

RANKED SET SAMPLING: YESTERDAY, TODAY AND TOMORROW

O. OZTÜRK

ABSTRACT. Simple random sampling (SRS) design is one the basic sampling procedures commonly used in observational studies. SRS is appealing to researchers for two reasons. It is simple to use and it does not have any selection bias. On the other hand, SRS design may not be desirable in settings where a full measurement of a unit is time consuming or expensive while ranking a few set of units is easy and cheap. In these settings, researchers usually have additional auxiliary information to rank the units without a full measurement. This auxiliary information is used to identify the relative position (approximate ranks) of each experimental unit in the set. A relatively new sampling design, ranked set sampling, uses these approximate ranks to construct a sample that represents the population better than a simple random sample.

In order to construct a ranked set sample, one needs to select n sets of units, each of size m . Units in each of these n sets are ranked from smallest to largest without a measurement. Ranking can be performed based on visual inspection, concomitant variable, or any other means that does not require a full measurement. The i -th ranked unit, $i = 1, \dots, m$, is fully measured in n_i sets, such that $\sum_{i=1}^m n_i = n$. These fully measured units are called a ranked set sample.

Ranked set sampling is a relatively new sampling design that has a potential to be used in environmental, ecological, biological, medical, social, agricultural sciences as well as business applications. In this lecture, I will provide a historical background on ranked set sampling. I will talk about the motivation behind the original idea, provide a detailed tutorial on different variation of sampling design. I will also provide example for its use in different research fields such as medicine, agriculture, business and environmental sampling. I will then go through the theoretical development of statistical inference based on ranked set sampling. This talk will be at a level that is appropriate to the graduate and advanced level under graduate students.

OHIO STATE UNIVERSITY
(SEMINAR GIVEN AT EGE UNIVERSITY, JUNE 2011, IZMIR - TURKEY)
E-mail address: omer@stat.osu.edu