

ADM2303E Statistics for Management

Assignment 5 part 2

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This assignment (Part 1 and Part 2) conforms to the rules on academic integrity of the University of Ottawa:

Typed name in place of Signature: Brandon Blacquiere

Assignment 5 Part 2

Question 1

Plan

During the second half of every month Statistics Canada conducts the labour force survey to find out peoples employment status so they may then try and make estimation on the unemployment rate of the country. Generally around 50,000 households are surveyed after which the data is analyzed and then reported to the public. We have been tasked with designing such a survey so that we will get a fair and accurate representation of the population.

Do

Who: The 50,000 Canadian households

What: Collect the employment data representative of all Canadians.

Specific: - Rate of unemployment

- Employees' work shifts compared to other industries

- Hours worked

When: The survey will be conducted during the second half of every month

Where: Surveys can be conducted online, telephone and mail throughout all parts of the country

Why: Collect information about the Canadian economy like number of hours worked, and rate of unemployment.

How: Through Stratified Random Sampling, sampling different demographics in the Canadian economy.

What is the population interest?

The population of interest are all Canadian households.

Why might it be difficult to select a simple random sample from this sampling frame?

Using the simple random sample method for this sampling frame would be difficult as it would be hard to reflect the entire Canadian economy, because the survey might not cover important areas of the sample to represent the economy as a whole. Some issues might arise from this method such as missing entire demographics, and having contradictory information.

What sampling technique would you use to ensure that we have a representative sample?

I would use the stratified random sampling technique to ensure that all the results will be representative of people from different demographics, provinces and territory. This would ensure that the data collected is representative of the entire Canadian economy and not just from certain groups of people.

Report

After examining of all the different sampling techniques available it is clear that in order to get the best representation we should go with a stratified random sampling technique. This would allow us to split up the country so we can get an equal distribution or responses from everyone.

Assignment 5 Part 2

Question 2

Plan:

The Sport's club I am employed by is currently looking at whether or not it would be worth joining MBNA's affiliates program. Since the market is already oversaturated we have decided to look at one of our competitors who had a take up rate of 4.3% when they started. Since both of our clubs are fairly similar the consensus is that the take up rate would be roughly the same for our particular club as well. The president is only willing to join the program if the proportion of people signing up for the card is over 3%. So using 4.3% as our population proportion we will conduct a survey and calculate the probability that at our particular club more than 3% will sign up.

We will do so by assuming the following,

Assumptions:

1. 4.3% is the acceptance rate is the population proportion of the other club
2. Both clubs have similar patrons
3. Both clubs share a population proportion of acceptance (4.3%)

Do:

Step 1: Calculate the standard deviation

$$\sigma = \sqrt{\frac{(P)(Q)}{N}}$$

$$\sigma = \sqrt{\frac{(0.043)(0.957)}{100}}$$

$$\sigma = \sqrt{\frac{0.041151}{100}}$$

$$= 0.0203$$

Step 2: Find the probability more than 3% will accept the new card

$$P[P > 3] = 1 - P \left[Z < \frac{P - \mu}{\sigma} \right]$$

$$= 1 - P \left[Z < \frac{0.03 - 0.043}{0.0203} \right]$$

$$= 1 - P \left[Z < \frac{-0.013}{0.0203} \right]$$

$$= 1 - P [Z < -0.64]$$

Step 3: Find the corresponding probability using the calculated Z score

$$= 1 - 0.26$$

$$= 0.74$$

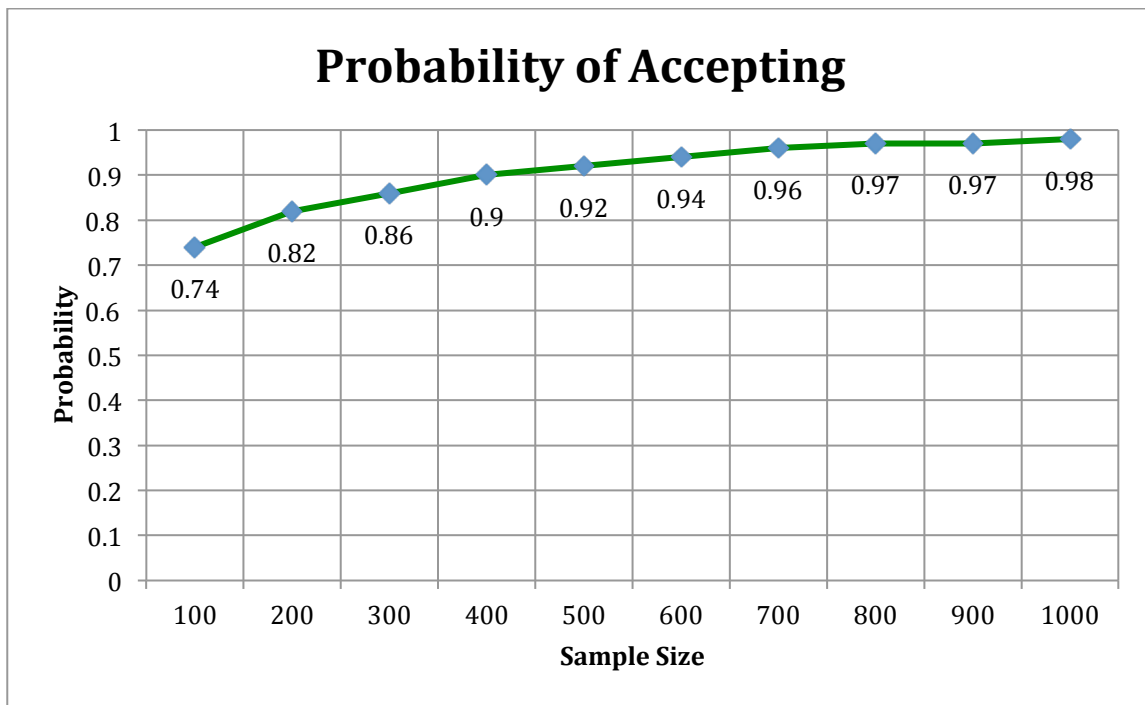
Report:

Therefore from the calculations above we can see that the probability of more than 3% of our population accepting the new card would be 74% with a population size of 100.

From this we know there is a fairly good chance of more than 3% signing up however this was calculated by only looking at a population size of 100 The following chart shows how this population changes as we increase our population size in increments of 100:

Sample	Standard Deviation	Z-Score	Probability	1 - P
100	0.0203	-0.64	0.2611	0.74
200	0.0143	-0.90	0.1841	0.82
300	0.0117	-1.10	0.1357	0.86
400	0.0101	-1.28	0.1003	0.90
500	0.0090	-1.43	0.0764	0.92
600	0.0082	-1.56	0.0594	0.94
700	0.0076	-1.69	0.0455	0.96
800	0.0071	-1.81	0.0351	0.97
900	0.0067	-1.92	0.0274	0.97
1000	0.0064	-2.02	0.0217	0.98

From the chart we can also graph the corresponding results:



We can clearly see that as our population size increases the probability of more than 3% of our members accepting also increase as is expected. The sample size I would recommend would vary depending on how large our club is if it has a lot of members a sample size of 100 would probably be enough however to be safe I would probably go with a sample size of around 500 assuming the cost is not too high to do so this would give us a fairly accurate probability. It looks as we increase even more the probability will continue to get closer and closer to 100% so assuming our club has more than 1000 members it would almost be guaranteed that more than three percent of our members would sign up for the program. Therefore the president should go ahead with the program.