Design of Research Studies-SST 501

Assignment Two

**The Question:-**

In reference to your practical experience explain how the following experimental designs will be used

• Split-split plot arrangement in a RCBD

• Incomplete block design

• Factorial block design

**Split-split plot arrangement in a RCBD:-**

These designs usually have three different sizes or types of experimental units. The split-split plot design is often employed in a randomized complete block design, In a 3-factor factorial, for example, it is possible to assign Factor A to whole plots, then Factor B to split-plots within the applications of Factor A, and then split the experimental units used for Factor B into sub-sub-plots to receive the levels of Factor C.

A quick example is a maize cultivation field a researcher can be testing the effects of irrigation,fertilizers and the type of seed used to grow the maize. Since irrigation is done before the cultivation to prepare the soil the growth of the maize can take months before any studies can be made on it .Hence testing the irrigation levels is difficult and time consuming.

Hence making this factor very hard to change. On the other hand changing fertilizers can be hard to change through and through but changing the type of seed is easy.

In this specific example the whole plot experimental units are the level of irrigation becoming factor A. The split plot experimental units are the types of fertilizers becoming factor B and the split-split experimental units are the type of seeds becoming factor C.

**Incomplete block design:-**

In an incomplete block design you cannot assign all of the treatments in each block. This means that for each block a treatment is not included so as to test the variability of the block in the absence of that treatment.

A quick example involves a study to see how vaccination shots affect their overall growth. A sample of 4 kids where they have 4 different vaccinations ie tetanus,whooping cough,polio and diphtheria. The first kid is given all vaccines except tetanus,the second kid is given all vaccines except whooping cough,the third child is given all vaccines except polio and the fourth kid is given all vaccines except diphtheria. This is the incomplete block design.

**Factorial block design:-**

A design in which every setting of every factor appears with every setting of every other factor is a full factorial design. A common experimental design is one with all input factors set at two levels each. These levels are called `high' and `low' or `+1' and `-1', respectively. A design with all possible high/low combinations of all the input factors is called a full factorial design in two levels. If there are k factors, each at 2 levels, a full factorial design has 2k runs.

This means that all the factors can be easily changes.

A quick example of students one might be interested to know if gender and difficulty of test affect performance on the test. So now the researcher has to look at how each independent variable affects the dependent variable(performance on the test), but also how the combination of the independent variables affect the dependent variable.The more the factors the bigger the design gets.