

# Driving Circularity Transitions: The Circular Value-Added Productivity Indicator (CVP) by H-AIST CE Lab.

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## Executive Summary

Circular economy (CE) frameworks have historically prioritized environmental metrics, often overlooking the financial feasibility essential to broad industry adoption. The Hitachi-AIST Circular Economy Cooperative Research Laboratory (H-AIST CE Lab.) has developed the Circular Value-Added Productivity (CVP) indicator to address this critical gap. CVP is designed to assess how effectively circular activities generate financial value in proportion to their associated costs.

This white paper presents an overview of the CVP indicator's rationale, structure, and use cases. It provides a comparative assessment with established CE frameworks such as the World Business Council for Sustainable Development (WBCSD) Circular Transition Indicators (CTI) and the ISO 59000 series, emphasising how CVP fills a longstanding gap in economic evaluation. Through this enriched perspective, the white paper seeks to support policymakers, business leaders, and sustainability practitioners in deploying the indicator across varied organisational and geographical contexts.

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## 1. Introduction

Despite significant progress in circular economy implementation, the absence of harmonised, financially grounded metrics remains a systemic challenge. Current CE assessment frameworks excel in tracking material flows, waste reduction, and emissions, but often fall short in connecting these efforts to measurable financial returns.

As a result, businesses struggle to justify investments in CE interventions. This disconnect weakens the business case for circularity, undermines scalability, and reduces stakeholder engagement. CVP addresses this gap by evaluating the efficiency of financial resource use in circular operations.

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## 2. Background and Research Context

The H-AIST CE Lab., a research partnership between Hitachi, Ltd. and the National Institute of Advanced Industrial Science and Technology (AIST), is dedicated to accelerating the transition to a sustainable, resource-efficient economy. In 2023, The Lab. commissioned Yordas Group to conduct a global assessment of CE practices, challenges, and opportunities, with a particular focus on economic barriers to adoption.

Key findings from the research revealed that:

- High upfront investment and operational costs limit CE adoption

- Regulatory and financial incentives are unevenly distributed, disadvantaging developing regions
- Existing CE indicators lack granularity in financial metrics

To help organisations align circular interventions with measurable economic outcomes, H-AIST CE Lab. developed the CVP indicator.

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### 3. The CVP Formula

**CVP = Value-added from CE activities / Expenditures for CE activities**

Further expanded to:

$$\text{CVP} = (\text{Sales Revenue} - \text{Intermediate Input Costs}) / \text{Total CE Operating Costs}$$

- **Sales Revenue:** Income generated from CE activities, such as repair services, remanufacturing, or sales of recycled goods.
- **Intermediate Inputs:** Costs of goods, materials and services sourced from external suppliers.
- **CE Operating Costs:** Total costs related to CE operations, including labour, logistics, depreciation.

This formula enables organisations to calculate the return on their circular economy investments, expressed as the net value generated for every unit of cost incurred.

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### 4. Use Cases and Application Scope

#### 4.1. Sectoral Applications

- **Manufacturing and Remanufacturing:** Use of secondary materials, disassembly of end-of-life products, modular product design
- **Logistics and Retail:** Reverse logistics, resale of refurbished products
- **Services and Utilities:** Leasing models, resource-sharing platforms, Product-as-a-Service (PaaS)

#### 4.2. CE Loops Mapping

The CVP indicator quantifies contributions across:

- **Narrowing Loops:** Reducing input use
- **Slowing Loops:** Extending product life through repair and remanufacturing
- **Closing Loops:** Recycling and Material Recovery

Through a holistic approach CVP can capture economic value across different CE strategies and stages.

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### 5. Comparative Framework Analysis

#### 5.1. WBCSD Circular Transition Indicators (CTI)

CTI provides a self-assessment framework focused on material flows and environmental goals. While CTI includes indicators like Circular Material Productivity

(CMP) and CTI Revenue, it does not incorporate operating costs or investment needs—key elements captured by CVP.

## 5.2. ISO 59000 Series

ISO 59020 introduces economic indicators such as Net Value Added and Resource Productivity. However, these remain optional and lack detailed guidance for tracking CE-specific investments. CVP bridges this gap with its dedicated focus on circular investment economics.

## Integration Potential

CVP can be integrated into the “Value the Loop” module of CTI and complement ISO 59020 assessments. It enhances financial granularity, enabling more informed investment and policy decisions.

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## 6. Strategic Implications

CVP addresses a fundamental need for financially robust CE metrics. It supports:

- **Business Planning:** Demonstrating return on circular investments
- **Policy Development:** Informing incentive design and funding allocation
- **Benchmarking:** Enabling regional, sectoral, and organisational comparisons

By quantifying productivity gains linked to circular strategies, CVP strengthens the business case for CE and encourages adoption in traditionally cost-sensitive sectors.

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## 7. Conclusion

The Circular Value-Added Productivity (CVP) indicator, developed by H-AIST CE Lab., fills a critical gap in the current CE measurement landscape. By accounting for both the costs and benefits of circular strategies, CVP empowers companies, policymakers, and investors to make data-informed decisions aligned with long-term sustainability goals.

Its potential compatibility with established frameworks like CTI and ISO, coupled with its flexibility across sectors, makes CVP a powerful tool for enabling the next phase of CE adoption. With further piloting and stakeholder input, CVP has the potential to evolve into a globally applicable indicator for evaluating economic value associated with circular transitions.

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## 8. About H-AIST CE Lab.

H-AIST CE Lab. is a joint research centre established by Hitachi, Ltd. (Hitachi) and the National Institute of Advanced Industrial Science and Technology (AIST) that aims for a CE-based society wherein resources are used efficiently throughout the entire value chain and across industries.

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## Acknowledgement

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## References

- [WBCSD Circular Transition Indicators \(CTI 4.0\)](#)
  - ISO 59000 series ([ISO 59020](#), [ISO 59010](#))
  - [H-AIST CE Lab.](#)
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### H-AIST CE Lab.

<https://unit.aist.go.jp/hitachi-cecrl/en/index.html>



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