

Supplementary Material to Article

Characterization of the Cradle to Cradle Certified™ Program in the Context of Eco-labels and Environmental Declarations

Nikolay Minkov ^{1,*}, Vanessa Bach ¹ and Matthias Finkbeiner ¹

¹ Technische Universität Berlin, Germany

* Correspondence: nikolay.minkov@tu-berlin.de; Tel.: +49 30 314 28 517

Table S1. Description of the attributes and their features of the adopted eco-label characterization scheme applied in the article based on Minkov et al. [1]

Attribute and features	Description
Communication characteristics	
1 ISO Typology Type I Type II Type III Undefined	Defines to which typology from the categorization of the ISO 14020 series a label ¹ is assigned.
2 Awarding format Seal Rating (non-sealed) Rating (sealed) Declaration (non-sealed) Declaration (sealed)	Defines the level of information that the consumer receives through a label. A seal provides a simple binary pass–fail information. A rating demonstrates a level of superiority. A declaration provides quantified information in a preset list of categories.
3 Multiplicity of covered aspects Single-aspect Multi-aspect	Defines whether a label cover one or multiple aspects.
4 Aspects diversity Environmental Social Health	Defines whether a label covers additional aspects different from environmental (e.g. social and/or health).
5 End-user focus Business-to-consumer Business-to-business Both	Defines the audience to which a label is focused. The end-user focus could be an important factor for the selection of e.g. the awarding format.
Scope	
6 Sector scope Sector-specific Multi-sectorial	Defines whether a label covers products from only one specific sector or multiple sectors. In the latter case, awarding criteria are usually developed for each product group individually.
7 Operation scope Product Production process/ method Organization	Defines whether a label characterizes a property of the product or a step of or the whole production process, or an achievement of an organization.
8 Geographic scope National	Defines the scope in geographical terms to which a label spreads out (i.e. is being recognized and its awarding criteria

Regional International	are valid).
9 Awarding criteria scope Product-specific Generic	Defines whether the awarding criteria are product-specific or generic (i.e. apply equally to all products under certification).
10 Materiality principle Yes Neutral No	Defines whether the awarding criteria of a label focus on the key performance characteristics of the product. This attribute is closely related to the Awarding criteria scope.
11 Life cycle (LC) perspective Non-LC based LC based LCA based	Defines the level of a product's life cycle perspective considered in the awarding criteria of a label. Non-LC based ones usually consider only a single stage or attribute of the product. LC based ones require only a qualitative LC screening of a product under consideration, whereas the analysis is undertaken on particular LC stage(s) only. LCA-based labels consider all of the relevant environmental aspects of a product and require full conformance with ISO 14040.
Standard characteristics	
12 Compulsoriness Voluntary Mandatory	Defines whether the application and use of a label is voluntary or mandatory.
13 Financing ² Fees and/or member dues Governmental subsidies Industry funding Donations Other	Defines the source or the combination of sources that a label uses for funding.
14 Purpose Ideals-centric Adversity-centric Neutral	Defines the purpose of a label. An ideals-centric label serves as a benchmark of achieving certain ideals or excellence. An adversity-centric label serves at the bottom line to show the avoidance of certain adversities, e.g. a "chlorine-free paper" label. A neutral is a declaration type of label.
15 Longevity Single-issued Renewable Improvement-based	Defines the format of expiration of a label. A single-issued label is issued once, and is never a subject of further verification again. A renewable label can be revised and reissued after expiration or after change in rules or in system elements. A reduction-based label requires a demonstration of improved performance on a regular basis in order to be recertified.
Governance characteristics	
16 Governance Governmental Quasi-governmental Private (PFP, NPO, NGO)	Defines the type of governance of a label. A quasi-governmental label is such initiated by a government, but managed by a private company. A private label can be managed by private for profits (PFP), private for non-profits (NPO) or non-governmental organizations (NGO).
17 Verification First party Second party Third party	Defines the approach to confirmation that all criteria and requirements of a label are met. First-party verification is performed by the organization that applies for the label itself. Second-party verification is done by the labeling program. Third-party verification is performed by an independent third-party verification body that could be internal or external to the applicant.
18 Awarding criteria revision	Defines whether a label sets rules for revision of the awarding

Yes, regularly Yes, randomly No	criteria.
19 Stakeholder involvement Low Medium High	Evaluates the level of involvement of stakeholders in the process of labeling program setting and update, or during the process of definition of a new product group and/or awarding criteria.
Conclusive characteristics	
20 Transparency ³ Label-setting process Awardees Funding Verification report	Evaluates the level of transparency (i.e. access to information) of a label regarding the listed features (answered with <i>yes</i> for transparent and with <i>no</i> for non-transparent).
21 Comparability Low Medium High	Evaluates the level of comparability that a label allows between certified products themselves and between awarded and non-awarded products from the same product category.
22 Environmental excellence Intended Not intended Possible	Defines whether the setting of a label is intended to promote environmental excellence through certification.

¹ A label here is used as a generalization for an environmental label, eco-label, or environmental product declaration.

² The evaluation of this attribute could result as a sum of two or more features.

³ The features of this attribute are evaluated individually.

References

1. Minkov, N.; Lehmann, A.; Winter, L.; Finkbeiner, M. Characterization of environmental labels beyond the criteria of ISO 14020-series. *Manuscript submitted for publication* **2018**.



© 2018 by the authors. Submitted for possible open access publication under the terms and conditions of the Creative Commons Attribution (CC-BY) license (<http://creativecommons.org/licenses/by/4.0/>).