

The synthesis of criteria used for harmonising the indicators - specifically detailing the evaluation, reduction, and selection steps:

1. The 4-Stage Harmonisation Filter Sequence

The methodology applies four sequential filtering stages to transition from the initial broad indicator pool (109 candidate indicators) down to the balanced final core:

- **Criterion 1: Processing-Hotspot Screening:** Candidate indicators are first evaluated and scored for their direct applicability to subsector-specific operational hotspots (meat, dairy, and fruit/vegetable/juice processing SMEs). Indicators relevant purely to primary on-farm agriculture are removed.
- **Criteria 2-3: Double Materiality Screening:** Indicators are evaluated using an ordinal scale (0 = Not significant, 1 = Moderate, 2 = High) across two parameters:
 - *Impact Materiality:* Measures the magnitude of environmental or social impacts generated by the activity.
 - *Financial Materiality:* Measures the financial risk or value creation opportunity for the enterprise.
- **Criteria 4-9: Business-Relevance Multi-Criteria Evaluation (6 Core Criteria):** The shortlisted indicators are scored on a 1–5 scale by experts against six criteria. For example, the **cost of measurement** is primarily captured within **Data Availability** (feasibility/cost of collecting data) and **Cost Impact**:

Criterion	Description	Applied Weight
4. Risk Exposure	Regulatory, supply chain, environmental, or labor/business risks.	25%
5. Strategic Alignment	Alignment with CE/sustainability goals and regulatory reporting expectations.	25%
6. Cost Impact	Direct/indirect impact on the business cost structure (including measurement/operational cost).	20%
7. Managerial Control Ability	Extent to which management can directly influence the metric with traceable evidence.	15%
8. Revenue Impact	Potential for value creation, product differentiation, or new revenue streams.	10%
9. Data Availability (Measurement Cost)	Feasibility of obtaining required data using existing systems without excessive cost/effort.	5%

- **Criteria 10-12: Fuzzy Harmonisation & Defuzzification & Ranking:** Expert ordinal evaluations (1–5) are converted into Triangular Fuzzy Numbers (TFNs) to model subjective uncertainty. The weighted fuzzy scores are defuzzified into a single centroid score to establish 4 priority ranking classes.

2. Safeguards and Structural Balancing Rules

- **Criterion 13: Compliance Safeguard:** Indicators that are mandatory by regulation or strategically essential are retained regardless of low business preference scores or high measurement costs.
- **Criterion 14: Logic-Chain Balancing Rule (3-D Structure):** To avoid over-representing easy-to-measure inputs while ignoring outputs or impacts, the harmonised framework enforces a strict balanced selection of **exactly 2 indicators per logic level per sustainability dimension** ($3 \times 4 \times 2 = 24$ core indicators in total):
 - **Dimensions (3):** Environmental, Social, and Economic.
 - **Logic Levels (4):** Input > Process > Output > Outcome/Impact.
- **Criterion 15: Symmetrical Coverage:** The framework prevents "greenwashing" (over-reporting easy input metrics like training hours or water purchased while ignoring actual outputs or impacts like COD load or financial risk reduction).

3. Technical Quality & Implementation Criteria

During the harmonisation phase, each candidate metric must also satisfy specific operational and technical implementation criteria:

- **Criterion 16: Data Traceability & Verifiability:** Priority is given to metrics derived from established, traceable business records (e.g., weighbridge tickets, utility bills, formal contracts, HR records).
- **Criterion 17: Subsector Applicability:** Metrics must be relevant to the primary operational hotspots of rural agrifood processing SMEs (specifically meat, dairy, and fruit/vegetable/juice processing).
- **Criterion 18: Normalization & Benchmark Anchoring:** Indicators must be convertible to a standardized 0–100 scale using defined lower, target, and upper ceiling reference anchors (derived from BAT/BREF standards or empirical subsector benchmarks).
- **Criterion 19: Data Coverage & Completeness Threshold:** Requires a minimum data coverage threshold (e.g., 65% of dimension weight) before dimension scores can be reliably calculated.

4. Work Force and Social Responsibility

- **Criterion 20: Employment and CE Commitment:** This criterion harmonises indicators related to workforce training in the CE sector and workforce stability across the various fields addressed by the project, as well as the ability of companies to collaborate sustainably for the benefit of communities. The targets and thresholds take into account the size of the enterprises.