

Four experiments determine the moisture content of samples of a powder, each man taking a sample from each of six consignments. The assessments are

Observer	Consignment					
	1	2	3	4	5	6
1	9	10	9	10	11	11
2	12	11	9	11	10	10
3	11	10	10	12	11	10
4	12	11	11	14	12	10

Formula :-

Statistical model

$$x_{ij} = \mu + \alpha_i + \epsilon_{ij}$$

$$\begin{aligned} \text{Total S.S.} &= \sum_i \sum_j (x_{ij} - \bar{x}_{..})^2 \\ &= \sum_i \sum_j x_{ij}^2 - \left(\frac{\sum_i \sum_j x_{ij}}{N} \right)^2 \\ &= \sum_i \sum_j x_{ij}^2 - \frac{G^2}{N} \end{aligned}$$

where G is the grand total of all the obserⁿ.
and $N = n_1 + n_2 + \dots + n_k$

The expression $\sum_i \sum_j x_{ij}^2$ i.e. sum of the squares of all the obserⁿ is known as Row sum of squares and the expression $\frac{G^2}{N}$ is called the correction factor (C.F.).

$$\text{Total} = \text{R.S.S.} - \text{C.F.}$$

$$\begin{aligned} \text{Error S.S.} &= \sum_i \sum_j (x_{ij} - \bar{x}_{..})^2 = \sum_i \left[\sum_j x_{ij} - \bar{x}_{..} \right]^2 \\ &= \sum_i \sum_j x_{ij}^2 - \sum_i \left(\frac{T_i^2}{n_i} \right) \end{aligned}$$

where

T_i is the total yield from the units receiving the i th treatments

$$\text{Treatment S.S.} = S.S.T. = T.SS - S.S.E$$

$$= \frac{\sum T_i^2}{n_i} - C.F.$$