

FORMULA FE02: Non-compensatory weighted geometric mean

Given a sample set of material topics $s_1, s_2, s_3, \dots, s_n$, with corresponding weight coefficient $\omega_1, \omega_2, \omega_3, \dots, \omega_n$, and inner thresholds of $s_{i \text{ (min)}}$ and outer threshold $s_{i \text{ (max)}}$.

Normalized material topics and weights are calculated as follows:

$$\tilde{s}_i = |(s_i - s_{i \text{ (min)}}) / (s_{i \text{ (max)}} - s_{i \text{ (min)}})| = \left| \frac{(s_i - s_{i \text{ (min)}})}{(s_{i \text{ (max)}} - s_{i \text{ (min)}})} \right|$$

$$\tilde{\omega}_i = \omega_i / \sum_{i=1}^n \omega_i = \frac{\omega_i}{\sum_{i=1}^n \omega_i}, \text{ where } \omega_i \in \mathbb{R}^+$$

Thus, the sustainability performance indicator (SPi) for material topic i is:

$$SP_i = \tilde{s}_i \cdot \tilde{\omega}_i \quad \text{-- equation (1)}$$

The weighted geometric mean (WGM) using invariant normalized material indices formula is:

$$WGM \stackrel{\text{def}}{=} \sqrt[n]{\prod_{i=1}^n \tilde{s}_i \cdot \tilde{\omega}_i}$$

\therefore the sustainability performance score (SPS) for enterprise e is:

$$SPS_e = \left(\prod_{i=1}^n \tilde{s}_i \cdot \tilde{\omega}_i \right)^{\frac{1}{n}} \quad \text{-- equation (2)}$$

Where

e is the enterprise under consideration,

n is the list of material topics under consideration,

and \tilde{s}_i and $\tilde{\omega}_i$ are calculated as shown above.

For ease of implementation equation (1) has been transformed to:

$$e^{AVG(\ln(\tilde{s}_i \cdot \tilde{\omega}_i))} \text{ or more generally } m^{AVG(\log_m(\tilde{s}_i \cdot \tilde{\omega}_i))} \quad \text{-- equation (3)}$$

Where $m \in \mathbb{N}$

and AVG is the average or arithmetic mean function in SQL.