

## Load .xlsx

- Add an expert opinion worksheet from the Microsoft® Excel® spreadsheet workbook '.xlsx' in the 'List.xlsx' box, Microsoft® Excel® spreadsheet should be only in the numeric data with  $n \times n$  array size matrix.

A pairwise comparison matrix is created by the experts on condition that judgments are evaluated to find suitable alternatives to estimate the associated absolute numbers from 1 to 9, the fundamental scales of the AHP (Saaty 1980).

$$Aw = \begin{bmatrix} 1 & p & q \\ 1/p & 1 & r \\ 1/q & 1/r & 1 \end{bmatrix}$$

- Normalize (Nw) the pairwise comparison matrix by dividing the elements of each column by the sum of the elements of the same column.
- Compute the consistency index (CI):

$$CI = \frac{\lambda_{\max} - n}{n - 1}$$

- Where n is the number of items being compared, and  $\lambda_{\max}$  can be defined as the eigen value max of Aw and Nw
- Compute the consistency ratio (CR):

$$CR = \frac{CI}{RI}$$

- Where RI is the random consistency index, which is the consistency index of a randomly generated pairwise comparison matrix. It can be shown that RI depends on the number of elements being compared.

The adjustment of the pairwise matrix values is used applying a reconstruction method, where the technique follows several steps:

- Find the greatest  $E_{ij}$ , where  $E_{ij} = a_{ij} * w_j \setminus w_i$ .  $a_{ij}$  denotes the element of  $i$ th line and  $j$ th column of the inconsistent matrix,  $w_i$  is defined by the criterion  $i$  weight, and  $w_j$  represents the criterion  $j$  weight.
- The farthest value of one  $E_{ij}$  is selected,  $a_{ij}$ ,  $a_{ji}$  are replaced by 0, and both diagonal entities correspond to 2.
- The eigenvector of this new matrix is computed, and the inconsistent element is replaced by  $w_i \setminus w_j$ , where  $w_i$  and  $w_j$  are  $i$ th and  $j$ th weights of the new priority vector, respectively.
- This new value is changed by the nearest Saaty scale value, it is applied to the origin pairwise matrix, and CR is again calculated.