

Operations Management

Indications for correct rounding

Leitmotif I: Avoid consequential errors

Rounding errors have a critical effect when dividing by generously rounded values.

Example:

$$a = \frac{1}{11}, b = 250, c = \frac{b}{a}$$

Calculated with fractional numbers, the result is:

$$c = \frac{250}{\frac{1}{11}} = 2750$$

Using decimal numbers rounded to one decimal place instead results in an obvious rounding error:

$$c = \frac{250}{0.1} = 2500$$

Therefore, the following procedure is recommended:

- If possible, calculate with fractional numbers.
- When using decimal numbers, round carefully so that the rounding error remains small in subsequent calculations

Leitmotif II: Rounding so that the economic advantage is maximized

In some decision-making situations in operations management, decimal fractions have to be rounded to integers. For example, it is not possible for a car dealer to order 25.38 cars. In such cases, it must always be checked whether rounding up or rounding down leads to a better result. In the above example, this means that it is necessary to calculate whether the profit is greater for an order of 25 or 26 cars.

Leitmotif III: Rounding to the safe side

Operations managers generally prefer to be on the "safe side". This can be transferred to rounding. For example, when it comes to determining the probability of errors, rounding should be done in such a way that the greater probability of errors or the higher number of errors results.

Round-up rule when working with statistical tables

- If the probability that is looked up in a statistical table falls between two values, then the one with the greater probability is used.
- If a z-value is calculated with more decimal places than can be found in a statistical table, then it is rounded up.
- If an exact value for a mean, a S or Q value, a value for r or m is not listed in a table, the next larger value is used.

Specific suggestions for rounding

- Money values are rounded to two decimal places, unless these values are very small or very large:
€ 255.38 € 0.0183 € 274,298,387
- Percentages are rounded to two decimal places:
23.65%
- Decimal fractions derived by dividing percentage values with 100 are rounded to 4 decimal places:
0.2365

- Probabilities should have 4 decimal places:
0.4398
- Expected values are never rounded to integers.

Evaluation of rounding errors

In principle, there is no point deduction for rounding errors, unless inappropriate rounding results in gross consequential errors (see also Leitmotif I) or unfair advantages in solving problems (for example, rounding up of a critical ratio $CR = 0.4729$ to 0.5 , so that $z = 0$).