Comparison of Basic Sampling Techniques: Simple Random Sampling and Systematic Random Sampling

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Abstract: **Sample is a fractional part of population. Sampling is the act of selecting sample from whole population for required information in order to take decision. Sampling techniques are the methods used to select samples from whole population which are in two ways probabilistic and non-probabilistic sampling. Two probabilistic sampling techniques were compared in this paper, simple random sampling with use of random number table to select samples and systematic random sampling with fixed sampling interval to other take samples after first randomly selected sample. The standard error value of simple random sampling is the least compared to that of systematic random sampling and therefore simple random sampling technique gives the best precision.**

Keyword: **Sample. Sampling technique, Population, Standard error and precision**

I. INTRODUCTION

Sample is a fractional or subset of population and its finite. Sampling is the process of selecting sample within entire population to provide sufficient information necessary to take a decision. Sampling unit is an item on which measurement can be taken Schreuder and et.al (1993). There are methods for sample selections from population which are refer to as sampling techniques. Sampling techniques are of two types namely probabilistic and non-probabilistic sampling techniques. Probabilistic sampling techniques is a method that utilizes form of random selection while non-probabilistic does not make use random selection but subjective judgment Wretman (2010). In this paper, we shall consider two probabilistic sampling Simple random sampling and systematic random sampling.

Simple random sampling is a technique whereby every sampling unit has equal chance of being selected. Cochran (1999). There are two procedures to simple random sampling, first through the use of hat method by assign number to every sampling unit and without looking pick sample till require size is taken; second through the use of random number table or random number generator.

Systematic random sampling is the act of sample selection from population with the use of fixed sampling interval after selecting a random starting point Cochran(1999), Gregoire and Valentine(2008). The procedure is to obtain sampling interval k=N/n, select first sample between 1 and k using random number table and the subsequent samples through fixed sampling interval.

Table 1: Simple random sampling Systematic random sampling

Advantage	Disadvantage	Advantage	Disadvantage
1 it gives each sampling unit equal probability of selection 2 it is basis for occurrence of others sampling techniques 3 selection of sample is not predetermine (biased)	1 it consumes time and 2 it involves a lot of effort and capital	1 sample is easier to draw 2 sample is selected without mistake 3 cost reduction and spreads over entire population.	1 it does not give every sampling unit chance of being selected 2 data manipula tion is of high risk 3 sampling pattern can be detected.

II. DATA FOR SAMPLE SELECTION

Ten companies were selected in order to ascertain profit declaration of thirty companies in a financial year using simple random sampling and systematic random sampling.

Table 2: Profit Declaration of Thirty Companies

No	1	2	3	4	5	6	7	8	9	10	11	12
Profit(in millions)	4	3	2	5	2	3	0	4	3	1	3	3

No	13	14	15	16	17	18	19	20	21	22	23	24
Profit(in millions)	5	2	4	3	1	3	3	3	2	3	4	2

No	25	26	27	28	29	30
Profit(in millions)	3	4	3	5	2	5

2.1 Sample Selection using Simple Random Sampling

Procedure

Assign number to sampling unit members in the population

Used random number table to select below samples

Table 3: Selected Sample with Simple Random Sampling

No	29	25	2	17	7	20	30	21	22	26
Sample(#000000)	2	3	3	1	0	3	5	2	3	4

2.2 Sample Selection using Systematic Random Sampling

Obtain sampling interval k

Select first sample randomly between 1 and k

Select subsequent samples with a fixed sampling interval k

Table 4: Selected Sample with Systematic Random Sampling

No	2	5	8	11	14	17	20	23	26	29
Sample(#000000)	3	2	4	3	2	1	3	4	4	2

Table 5: Result of Data Analysis

	Mean	Standard Error
Simple Random Sampling	2.6	1.43
Systematic Random Sampling	2.8	1.54

III. RESULT

The result from table 2 for simple random sampling shows that sample selected are random using random number table and from table 3 for systematic random sampling shows that after first randomly selected sample subsequent samples were selected with a fixed sampling interval. Both table 2 and table 3 for simple random and sampling and systematic random sampling respectively have some samples in common which are sampling unit number 2, 17, 20 26 and 29. From table 4 the mean values are 2.6 and 2.8 for both simple random and sampling and systematic random sampling respectively; and the values of standard error are 1.43 and 1.54 for both simple random and sampling and systematic random sampling respectively.

IV. DISCUSSION

From the result, it shows that both simple random and sampling and systematic random sampling techniques used selected some different sampling unit number due to fixed sampling interval used by systematic random sampling technique even after first starting random number. It also shows that simple random sampling technique is more precise than systematic random sampling technique due to its least standard error value.

V. CONCLUSION

Based on the above data analysis, it was concluded that simple random sampling technique is the better technique to select sample because it gives the best precision and because of unbiased towards each sampling unit for probability of selection.

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