

Chapter 5

Use of Random Number Table for Sample Selection



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Abstract

The use of the random number table is unknown by many individuals engaged in research. However selection of elements or members of a sample remain very crucial to the data to be collected. Bias in research is expected to be reduced to the barest minimum if it cannot be outrightly eliminated. Due to this random numbers, for that matter the random table is used to help or aid the selection of members of sample for a given population. The way and manner the table is used in achieving this has been demonstrated in this chapter. Though the tables exist, appropriate Excel Application functions can be used to generate specific random numbers that can be assigned to subjects to help with sample selection. The chapter gives an in-depth knowledge on how the table and the Excel Application can be used to generated random numbers for the purposes of sampling from a given population.

Keywords

Random, Number, Sample, Probability, Population

5.1 Introduction

A random number is that which is based on probability distribution rather than any deterministic approaches or basis. Thus it has no definite plan or formula for its determination. It thus presupposes that random numbers occurrence is based on chances and therefore no manipulation can be done by the researcher in making them appear for selection. This thus satisfies one of the basic characteristics of research that it must be *unbiased*. It is to this end that the use of random number table and its application to the selection of sample from a given population is crucial to the data to be collected and analysed to provide an *empirical evidence* – another characteristics of research.

Use of the random number table

The random number table is a table with various generated numbers which can be used in sampling of objects from a given population given the required sample size. Assuming the sample size is determined as nineteen (19) from a population size of twenty (20), one can assign numbers from 1 to 20 to the objects or subjects within the population. Once this is done, the researcher can open a page of the random number table and close his or her eyes to point any number in the table.

Table 5.1 *Random Number Tables.*

91005	44463	22662	65905
<u>13000</u>	<u>15389</u>	<u>20013</u>	67770
<u>04444</u>	75941	65905	<u>13557</u>
67909	61149	<u>11268</u>	<u>18850</u>
<u>09999</u>	41417	55100	69440
47489	28357	<u>10806</u>	<u>14570</u>
52000	<u>16783</u>	<u>19015</u>	66164
78888	30950	94820	29881
24414	52995	44157	28660

Assuming the researcher opens to the page with the random numbers above, he or she would close the eyes and point to anyone of them. Taking for instance that the researcher points to 65905 as marked red in the table; because the possible numbers to be selected based on the population size under consideration are expected to be from 1 to 20. Therefore only the first two digits of the numbers are to be considered from the table. In applying this principle, the number marked red would be ignored because the two first digits - 65 would not make it fall under the population size of 1 - 20. The researcher can move through the table and then select random numbers that qualify to be selected as indicated in the table with bold fonts and underlined. The researcher is expected to go through the random table till all the first nineteen 19 random numbers are obtained. Once the first nineteen (19) random numbers are obtained, it presupposes that the objects or subjects within the population assigned the numbers obtained from the random table have been selected to constitute the sample.

Use of Excel Application to generate Random Numbers

The Excel application can be used to generate random numbers that can be assigned to objects of a population for the purposes of selecting samples. In order to use the random number, one needs to use the appropriate commands to generate the numbers before they are randomly assigned to objects or subjects within the population.

For one to generate the random numbers for using EXCEL Application the following commands or functions can be applied:

Type in a cell: = RAND ()

This function when typed into the cell and the enter button pressed would generate random numbers with decimals. One can choose to ignore the decimals

and used the numbers or integers. It implies that the researcher is to select the numbers that appear and fall within the domain of the population until the sample size is attained. The subsequent numbers that appear after the sample size is reached or attained can be ignored.

Using the function above would generate the following random numbers when the cells are dragged over a range:

Table 5.2 *Random Numbers Generated.*

0.84119	0.41447	0.96359	0.79984
0.09976	0.29623	0.84550	0.26919
0.64255	0.45713	0.49517	0.58345
0.30392	0.58731	0.73212	0.81216
0.22872	0.49228	0.39392	0.71131
0.56884	0.21029	0.40610	0.01592
0.80367	0.01590	0.66877	0.26521
0.82651	0.76603	0.06450	0.01026
0.67440	0.14069	0.62185	0.20182
0.03624	0.75226	0.28048	0.12603
0.73470	0.21909	0.61547	0.84535

Thus ignoring the decimal points in Table 5.3 would change to:

Table 5.3 *Discarding Decimal Points from Random Numbers.*

84119	41447	96359	79984
09976	29623	84550	26919
64255	45713	49517	58345
30392	58731	73212	81216
22872	49228	39392	71131
56884	21029	40610	01592
80367	01590	66877	26521
82651	76603	06450	01026
67440	14069	62185	20182
03624	75226	28048	12603
73470	21909	61547	84535

Therefore assuming the researcher is selecting a sample size of 10 from a population size that is from one (1) to twenty (20), the subjects assigned the numbers underline in the table from the first to the tenth would be selected to constitute the sample size.

However in order to eliminate the decimal using a function and the number of digits being considered, the following functions are appropriate:

Type into the cell: = INT (RAND()*(10-1) + 1)

When this command is type in a cell and the enter button is pressed, it would churn out an integer and when the cell is drag over a range, it would give random integers ranging from 1 and 10. Thus if a sample size is to be selected from a given population, the first random numbers that appear till the sample size is attained or reached are selected. Sample of numbers generated by applying above function is given below:

Table 5.4 *Generating Single Digits Random Numbers.*

7	4	4	5	5
9	1	6	6	5
8	2	7	7	9
4	4	1	2	9
5	8	3	6	6
1	6	3	5	7
7	8	1	5	4

It should however be noted that the same number cannot be assigned more than once to a subject or an object within a population and also the numbers are assigned prior to using the random numbers to select them. Therefore each and every member of the population has equal chance of being selected and can be selected only once.

Type into the cell: = INT (RAND()*(100-1) +2)

This function when applied in the same way would generate random integers ranging from 1 and 100, eliminating the decimals. Applying this function the following random numbers are churned out with the dragging of the cells:

Table 5.5 *Generating Double Digits Random Numbers.*

16	56	64	54	50
65	51	94	55	22
40	57	92	19	19
80	32	98	60	66
18	29	65	10	77
18	4	35	73	92

Type into the cell: = INT (RAND()*(1000-1) +3)

This function when applied would generate random integers ranging from 1 and 1000.

Table 5.6 *Generating Triple Digits Random Numbers.*

675	536	481	545
507	13	526	404
902	693	889	826
397	917	737	687
166	819	368	207
578	642	190	474
620	396	198	910

Type into the cell: = INT (RAND()*(10000-1)+4)

This function when applied would generate random integers ranging from 1 and 10000.

Table 5.7 *Generating Four Digits Random Numbers.*

6147	9287	8660	401	671
6182	6098	8102	5868	8379
1995	4846	4875	32	8884
1662	7512	1272	3770	2442
1886	8554	9858	8320	8859
6274	8052	5219	4765	6159

5.2 Random Numbers Generation with Population Sizes

Type into the cell: = INT (RAND()*200)

Once the population size is known, it can be used in generating the random numbers such that the random numbers are selected starting from the first till the total number of the sample is reached or attained. Thus assuming the population size is 200, when the function above is entered into a cell and dragged over a range the following random numbers are generated and can be selected from the beginning until the sample size is attained:

Table 5.8 *Generating Random Numbers from using a Sample Size.*

128	175	10	35	7
146	85	113	120	55
46	35	156	63	77
143	52	23	154	59
15	166	182	58	35
159	149	163	159	47
119	117	181	133	105
167	27	189	67	29

5.3 Assigning of Random Numbers to Subjects or Objects within a Population

In order to select a sample from a given population, the sample size determined determined with an appropriate formula demonstrated in the earlier chapter. The subjects or objects are then assigned a number by the researcher. Once this is done, the random numbers can be obtained and those that appear from the first until the number expected in the sample size is attained. Once the random numbers are selected it means subjects or objects within the population with numbers assigned corresponding with the random numbers selected would constitute the sample.

Assuming the researcher is to sample from a given population size of 20 and using the appropriate formula, the sample size must be obtained first.

Considering the members or subjects of the population to be the first 20 English alphabets, the research can assign each of them the numbers from 1 to 20, starting from A to T as shown in the table below:

Table 5.9.1 Table Illustration of Members of Sample Selected from a given Population.

¹ [A]	² [B]	³ [C]	⁴ [D]	⁵ [E]	⁶ [F]	⁷ [G]	⁸ [H]	⁹ [I]	¹⁰ [J]
¹¹ [K]	¹² [L]	¹³ [M]	¹⁴ [N]	¹⁵ [O]	¹⁶ [P]	¹⁷ [Q]	¹⁸ [R]	¹⁹ [S]	²⁰ [T]

From the table the letters represents the subjects or objects within the population from which the sample must be taken. The sample size of 19 was determined using the formula below:

$$n = \frac{N}{1 + N(\text{level of } s\text{g}f.)^2}$$

$$n = \frac{20}{1 + 20(0.05)^2}$$

$$n = \frac{20}{1 + 20(0.0025)}$$

$$n = \frac{20}{1 + (0.05)}$$

$$n = \frac{20}{(1 + 0.05)} = \frac{20}{1.05} = 19.04 \cong 19$$

Using the random number table, the researcher can open and point to any number at all on it as a starting point for selection. Now the eyes can be opened to check whether the number pointed falls or does not fall within the population assigned numbers. The researcher can select the number if it falls within the assigned numbers of the population or otherwise ignore it and move to the next number until the total number for the sample is selected.

When the Excel Application is to be used instead of the random table, the function: = INT(RAND()*(20)) can be typed into an EXCEL cell with the enter button pressed and then cell dragged until the sample size is obtained. When this is done random numbers as found below would be generated:

Table 5.9.2 *Generated Random Numbers to be used for Sample Selection.*

4	7	1	19	5
8	11	4	12	14
7	3	4	11	1
18	14	12	12	2
7	12	6	1	14
17	17	9	1	5
5	18	0	16	16
10	9	3	11	18
0	15	4	8	18
19	13	12	13	14
7	16	12	0	3
1	5	19	3	6

Form these random numbers the numbers underlined are those that have been selected. It should be noted that each of the random numbers can be selected once and the rest of the numbers that are same ignored once the first of its kind is selected. The random numbers selected are then corresponded to the numbers assigned the subjects or objects within the population and then practically selected to constitute the sample to be study as per the given population understudy. Thus the objects or subjects selected within the population are indicated in the table in bold font. Within the table only subject represented with letter [J] that had not been selected.

Table 5.9.3 *Members Selected to Constitute Sample.*

¹ [A]	² [B]	³ [C]	⁴ [D]	⁵ [E]	⁶ [F]	⁷ [G]	⁸ [H]	⁹ [I]	¹⁰ [J]
¹¹ [K]	¹² [L]	¹³ [M]	¹⁴ [N]	¹⁵ [O]	¹⁶ [P]	¹⁷ [Q]	¹⁸ [R]	¹⁹ [S]	²⁰ [T]

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