type of house, number of people living in the house, expenses and income, number of children going to school, source of water for the house, who makes decisions in the household, what transport they use, what prior energy sources they used for lighting, cooking, phone charging etc., what electric appliances they own, their satisfaction with life, and adverse health-related events due to other sources of energy (e.g. kerosene burns).

Despite this survey being very comprehensive with around 100 questions, it resulted in little reliable feedback. This was due to several issues: (1) the survey was too long and resulted in survey fatigue on both customer and enumerator side, and (2) questions were phrased in a too complex way and context was lost when translating them to the local languages, resulting in both the customer often not understanding the question or even the enumerator not understanding the full meaning.

We solved this by conducting an analysis of which questions are most important and predictive of energy consumption, and focussed on those. We also defined social impact hypotheses (see above) in areas that we found important and kept one or two questions per area. By that, we were able to cut down the survey length to 15-20 minutes and make the questions simpler and more direct. We also changed from in-person to phone surveys and used one international company instead of individual local enumerators to conduct surveys in all countries, to ensure consistency and understanding of the questions.

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