Short Report

Post IT Local

Bringing Policy Makers Back to the Society

Table of Contents

A Short Note 2

1. What is a professionally good sample of respondents, and how to establish this selection in one municipality? 3

1.1 When do you need a representative sample? 3

1.2 Why are representative samples important? 5

1.2.1 Five common types of sampling errors 5

1.3 Sampling size 6

1.4 How to achieve representative sample? 7

1.4.1 Proportionate stratified sampling 8

1.4.2 Disproportionate stratified sampling 10

1.4.3 Self-administered stratified sampling. 11

1.4.4 Weighting methods 11

1.5 Sampling conclusion 16

1.5.1 Key takeaways 16

2. How the concept should be marketed internally 17

3. How the concept should be marketed externally 18

3.1 How to get first users? 18

3.2 How to communicate this tool? 19

3.3 How to retain users? 19

4. Whether a network of respondents can be used commercially in other contexts, and how the idea can be further developed 20

5. What we have learned? 20

6. Future concerns that are advised to be taken into account 20

References: 22

Frequently asked questions 23

Appendix 26

A Short Note

How it started…

In April 2019, we, who at that time were PhD students affiliated with USN, were asked to have a meeting with a company named Post It Local to give them some feedback on their project: developing a new App to connect policy makers to public. There, our exciting learning journey with Post It Local and the great people who work in Post It Local started. We enjoyed and learned many new things and met many people (e.g., mayors, national and international journalist) whom we had a chance to interact with and improve our understanding of the new App and the problem that the App is trying to solve. We truly appreciate Post It Local for giving us the chance to communicate and practice what we have learned in books!

Why we are here today with Post It Local…

The main motivation to join this project lies at the heart of our research interest: how people in societies and groups respond to changes such as introducing a new concepts or technologies in their environment and how these changes affect their behaviors. Once started the project, by combining the insights from research on social psychology, inter-group relationships, and innovation adoption, we were able to see the big picture that was a disconnected society where the link connecting a group of policy makers to a group of people in society was missing.

This problem, while may not today be seen as a major issue in society, however, it can in long-term lead to a bigger problem: a paralyzed society that suffers from a high level of power imbalance where minority make decisions for the majority, which in turn, severely undermines the capacity of democracies to survive.

Together, we, as researchers who see ourselves obliged to, not only conducting research that contributes to the accumulative knowledge, but more importantly to a greater good, decided to be part of and contribute to such an enlightening initiation by Post It Local. An initiation that its core goal is to contribute to a greater good: creating a society that motivates policy makers to make their decision in a participatory communicative democratic process.

Afra and Ajmal
June 2019
Oslo

1. What is a professionally good sample of respondents, and how to establish this selection in one municipality?

1.1 When do you need a representative sample?

A sample can be used to make reliable statements about the whole population. This means that we need to be able to control and minimize potential biases, and capture the variability of the population as well as possible. The sample needs to fulfill the following conditions. First, the sampling process must have a component of random selection particularly at the level of case units that are the center of interest. For example, probability based sampling at the level of the household if the main case/question has to do with the indicators of financial situation at household levels. Probability based sampling or statistical sampling is the best way to address issues of bias in selection of a sample. Second, the sample size should be large enough to gives us a good picture of the variability of the population. A sample of an appropriate size should describe the variability of the population. Third, in order to obtain a minimum sample, average sample, or large sample that statistically best represents the entire population, stratified sampling can be used. For example, with stratified sampling minority groups of interest or high variability can be oversampled. A greater proportion of units can be selected from minority groups than the majority group. Fourth, the estimation process should take into account weight that need to be attached to each observation in our sample. Whether we need to use weight in our estimation process and how those weights are derived depends on how the sample has been drawn. Table 1 briefly illustrates the sampling process.

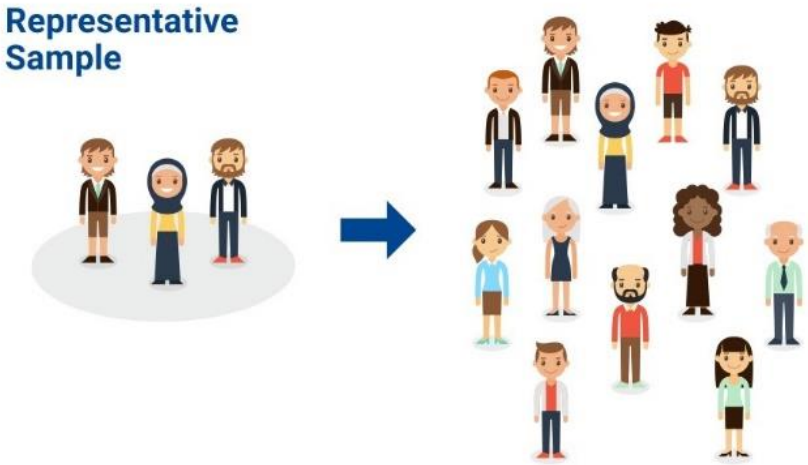


Table 1

When do you need a representative sample?

A representative sample is needed when the results are going to be used to make **statements** about overall **population**.

Why are representative samples important?

Representative samples are important, as you need to be able to:

1. Truly reflect the target population and do not inadvertently exclude valuable subpopulations.
2. Has roughly the same mixture of people as the entire population depending on the cases.
3. Control and minimize potential **biases.**
4. Calculate **margins of error** in the estimation.
5. Calculate large enough sample size that gives us a good picture of the **variability** of the population.
6. Calculate **weights** that need to be attached to each observation in our sample.

How to achieve representative samples:

For PostItLocal app, we propose that representative sample can be achieved in three ways:

1. Proportionate stratified sampling.
2. Disproportionate stratified sampling.
3. Self-administered stratified sampling.
4. Post-stratification also known as weighting method.

Non-representative samples:

Provide reliable information only about the elements that are included in the sample. Can we use the results to make reliable inferences?

1. Estimates may be subject to unknown biases.
2. No way to quantify the margins of error.
3. Sometimes necessary when it is impossible to draw a representative sample.

A simple example of representative sample

- Assumed student population at Ringerike:
  - 40% live with parents, 60% do not live with parents
  - 20% are university, 30% are upper secondary school, 20% are lower secondary school, and 30% are primary school
- A perfectly representative sample of 100 students from Ringerike would need to include:
  - 40 students live with parents, 60 students do not live with parents
  - 20 university, 30 upper secondary, 20 lower secondary, 30 primary school

Key takeways:

- When it comes to getting a representative sample, sample source is more important than sample size.
- The more representative the sample, the more accurate the information about the entire population will be.
- No sample is perfectly representative, so no sample provides perfect information about the entire population. However, there are things that can be done (ahead of time) to increase the representativeness of the sample so that the information about the population is as accurate as possible.
  - Random samples tend to be more representative than non-random sample (especially if the sample size is large), as random sampling gives all population members an equal chance of being selected (at least in theory), so a wider variety of population member is usually captured in the sample.
  - We can make non-representative sample to be more representative by stratification, weighting, and clustering when the population is known (how many of each type of person we would like to have from each category)

1.2 Why are representative samples important?

Representative samples are important as they ensure that all relevant types of people are included in your sample and that the right mix of people are participated. If your sample is not representative, it will be subject to bias. Certain group may be over-represented and their opinions magnified while others may be under-represented.

1.2.1 Five common types of sampling errors

- **Population specification error**—This error occurs when the researcher does not understand who they should survey. For example, imagine a survey about breakfast cereal consumption. Who to survey? It might be the entire family, the mother, or the children. The mother might make the purchase decision, but the children influence her choice.
- **Sample frame error**—A frame error occurs when the wrong sub-population is used to select a sample. A classic frame error occurred in the 1936 presidential election between Roosevelt and Landon. The sample frame was from car registrations and telephone directories. In 1936, many Americans did not own cars or telephones, and those who did were largely Republicans. The results wrongly predicted a Republican victory.
- **Selection error**—This occurs when respondents self-select their participation in the study – only those that are interested respond. Selection error can be controlled by going extra lengths to get participation. A typical survey process includes initiating pre-survey contact requesting cooperation, actual surveying, and post-survey follow-up. If a response is not received, a second survey request follows, and perhaps interviews using alternate modes such as telephone or person-to-person.
- **Non-response**—Non-response errors occur when respondents are different than those who do not respond. This may occur because either the potential respondent was not contacted or they refused to respond. The extent of this non-response error can be checked through follow-up surveys using alternate modes.
- **Sampling errors**—These errors occur because of variation in the number or representativeness of the sample that responds. Sampling errors can be controlled by (1) careful sample designs, (2) large samples, and (3) multiple contacts to assure representative response.

Nowadays many surveys are sent out through social media with seemingly no control on the type or mix of respondents completing the survey. As many respondents as possible are sought with no concern about sample structure. If we do not know who has responded we do not know how well or badly the resulting data represents the complete target audience. Without controls it is likely that the sample will be significantly biased making the resulting data impossible to interpret and unusable. Therefore, we believe that PostItLocal app will significantly increase accuracy of data with the help of right sampling size and procedures.

1.3 Sampling size

- Firstly, generally the larger the sample size, the better it is, as it reduces the confidence interval of the value that population parameter might lie in and also the margin of error is reduced.
- However, a large sample size does not guarantee an accurate or unbiased sample.
- Other factors, such as the structure of your sample also affect the precision of your data. Therefore, we need to ensure that our sample size is big enough to fit our purpose:
    - How accurate do the survey results need to be? The larger the sample size the smaller the degree of confidence around the results. Tools like sample size calculator allow you to work out the sample size you need from your desired confidence level, confidence interval and size of your target population.
    - Which sub-groups within the sample will you need to look at in isolation? For example, if you are collecting a sample of all adults but want to be able to look at results for individual age groups alone (e.g. 16-24, 25-34 etc.) then you will need enough participants within each age group to be confident that the results are reasonably accurate. The more varied your target population the more sub-groups you will probably need to be able to analyze and the bigger the total sample size you will need. As a guide, refer to our discussion on how to achieve representative sample in section 1.4.
    - Sometimes we may want to perform analyses that require a minimum sample size. For example, multivariate analyses used for segmentation need a total sample size that is large enough to be split into groups that can be analyzed separately. In addition, stratified sampling reduces the size of the sample but gives you the best estimate to reach a normal distribution of the sampling mean.
    - The actual size of your target audience can also limit the number of respondents you can achieve. For instance if you want respondents who are immigrants then the

number of people who actually meet this criteria is relatively small. This will limit the number of respondents you can reasonably expect to achieve. However, 100 respondents with a target population that numbers 1,000 will yield more accurate results than a sample size of 100 with a target population of 1,000,000 as you will be asking a much higher proportion of people that meet your criteria for selection.

1.4 How to achieve representative sample?

We recommend four ways of deriving representative samples for PostItLocal depending on app adoption rate: (1) proportionate stratified sampling, (2) disproportionate stratified sampling, (3) self-administered stratified sampling, and (4) Post-stratification also known as weighting methods. We proposed stratified sampling and weighting methods for the following reasons:

- Because our target population of interest is significantly heterogeneous.
- Because we wants to highlight specific subgroups within his or her population of interest.
- Because we wants to observe the relationship(s) between two or more subgroups.
- Because our goal is to create representative samples from even the smallest, most inaccessible subgroups of the population.

The process for performing stratified sampling is as follows:

- **Step 1:** Define the population, for example, 30000 people in Ringerike.
- **Step 2:** Choose the relevant stratification by dividing the population into smaller subgroups, or strata, based on the members' shared attributes and characteristics. For example, gender or age.
- **Step 3:** List the population according to the chosen stratification. For example, in case of gender we end up with two lists, one detailing all male and one detailing all female and if it is age then the specific age groups.
- **Step 4:** Choose your sample size using sample size calculation formula: $n:= Z_{\alpha/2}^2 *p*(1-p)$ / margin of error MOE^2 ($Z_{\alpha/2}$ = significance level) for Z distribution.
- **Step 5:** Calculate a sample based on proportionate or disproportionate basis, from the population strata, or if self-administered stratification is used, then a sample size is selected from total population size, by the researcher based on some rationale and then based on population proportion of each strata samples are generated from these strata. Imagine that of the 30000 people, 60% of these are female and 40% male. We need to ensure that the number of units selected for the sample from each stratum is either

proportionate to the population or disproportionate based on some weights assigned by researcher from the stratum, or self-administered where a certain sample size is chosen by researcher based on his margin of error required, and then according to the population proportion of each strata in the population, samples are created to match the number of males and females in the population.(The sample size based on self-administration is used to account for the survey response rates to achieve a good large sample size)

- **Step 6:** Pool the subsets of the strata together to form a random sample. Let assume that we have chosen to sample 40 male and 60 female, we still need to select these people from our two lists of male and female (see step three above)
- **Step 7:** Conduct your analysis to check if the sample representation is consistent with what is known about the population (see step six above) that the study seeks to understand.
- **Step 8:** Use weighting technique to correct any imbalances in sample profiles after data collection. This is used for adjustment of under or over representation in the analysis post data collection.

1.4.1 Proportionate stratified sampling

In a proportionate stratified sample, the population of sampling units is divided into sub-groups, or strata, and the sample is selected separately in each stratum. First the total sample size required is calculated through the population proportion method for estimation of n (sample size) based on binomial distribution. Then sample size of each stratum is calculated to be proportionate to the population size of that stratum. For example for an age group 0-14 the population proportion of the stratum is calculated by N_k/N (N_k individuals in k^{th} stratum and N is total size of the population, and *n* is the randomly drawn sample size for all stratums combined). Therefore, sample size of strata of each group like would be given by $n_j = N_k/N^* n$ where n_j is sample startum referred by j.

Age	Population #	Population Proportion%
14 and under	4765	15.6%
15-24	3467	11.4%
25-39	5579	18.3%
40-54	6366	20.9%
55-66	4787	15.7%
67-74	2827	9.3%
75 and over	2651	8.7%
Total	30442	100%

Proportionate allocation is used for two reasons:

(i) To reduce standard error for survey estimates.

(ii) To ensure that sample sizes for strata are of their expected size according the population proportion.

(iii) Effective and quick as it reduces sample size but the result are still produced with low confidence intervals and margin of error (MOE).

A simple example of sample calculation for Ringerike commune of Age group by using sample size calculation formula: n:= $Z_{\alpha/2}^2$ *p*(1-p) / MOE^2 ($Z_{\alpha/2}$ = significance level) for Z distribution, see table 2. This proportionate stratified sampling technique is used to minimize the sample size to ensure what smallest sample size would be the true unbiased estimate of the true population.

Table 2: proportionate stratified sampling for Age

Age	**0-14**	**15-24**	**25-39**	**40-54**	**55-66**	**67-74**	**75+**	**Total**
Population	4765	3467	5579	6366	4787	2827	2651	30442
Sample	59	43	70	79	60	35	33	380

Suppose a sample of 380 (which is statistically calculated above for 95% Confidence Interval and 50% response rate of probability) Ringerike inhabitants is to be selected from a total population in Ringerike commune.

- Calculation 0-14 age sample: ***4765/30442 * 380 = 59***
  - N_k/N* n (N_k individuals in k^{th} stratum and N is total size of the population, and *n* is the randomly drawn sample size for all stratums combined).

If, before drawing the sample, the population is divided by gender in each age group based on the population proportion of gender distribution, then a separate sample is drawn per age for each gender stratum. This is illustrated in the Table 3, where we can see that in real examples the sampling is proportionate to the age proportion of the total population as in the above table for each stratum but the gender proportion in the population for each strata is 50% so the males and females are divided into different categories based on this 50% proportion of the population. This creates cohesion between the size of population proportions of the stratum to match the proportion in sample size of stratum as percentage to total sample size.

Table 3: proportional stratified sampling for Age groups based on Gender proportion of the population

Age/Gender	Population	Sample	Total
0-14 Male	2382	30	
0-14 Female	2383	30	60
15-24 Male	1733	22	
15-24 Female	1734	22	44
25-39 Male	2790	35	
25-39 Female	2789	35	70
40-54 Male	3183	40	
40-54 Female	3184	40	80
55-66 Male	2394	30	
55-66 Female	2393	30	60
67-74 Male	1415	18	
67-74 Female	1413	18	36
75+ Male	1326	17	
75+ Female	1325	17	34
Total	**30442**	**384**	**384**

1.4.2 Disproportionate stratified sampling

In a disproportionate stratified sample, the population of sampling units is divided into sub-groups, or strata, and a sample selected separately per stratum. Crucially, the sampling fraction is not the same within all strata as in proportionate sampling in the previous procedure. We might start with proportionate but then use individual inferences of the data based on the responses wanted in the survey from each stratum. Therefore, some strata are over-sampled relative to others. Disproportionate stratification is used for two purposes:

(i) To give larger than proportionate sample sizes in one or more sub-groups so that separate analyses by sub-group will be possible; and, far more rarely.
(ii) To increase the precision of key survey estimates.

A sample is calculated by using sample size calculation formula: $n:= Z_{\alpha/2}^2 * p*(1-p) / MOE^2$ ($Z_{\alpha/2}$ = significance level) for Z distribution for each strata in Table 4. This disproportionate stratified sampling technique is used to increase the sample size to ensure unbiased estimate of the true population for each stratum. To obtain unbiased estimates for a disproportionate stratified sample, the survey estimates have to be weighted (refer to our discussion on weighting methods).

Table 4: Disproportional stratified sampling for Age

Age	0-14	15-24	25-39	40-54	55-66	67-74	75+	Total
Population	4765	3467	5579	6366	4787	2827	2651	30442
Sample	0[1]	346	360	363	356	339	336	2100

1.4.3 Self-administered stratified sampling.

Another technique for stratified sampling is with self-administered value for sample size, the larger the sample size the smaller would be the margin of error for the strata created based on population proportions. Assume we want our sample to be 10000 in Ringerike in table 5.

In the ***self-administered sample*** size for stratification, a large sample can be chosen in the research to ensure that a large responses can be collected from all age groups at large. This is generally done in research after the initial phase considering that the response rate of the survey comes out to be very low. Like 20% so in order for the analysis to achieve normal distribution in statistics with more accuracy and less margin of error that sample requirement can be increased to large values, to ensure a large number of respondents answer the question. If for instance the aim of the study is to ensure some randomness that achieves normality and then a sample size of 1565 for 0-14 age, with response rate of 20% would be able to give us sample answers of 313, and if we start with this end point to ensure the maximum sample to be aimed at to achieve 313 responses then the formula would be: 313/20% = 1565. So both samples 1565 or 313 would still be equal to the population proportion of 0-14 age as a total of the population size which is 15.6% calculated in the earlier discussion of proportionate sampling techniques.

Table 5: self-administered stratified sampling for Age

Age	0-14	15-24	25-39	40-54	55-66	67-74	75+	Total
Population	4765	3467	5579	6366	4787	2827	2651	30442
Sample	1565	1139	1833	2091	1572	929	871	10000

1.4.4 Weighting methods

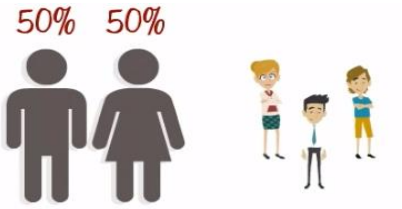
Post-stratification or weighing would be used when there is an over or under estimation for each sample within each strata of the samples obtained from the population. The weights are assigned to create an unbiased estimate. For example, if there are more females than males in the target

[1] We made an assumption that subjects in 0-14 groups will not use the APP and thus, we considered the representative sample of this group zero.

population, the same population should maintained in the sample. If there are 40% females in the target population, in a sample of 100 respondents, a proportionate number should be maintained (40) to generalize the research.

We assume that data collected from surveys is not exactly representative of the target population even in those instances where strata have been applied (refer to our discussion on how to achieve representative sample?). Weighting is a statistical technique that can be used to correct any imbalances in sample profiles after data collection.

- Imagine we have a target population that is evenly split by gender. If we then collected a sample of 400 people within this population, 300 of whom are male and 100 female then we'd know that our sample over-represents men.



- Weighting the resulting data can help us to correct this imbalance. The target proportions for both men and women are 50%. The proportion of men would therefore need to be "downweighted" from 75% (300 out of 400 respondents) to 50% while the proportion of women needs to be "upweighted" from 25% to 50%.
- In this case, weighting would multiply the existing female participants by 2, so that the female response is amplified in the data. For example, on the gender question we have 100 people answering female but after weighting this becomes 200 as the "female" data is counted twice.
- The male interviews need to be correspondingly downweighted. In this instance we need to get 300 responses to effectively count as 200 so we multiply the male responses by two-thirds (or 0.67). Before weighting we have 300 males coded on the gender question. Multiplying by two-thirds gives us 200 males, equaling the number of female responses after weighting.
- The numbers used to multiply the responses from each proportion of the sample are called weighting factors. A summary of the weighting factors for this example is shown below:

Table 6: Gender weighting

	Before weighting		**After weighting**		
Group	No. of interviews	% of sample	No. of interviews	% of target population	Weighting factor
Male	300	75%	200	50%	0.67
Female	100	25%	200	50%	2

- This is a very simplistic example, used only to illustrate the concept of weighting. Typically, weighting is used to match the population profile on more than one variable to get as representative a sample as possible. For example, to get a representative sample of a Ringerike population we might weight on a number of demographic variables such as gender, age, family condition, and location.
- This example has been written to provide a very basic understanding of weighting. In reality analysts weight survey data using specialist software such as SPSS. To be able to instruct these analysts how to weight your data you will need an understanding of the different types of weighting available and be able to understand the effect of weighting on your data. Weighting can change the structure of your data in an adverse way, so caution is required when applying it. It is, for example, inadvisable to upweight small groups of respondents so that they account for a significant proportion of the total sample as this will mean that survey results are disproportionately affected by a small minority of respondents.

The table 7 shows the proportion of people in different age group participated in a survey. A quick examination of the data reveals that something is wrong. For example, only 3.2% of the sample are aged 15 to 24, whereas approximately 9 times this number are aged 40 to 54. This suggests that the sample may not be representative of the population at large.

In order to be confident that a sample is or is not consistent with what is known about a population we need some other data about the population. Ideally this will be from a source with known reliability, such as Statistic Norway (SSB) or Veksbarometer. However, it can also be obtained from other surveys where there was a good reason to believe in their representativeness. As an example, the following data shows the required age in the Ringerike population for the survey.

Table 7: Age weighting

Age	Survey (A)	Population #	Population % (B)	(B)/(A)
14 and under	1.5%	4765	15.6%	10.4
15-24	3.2%	3467	11.4%	3.5
25-39	23.8%	5579	18.3%	0.7
40-54	27.1%	6366	20.9%	0.8
55-66	20.8%	4787	15.7%	0.7
67-74	12.1%	2827	9.3%	0.7
75 and over	11.5%	2651	8.7%	0.7
Total	100%	30442	100%	1.0

Putting the sample results side-by-side with the known data for the market quickly reveals the scale of the problem with this particular study. Looking at the first row of numbers in the table 7 we can see that 1.5% of the sample were aged 14 and under, which compares to 15.6% in the population and thus the true proportion in the population is approximately 10.4 times that observed in the study (as all the numbers are rounded you will get a slightly different answer if you attempt to reproduce this calculation). Reading down the right-most column of the table 7 we can see that there are no instances where the ratio of the percentages is at 1.0, which is approximately what is required for the study to be representative (small deviations are acceptable due to sampling error).

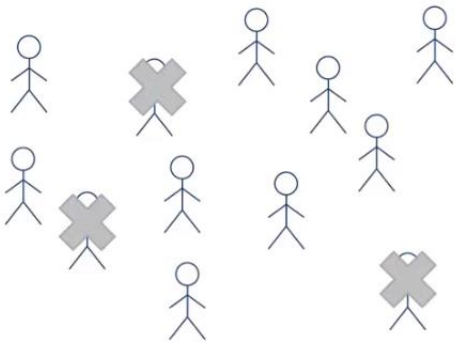
A similar process would then need to be performed for any other secondary data. Then, once all the comparisons have been done, a decision needs to be made, where the options are:

- Conclude that the data from the sample is consistent with what is known about the population. In this example, such a conclusion is clearly not warranted.
- Weight the data, which involves adjusting how the data is analyzed so as to take into account the nature of differences between the sample and the population. This option only makes sense if any deviations between the survey's results and the population are considered to be 'sensible'. Typically, results as disparate as those shown above would indicate that the study was fundamentally flawed. However, there are scenarios when such discrepancies may be considered plausible. For example, it is commonly the case that women are more likely to respond to surveys than men and so if a survey exhibited an over-representation of women and all the discrepancies between the survey and secondary data could be explained by such a phenomena, then weighting would be a sensible remedy.

We propose three kinds of survey weights potentially needed for PostItLocal app:

1. **Non-response weights**

Survey response rate is tend to be lower among younger people and men and weights will adjust for this. By applying weighting techniques on a data results you can make representative assumptions (refer to our discussion on weighting methods).

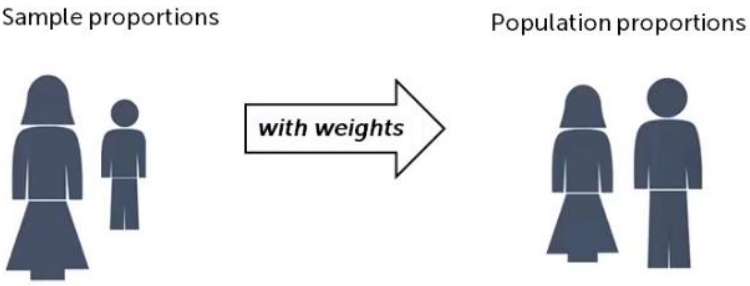


2. **Design weights**

The probability of being the one person in the household selected to participate is 1/1 if you live alone, ½ if you live in a two-person household, ¼ if you live in a four-person household. Design weights will adjust for these unequal probabilities

3. **Population weights**

Weights can adjust sample proportions to population proportions, using information from other sources such as SSB[2] and Veksberometer[3].



[2] https://www.ssb.no/en/
[3] https://vekstbarometer.usn.no/

1.5 Sampling conclusion

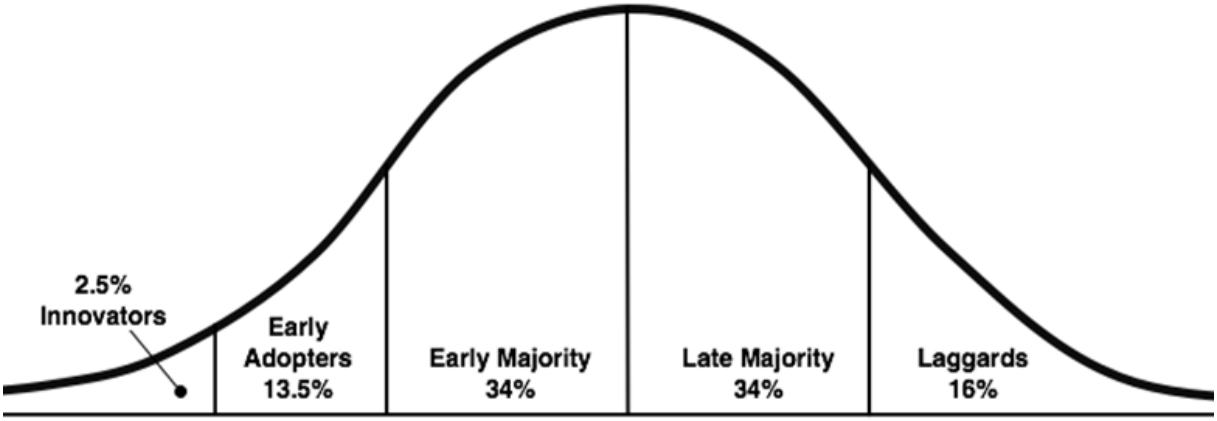
For the initial starting phase of the survey tool, we would recommend using proportionate stratified sampling as it would give the minimum sample size needed. For the subsequent stage when the response rate reaches to 15% - 20% on average, disproportionate sampling can be assigned based on weights assigned by us this is mentioned in section 1.4. For the final stage self-administered stratified sampling can be used with large sample size for each commune which can then be proportionately divided based on population proportion for stratified sampling with adjustment in weights post analysis, to achieve at optimal sampling results that give us small margin of error.

1.5.1 Key takeaways

- Stratified random sampling allows us to obtain a sample population that best represents the entire population being studied.
- The strata should be designed so that we collectively include all members of the target population.
- Minority groups of interest or high variability can be oversampled. A greater proportion of units can be selected from minority groups than the majority group.
- The results are more accurate. Sampling error is reduced because of the grouping of similar units. It should be remembered that there is no gain in accuracy from stratifying by a factor unrelated to the subject of the survey.
- Different selection and estimation procedures can be applied to the various strata.
- Separate information can be obtained about the various strata. Stratification also permits separate analyses on each group and allows different interests to be analyzed for different groups.
- The definitions of boundaries of the strata should be precise and unambiguous.
- Ideally, no more than 4-6 stratification variables and no more than 6 strata should be used in a sample because an increase in stratification variables will increase the chances of some variables canceling out the impact of other variables. Using more variables than this can make the structure of the sample complicated and, in turn, make it difficult.
- Stratified random sampling differs from simple random sampling, which involves the random selection of data from an entire population, so each possible sample is equally likely to occur.

2. How the concept should be marketed internally

Let us look at stakeholders and who can benefit from this solution. First stakeholder is public. Public can get benefit from this as this App can help them to involve in decision making, raise their concerns/pain and live in a better city. However, not everyone will start to use this immediately. Let's look at below graph which shows what portion of population adapt new ideas/technology at early stage. We can see only 15% of the population will adapt this and this people are good sample of respondents. We think city activist, environment protection activist, young leaders like university students, people who are working in public sector like social workers are among these 15%.



Another stakeholder are local councils/municipality. They have limited budget and the want to make sure their budget are being used productive and brings maximum value and happiness to the people. This can help them to get help from public and improve their urban planning.

Another stakeholder is Government, which wants to make sure that allocated budget, has been used in the best way to make maximum value to public. This can give them a good monitoring tool to assess their budget allocation mechanism.

Another stakeholder is political parties. Normally there is a high competition to get the seats in local councils and it is very important for the political parties as it helps them to win federal/national elections. Knowing what public wants will be extremely useful for them in winning the elections and data produced by this app could be critical for their purpose.

Other stakeholders are local businesses/companies or even big construction/ urban development companies as they can predict future planning activities by this data and make sure they will get maximum benefit out of that.

In overall, we have 2 different sides here. Selling this idea to public, which should be started, by influencers/activists and the other side is selling this to government/councils/businesses to make sure the data entered by public will be utilized by them and this will also bring more trust to the app as people will see their ideas and comments transferred to action plans by politicians.

How may this be done?

We think app should be linked to their internal systems in ranking and making decisions on future developments/ projects. Not sure, what is the current process in their system (needs to be investigated). We think councils already collecting some data like volume of traffic in different suburbs, collecting people's ideas by questionnaire and considering that data in their process. This app can help them to save a lot as data continuously is coming and they collect public opinion on different things. Merging this data with some facts like traffic volume data which is coming from installed sensors can empower councils in making the right decisions. In terms of how to mark this with councils, we think the first and most important one is finance. We need to prove that this app will reduce their current cost. We need to know how much it costs councils to get the public opinion or communicating with public. The second thing is to prove that this can lead to better decisions and reduce human error/ wrong projects launch etc. And the third one is to prove that people will trust them and are satisfied.

This app could be offered free to NGOs, environment activists or similar groups to make a movement/wave in public. For other stakeholders like local shops/businesses/government is different and they should be targeted for revenue purposes as using this data can provide business opportunities and thus, this service should be offered to businesses with charge.

3. How the concept should be marketed externally

We strongly believe that App should not charge public for this service and revenue must come from businesses/councils/governments. Our intention here is not sell but encourage people to install and use the app.

3.1 How to get first users?

- Use paid advertising: cross-channel promotion such as Facebook exchange, Google Adwords, in-app ads, and direct media buy.
- This app should be available free to the public.

- Integrate community by making share easier: we think the nature of this app is inherently social, it could promote itself if PostItLocal enable social sharing every piece of content in an app, it could be liked on social platforms such as Facebook, WhatsApp, LinkedIn, email referrals and text messaging to stimulate sharing of the app. When social sharing is easy, it becomes an integral part of users and makes the app more interesting and engaging.
- App store optimization
- Use facebook groups, WhatsApp groups etc.

3.2 How to communicate this tool?

- Using the network such a universities, labor union (LO Norge)
- Local and National conferences
- Festivals
- Promo video that captures the essence of Post It Local in a one-minute pitch
- Direct promotion through Mayor. As Mayor is for everyone!

3.3 How to retain users?

- In order to determine the retention probability of app users, it is important to understand who they are by analyzing and tracking (segments) the sort of habits, interest/motivation in questions and answers they have engaged in, as well as characteristics like location and demographic details they provide during onboarding. This analysis will help us in identify highest value users, such as what is working for them and what is not, number of clicks, etc. In turn, help us to indicate future directions for analysis.
- The timely response of the Mayors is another important retention factor.
- Retain users by offering rewards: not only reward delight first time users and increase download, but also boost brand loyalty and increases user retention.
- Push notifications to answer the questions, rate and review.
- In-app gamification and incentivization.

4. Whether a network of respondents can be used commercially in other contexts, and how the idea can be further developed

This could be used not only for local councils but also for national wide public opinion assessment. This can promote direct democracy in the world and political parties can use this to understand what are the key pain points for public. This can make evolution in voting system and could be used by even large corporations to understand what are the needs of their employees. An important thing for this tool will be making great insight from data and having simple interface to be used by everyone.

5. What we have learned?

- Lack of connection between elected representatives.
- Lack of understanding of the concept contribute to resistance to adopt this tool. That is if policy makers do not understand the main aim of this App and the potential benefits the App have, they will not or be hesitated to use the App.
- Young people is the most challengeing segment, and it needs more research, and searching more ways to engage them. For example, group activities and habits etc.
- The representative sample could vary across segments and this affect what type of cases/questions this app should address.
- The success of the app can be traced with the number of users and retention rate, and the ratio of people representing different segments.
- As policy makers begin to post the questions, the more detailed data is going to available, which helps us to group this data together and further categorized the sample/segmentation. For example, who are attached to specific problem such as environment and health?

6. Future concerns that are advised to be taken into account

1. Some questions may not be readily answered by respondents, i.e. if respondents are not well informed of the issue, if there are short-term upsides but longtime downsides, respondents may have one answer today a different tomorrow. Can some politicians exploit this in an unfavorable way offsetting the majority? What are the legal

ramifications of getting an answer by the politicians? Do politicians have to treat the answer as a democratic vote? As legally binding? What happens if they ignore it?

2. Are there limits to how many questions should be put out? One question per week or 2 per month? Big questions, small questions? How much actual negotiating power does a politician have if questions are coming in all the time?
3. How are you going to assure security of the system or even prevent the high jacking of the system? Would there not be an incredible effort from intelligence agencies of other nations or private entities to seek to penetrate the system to push a vote one way or the other? How are going to assure accountability, would that even be possible?
4. What are the long-term ramifications for the political debate? Would some parties solely rely on app voting? One of the reasons for lengthy debates in parliament is to make sure to include all aspects of the matter at hand, to make sure you reach a sensibly outcome that is aligned with the majority of the population. Will this app not hollow out the debates? Why debate it, just put it out for a vote. Perhaps in the future it will be more important to ask the question in a way that persuades than for its actual content.

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Frequently asked questions

Q1. What is the product?

An app or a means for a direct communication.

Q2. What is the main goal of the app?

To promote direct democracy or delegating decisions to public.

Q3. How can people benefit from this appt?

- Before the policies are made or implemented, people are informed on the spot about the policies that may directly or indirectly affect their lives
- People are able to voice their concerns if they disagree or agree with the policies
- By taking part in a decision-making process, people feel that they are heard and accountable for such important decisions or policies (e.g., this more likely can lead to developing a trust- based relationship between the people and policy makers).

Q4. How can policy makers benefit from this app?

- By incorporating people's feedback or suggestions, they will better be able to more thoroughly examine their policies and important aspects of their policies
- The developed trust between people and policy makers and a greater engagement of the people lead policy makers to more confidently peruse their policies

Q5. What are the main features of the app?

- Easy to use for people (e.g., pre-defined questions for the members, multiple choice questions)
- Easy to use for the policy makers (e.g., it takes only few steps for them to post their questions or decisions)
- Privacy of people who use this App (e.g., people can sign up only with a phone number)
- People will be able to observe how other people in their community or municipality think about a possible policy to be made or implemented (e.g., people can see how many and whether people agree or disagree with a policy)

Q6. Who will benefit from this app?

- Both young and elderly people (e.g., consumer segment) or residents in a municipality
- The policy makers who have the chance to gain people's trust and beliefs in their policies and as such, less resistance by public to their policies
- On a broader level, if this product is implemented successfully, would benefit other public organizations that heavily rely on decisions or policies that affect people's lives (e.g., labor unions)

Q7. What are the important consequences of promoting direct democracy by using this App?

- Because the policies are discussed and made through a joint collaboration process, policy makers are more likely to take responsibility for the outcomes of their decisions (this is indeed what we people want)
- By voicing their concerns, people in a society learn to speak up and actively decide on policy initiatives directly
- A great social power imbalance would be less likely in a society where people are able to influence or resist policies that affect their lives

Q8. Who in the population has inner motivation to help politicians or mayor to make effective decisions?

We think:

- Those who are attached to specific problem such as health?
- Those learning and reading about community issues and politics
- 20 percent of active social media users

Q9. Who is responsible for the decisions? Do everyone has equal representation?

Mayor and elected representatives

Q10. How to get selection of good questions?

It really depends on what mayor and elected representative wants to know about the population. We think questions related to increasing communication gap between policy-maker and ordinary people, facilities, budget spending, culture and leisure may be relevant, depending on the perceived importance of each area. The good selection of questions can be identified as people and politicians begin using the app.

- Communication: people-to-politicians, people-to-people, politicians-to-people etc.
- Facilities: health and welfare, education, transportation, family and childhood environment, kindergartens in Ringerike etc.
- Budget: repair of roads and streets, waste management, schools and hospitals, fireworks, investment in sectors and activities etc.
- Culture and leisure: volunteering, entertainment, vocation, outdoors, library, Ringerike culture etc.
- Boundaries: limitation, law permission, personal boundaries etc.

Q11. What kind of questions/cases are Ok to ask/discuss on this app?

As the basic purpose of this app is to bridge the communication gap between ordinary people and policy makers, as well as involve ordinary people in the decision making process. we think the nature of questions or cases could be categorized as follow:

- Formal: this focus on questions in political nature such as investment in sectors and budgets, pre-defined questions, multiple-choice questions.

- Informal: culture and leisure, etc.
- Frequency of questions and answers from both policy-makers and ordinary people.
- Frequency of people answering can be track through clicks counts such as 100 people clicks and 10 people answers.
- Categories of questions can developed as policy-makers and ordinary people start using the app ad we move along.

Q12. What is the Ok sample for the Mayor to subscribe to this app?

We believe it depends on the expectations of the Mayor about the ratio of people using this app. It is practically impossible for everyone in the municipality to download and use the app. Therefore, a small sample of people representing the municipality's population can be targeted and engaged. Refer to our discussion on representative sample.

Q13. What is population?

In statistic population is group of people, animals, things, or places that have something in common.

1. All USN students
2. All people in Ringerike
3. All people who own house
4. All dogs in Ringerike
5. All 420 commune in Norway

Q14. Why do we care about populations in statistics?

The goal of most data collection projects is to learn something about a population.

Q15. What is sample?

A sample is selected group of population members that provides during a research study. A sample is basically a “taste” of a population.

Q16. What is sampling frame?

The group of people from which you will draw your sample

Q17. What is an inference?

An inference is a conclusion that is reached without 100% certainty

Appendix

Scenario 1

Imagine the survey on living conditions among families with an immigrant background in Ringerike.

- Sampling technique:
  - **Population** is divided into the main categories – age, gender, immigrants background
  - **Age**- (for example) younger population (<25), middle population (<50), older population (>50)
  - **Gender**- male, female
  - **Immigrants background**- Poland, Bosnia and Herzegovina, Kosovo, Turkey, Iraq, Iran, Afghanistan, Pakistan, Sri Lanka, Vietnam, Eritrea and Somalia, etc.
  - **Family conditions**- Single, married, kids, no kids, etc.
  - This could represent the living conditions among families with an immigrant background
- Solution:
  - Clustered sampling = randomly sample family conditions (primary sampling unit) then randomly sample immigrants' background, age and gender (secondary sampling unit).
  - Stratifying and oversampling certain groups

Scenario 2

An investigation of student opinions about the school moving to another site.

- Sampling technique
  - Gender- male, female
  - Age 13-18
  - Grade-8,9,10,11,12