



Evaluating Circular Economy Concept and Waste Regulation Norms in Gorontalo Province

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Abstract

Regional waste regulation must respond not only to waste collection and disposal but also to the structural causes of material loss across product life cycles. This article examines the extent to which Gorontalo Provincial Regulation No. 3 of 2013 on Waste Management aligns with contemporary circular economy principles, using normative legal research through statutory and conceptual approaches. Primary legal materials were analyzed through a normative-conceptual fit evaluation that considers the clarity, depth, consistency, operational capacity, targets, supervision, and consequences of non-compliance across eight circular economy dimensions. The regulation demonstrates high alignment in waste prevention, material-cycle closure, and supporting governance; moderate alignment in product-value maintenance, resource efficiency, the life-cycle approach, and producer responsibility; and low alignment in product lifespan extension, particularly durability standards, the right to repair, spare-parts availability, and remanufacturing. Several of these gaps concern matters that lie outside provincial authority. The regulation thus reflects partial rather than comprehensive alignment with the circular economy framework. Harmonization is recommended through a revision of the regulation that positions the waste management hierarchy as a guiding principle, an implementing gubernatorial regulation on targets, reporting, and information systems, and policy advocacy to the central government on product-standardization matters beyond provincial competence.

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1. Introduction

The increase in waste generation has developed into one of the most complex environmental issues in contemporary development governance. Population growth, urbanization, changes in consumption patterns, and the expansion of short-lived goods production have increased pressure on environmental capacity and waste management infrastructure. The issue is not only related to the continuously increasing volume of waste but also to the economic model underlying the processes of production and consumption. The linear economic model operates through a pattern of resource extraction, production, consumption, and disposal, without ensuring that the material value is retained after the product is no longer in use. The take, make, and dispose pattern ignores the limitations of natural resources and places the final processing site as the main destination of material in the economic system.¹ Modern lifestyles increase society's preference for the convenience and practicality offered by disposable goods on a large scale.² Continuous extraction of raw materials accelerates resource depletion, while production and disposal processes generate air, water, and soil pollution. The accumulation of waste also disrupts ecosystem functions and increases the social and economic costs that must be borne by society and the government.³ At the global level, the proportion of materials successfully returned to the economic cycle is still very low. The global circularity rate is estimated to be only about 7.2 percent of the total materials used.⁴ Other estimates show figures between 8.8 percent and 9 percent, indicating that most of the world's economy remains dependent on linear production and consumption patterns.⁵

The impact of the linear model becomes more apparent when waste ends up in landfills without adequate processing and material recovery.⁶ Landfilling waste generates greenhouse gas emissions, leachate, odors, and environmental pollution around the disposal site. When the capacity of the final disposal site is exceeded, the risk of fires, waste

¹ Alen Jugović et al., "Assessing the Possibilities of Integrating Ports Into the Circular Economy," *Tehnicki Vjesnik - Technical Gazette* 29, no. 2 (2022), <https://doi.org/10.17559/tv-20200327221233>; Johnson A. Oyewale et al., "A Comparative Bibliometric Analysis on Plastic Waste Recycling," *International Journal of Sustainable Development and Planning* 18, no. 11 (2023): 3401–17, <https://doi.org/10.18280/ijstdp.181106>.

² Fenty Puluhulawa et al., "Legal Culture of Local Community in Plastic Waste Management," *KnE Social Sciences*, ahead of print, October 4, 2022, <https://doi.org/10.18502/kss.v7i15.12089>; Fenty Puluhulawa and Mohammad Rusdiyanto Puluhulawa, "Plastic Waste in Modern Era: Developing Plastic Waste Management for Sustainability," *E3S Web of Conferences* 259 (2021): 03001, <https://doi.org/10.1051/e3sconf/202125903001>.

³ R. Iagăru et al., "Strategic Thinking and Its Role in Accelerating the Transition From the Linear to the Circular Economic Model—Case Study of the Agri-Food Sector in the Sibiu Depression Microregion, Romania," *Sustainability* 15, no. 4 (2023): 3109, <https://doi.org/10.3390/su15043109>; Joseph K. Muriithi and Innocent Ngare, "Transitioning Circular Economy From Policy to Practice in Kenya," *Frontiers in Sustainability* 4 (2023), <https://doi.org/10.3389/frsus.2023.1190470>.

⁴ Sisi Chen et al., "Impact of Financial Development on the Circular Economy: Empirical Evidence From the European Union," *Business Strategy and the Environment* 35, no. 1 (2025): 251–63, <https://doi.org/10.1002/bse.70168>.

⁵ Saidia Ali and Farid Shirazi, "The Paradigm of Circular Economy and an Effective Electronic Waste Management," *Sustainability* 15, no. 3 (2023): 1998, <https://doi.org/10.3390/su15031998>.

⁶ Iliana Papamichael et al., "Construction and Demolition Waste Framework of Circular Economy: A Mini Review," *Waste Management & Research: The Journal for a Sustainable Circular Economy* 41, no. 12 (2023): 1728–40, <https://doi.org/10.1177/0734242X231190804>; Mitra Nikpay and Sayna Toorchi Roodsari, "Crafting a Scientific Framework to Mitigate Microplastic Impact on Ecosystems," *Microplastics* 3, no. 1 (2024): 165–83, <https://doi.org/10.3390/microplastics3010010>.

landslides, water body pollution, and public health disturbances also increases.⁷ Unmanaged waste can also clog drainage channels and river flows, increasing the risk of flooding in urban areas and densely populated settlements.⁸ Therefore, the issue of waste can no longer be treated solely as a matter of cleanliness or public service; it is now part of the broader environmental and public health risks associated with unmanaged urban waste.⁹

The limitations of the linear economy drive the development of the circular economy as an alternative paradigm. The initial idea of a circular economy is rooted in Boulding's thinking about the need to replace the open economic system that wastes resources with a system that maintains a sustainable flow of materials.¹⁰ Circular Economy then evolved into a regenerative system that aims to minimize the use of new resources and waste output through product design, maintenance, repair, reuse, remanufacturing, and recycling.¹¹ The main focus is not just on managing waste after it has formed, but on preventing the loss of material value from the design and production stages.¹² The circular economy demands that products be designed for longevity, ease of maintenance, repairability, and retain value after their first use.¹³ Components and materials need to be maintained in the economic cycle through reuse, recovery, remanufacturing, or high-quality recycling.¹⁴ This approach also seeks to reduce dependence on new raw materials and ensure that the processes of production, distribution, consumption, and post-consumption are viewed as a single life

⁷ Jugović et al., "Assessing the Possibilities of Integrating Ports Into the Circular Economy"; I. N. Muliarta, "Global Warming Mitigation Innovation Through Household Waste Management Becomes Eco-Enzyme: A Review," *Jurnal Penelitian Pendidikan Ipa* 10, no. 8 (2024): 515–25, <https://doi.org/10.29303/jppipa.v10i8.8154>.

⁸ Elizabeth A. MacAfee and Ansje J. Löhr, "Multi-scalar Interactions between Mismanaged Plastic Waste and Urban Flooding in an Era of Climate Change and Rapid Urbanization," *WIREs Water* 11, no. 2 (2024): e1708, <https://doi.org/10.1002/wat2.1708>; Syukriah Alimuddin et al., "Flood Mitigation through Waste Management in Rimuku, Mamuju, Indonesia," *Engineering, Technology & Applied Science Research* 15, no. 5 (2025): 26697–702, <https://doi.org/10.48084/etasr.11987>.

⁹ Rofiqoh Ainun et al., "Implementasi circular economy melalui pengendalian sampah bahan daur ulang terhadap peningkatan pendapatan masyarakat," *Economic Reviews Journal* 3, no. 1 (2023): 61–83, <https://doi.org/10.56709/mrj.v3i1.113>; Aloysius H. Kristianto et al., "Potensi pengembangan ekonomi sirkular kerakyatan dan solusi permasalahan sampah tidak terkelola (studi kasus Desa Sungai Duri Kabupaten Bengkayang)," *Jurnal Maneksi* 11, no. 1 (2022): 231–36, <https://doi.org/10.31959/jm.v11i1.1069>.

¹⁰ Irina Georgescu et al., "Empirical Evidence on Circular Economy and Economic Development in Europe: A Panel Approach," *Journal of Business Economics and Management* 23, no. 1 (2022): 199–217, <https://doi.org/10.3846/jbem.2022.16050>; Oyewale et al., "A Comparative Bibliometric Analysis on Plastic Waste Recycling."

¹¹ Xijie Jin et al., "Some Methodological Issues in Assessing the Efforts for the Circular Economy by Region or Country," *Sage Open* 13, no. 3 (2023), <https://doi.org/10.1177/21582440231184863>.

¹² Ruud Balkenende et al., eds., *Repair in the Circular Economy: European Legislation, Product Design and Business Models* (TU Delft OPEN Publishing, 2024), <https://doi.org/10.59490/mg.93>; Beltrán Puentes Cociña, "The Circular Economy Strategy as a Way of Designing More Durable, Repairable, and Reusable Products," *UNIO – EU Law Journal* 9, no. 2 (2023): 88–105, <https://doi.org/10.21814/unio.9.2.5518>.

¹³ United Nations Economic Commission for Europe, *Circularity Concepts in the Pulp and Paper Industry*, Geneva Timber and Forest Discussion Papers (United Nations, 2024), <https://doi.org/10.18356/9789213587102>.

¹⁴ Ali and Shirazi, "The Paradigm of Circular Economy and an Effective Electronic Waste Management"; Tariq Javed et al., "Circular Economy Implementation Status of Selected ASEAN Countries," *Sage Open* 14, no. 1 (2024), <https://doi.org/10.1177/21582440231216261>.

cycle, so that the circular economy does not stop at downstream management but intervenes throughout the entire value chain.¹⁵

The circular economy framework also contains a governance dimension. Changes in production and consumption systems cannot be fully left to market voluntarism because business actors often face transition costs,¹⁶ technological limitations,¹⁷ and economic incentives that are not yet aligned with environmental goals. Regulation is necessary to set waste reduction targets, encourage sustainable product design, regulate producer responsibility, provide incentives and disincentives, and build a market for secondary raw materials. The experience of the European Union through the Circular Economy Package of 2015 shows that the circular transition requires a coordinated policy framework and cannot rely solely on behavior change campaigns.¹⁸ The Union's waste hierarchy is codified in Directive 2008/98/EC, as amended by Directive (EU) 2018/851¹⁹, while its more recent ecodesign and right-to-repair instruments extend the same logic to product durability and reparability²⁰; these instruments are a useful normative benchmark for the dimensions evaluated in this study, although their direct transplantation into Indonesian law is constrained by Indonesia's own division of regulatory authority over product standards, discussed further below. Regulation thus becomes an instrument to change the structure of incentives and ensure that environmental responsibilities are shared among the government, producers, consumers, and waste managers. In the context of Indonesia, the main legal basis for waste management is established through Law Number 18 of 2008 on Waste Management.²¹ This law introduces an important shift from the paradigm of collection, transportation, and disposal to the reduction and handling of waste. The national framework is further strengthened by Presidential Regulation Number 97 of 2017 concerning the National Policy and Strategy for Household Waste and Similar Household Waste Management.²² The policy sets a target of reducing waste by 30 percent and

¹⁵ Potting et al., Circular Economy: Measuring Innovation in the Product Chain.

¹⁶ Zabina Asfahani et al., "Barriers to Circular Economy Transition in Small and Medium-Sized Businesses: A Systematic Review," *2023 IEEE International Conference on Industrial Engineering and Engineering Management (IEEM)*, December 18, 2023, 0470–74, <https://doi.org/10.1109/IEEM58616.2023.10406486>.

¹⁷ Xidan Wang and Zhihui Liao, "Empowering Sustainability: Harnessing Environmental Regulation and Management for Wider Use of Renewable Energy," *Integration of Industry and Education Journal* 3, no. 1 (2024), <https://doi.org/10.6914/iiej.030102>.

¹⁸ European Commission, *Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: Closing the Loop – An EU Action Plan for the Circular Economy*, COM(2015) 614 final (Brussels, 2 December 2015).

¹⁹ Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on Waste and Repealing Certain Directives, as amended by Directive (EU) 2018/851 of the European Parliament and of the Council of 30 May 2018.

²⁰ Regulation (EU) 2024/1781 of the European Parliament and of the Council of 13 June 2024 Establishing a Framework for the Setting of Ecodesign Requirements for Sustainable Products, Amending Directive (EU) 2020/1828 and Regulation (EU) 2023/1542 and Repealing Directive 2009/125/EC; Directive (EU) 2024/1799 of the European Parliament and of the Council of 13 June 2024 on Common Rules Promoting the Repair of Goods and Amending Regulation (EU) 2017/2394 and Directives (EU) 2019/771 and (EU) 2020/1828.

²¹ Undang-Undang Nomor 18 Tahun 2008 tentang Pengelolaan Sampah, Lembaran Negara Republik Indonesia Tahun 2008 Nomor 69, Tambahan Lembaran Negara Republik Indonesia Nomor 4851, as implemented by Peraturan Pemerintah Nomor 81 Tahun 2012 tentang Pengelolaan Sampah Rumah Tangga dan Sampah Sejenis Sampah Rumah Tangga.

²² Peraturan Presiden Nomor 97 Tahun 2017 tentang Kebijakan dan Strategi Nasional Pengelolaan Sampah Rumah Tangga dan Sampah Sejenis Sampah Rumah Tangga.

managing 70 percent by 2025, though this study does not independently verify national or Gorontalo-specific achievement data against that target.²³ Normatively, this policy direction acknowledges that waste management must start with source reduction and not just rely on end processing.

The existence of reduction and recycling norms does not automatically indicate that the Indonesian legal system has fully adopted a circular economy. The current legal framework is still considered suboptimal in regulating product lifespan extension, circular design, remanufacturing, secondary raw material markets, and measurable producer responsibility throughout the product lifecycle.²⁴ Extended Producer Responsibility (EPR)²⁵ has been introduced, but its implementation is not yet fully supported by recall mechanisms, post-consumption financing, material tracking, and consistent performance standards. These challenges are exacerbated by unclear authority, weak coordination between central and regional governments, limited processing facilities, low community participation, and the indecisiveness of law enforcement instruments. The national baseline for producer responsibility is further defined by Permen LHK No. P.75/2019 on the Producer Waste Reduction Roadmap, which has not previously been addressed in evaluations of Perda 3/2013's alignment with EPR obligations.^{26,27}

Based on data from the National Waste Management Information System (Sistem Informasi Pengelolaan Sampah Nasional, SIPSN), the waste generation in Gorontalo City is estimated to reach around 140 tons per day. Comparable province-wide figures disaggregated for Gorontalo Province as a whole were not identified in SIPSN's published reports at the time of writing; the city-level figure is used here as the closest available indicator of the waste volumes the regional regulation must address.²⁸ At the regional level, particularly in

²³ Salsafanti A. Ramadhani, "Analisis faktor yang mempengaruhi penerapan implementasi pengolahan limbah konstruksi berkelanjutan pada proyek konstruksi gedung bertingkat," *Jurnal Aplikasi Teknik Sipil* 22, no. 3 (2024): 307, <https://doi.org/10.12962/j2579-891x.v22i3.20835>; Rezi Rezi and Istiyawati Rahayu, "Transformasi kebijakan pengelolaan sampah plastik global pasca Global Plastics Treaty: Implikasi bagi regulasi nasional di Indonesia," *JIIIP - Jurnal Ilmiah Ilmu Pendidikan* 8, no. 3 (2025): 3320-26, <https://doi.org/10.54371/jiip.v8i3.7557>.

²⁴ Nasya N. Amalina, "Pendekatan quadruplehelix dalam menanggulangi problematika sampah makanan di Indonesia ditinjau perspektif hukum," *Padjadjaran Law Review* 10, no. 2 (2022), <https://doi.org/10.56895/plr.v10i2.1026>; Rezi and Rahayu, "Transformasi kebijakan pengelolaan sampah plastik global pasca Global Plastics Treaty: Implikasi bagi regulasi nasional di Indonesia."

²⁵ Elisabetta Ceroni, *The Role of Extended Producer Responsibility (EPR) in the Transition to a Circular Economy*, 11 (2024): 293-300, <https://doi.org/10.35603/sws.iscss.2024/vs02/22>.

²⁶ Peraturan Menteri Lingkungan Hidup dan Kehutanan Nomor P.75/2019 tentang Peta Jalan Pengurangan Sampah oleh Produsen, setting a producer waste-reduction roadmap for 2020-2029 with a 30 percent reduction target by 2029 across the manufacturing, retail, and food-and-beverage service sectors.

²⁷ Kristianto et al., "Potensi pengembangan ekonomi sirkular kerakyatan dan solusi permasalahan sampah tidak terkelola (studi kasus Desa Sungai Duri Kabupaten Bengkayang)"; Septia P. Rahmah and Raldi H. L. Koestoer, "Penerapan Reduce, Reuse, Recycle (3R) Dan Manajemen Pengelolaan Sampah Perkotaan: A Systematic Literature Review," *Jurnal Keselamatan Kesehatan Kerja Dan Lingkungan* 5, no. 2 (2024): 189-97, <https://doi.org/10.25077/jk31.5.2.189-197.2024>; Fina R. Ula and Nur F. Liyana, "Menilik penerapan landfill tax di negara lain dan urgensi penerapannya di Indonesia," *Jurnal Pajak dan Keuangan Negara (PKN)* 4, no. 1S (2022): 176-90, <https://doi.org/10.31092/jpkn.v4i1s.1734>.

²⁸ Fenty Puluhulawa et al., "Rethinking Coastal Waste: Integrating Green Criminology and Community Engagement for Sustainable Solutions," *Yustisia Jurnal Hukum* 14, no. 1 (2025): 69, <https://doi.org/10.20961/yustisia.v14i1.93825>.

Gorontalo Province, Gorontalo Provincial Regulation No. 3 of 2013 on Waste Management (hereinafter "Perda 3/2013")²⁹ has become an important instrument in translating national policies into the context of local authority and needs. The regional regulation governs aspects of reduction, sorting, collection, transportation, processing, final disposal, community participation, business responsibility, and the use of environmentally friendly technology. On its face, this regulation shows alignment with aspects of waste generation prevention, reuse, recycling, community participation, and risk control at the final processing site. However, there are indications that several elements of the circular economy have not been comprehensively regulated, particularly product durability, repair rights and mechanisms, remanufacturing, reduction of new raw materials, secondary material markets, circular product design, and measurable circularity targets. Regulatory alignment cannot be assessed solely by the presence of the terms reduction and recycling, but must be viewed in terms of the completeness of the material cycle and the distribution of responsibilities among actors.

The evaluation of Gorontalo's regulations is becoming increasingly important because regional norms do not merely function as administrative derivatives of national laws. Regional regulations should be instruments capable of linking national goals with regional characteristics, institutional capacity, waste production patterns, disaster risks, and the needs of the local community. Conversely, the integration of the circular economy allows regional regulations to promote waste prevention at the source, maintain material value, strengthen producer responsibility, create incentives for circular businesses, and reduce pressure on final processing sites. The need for this evaluation also arises from the gap between the development of the circular economy concept and the earlier-established waste management norms. Circular Economy is rapidly developing in global policies, whereas Law Number 18 of 2008 and Perda 3/2013 were formulated when circular product design, material tracking, remanufacturing, and secondary raw material markets had not yet become mainstream in environmental policy formation. Harmonization of regulations is therefore necessary so that waste management laws not only control the consequences but also correct the structural causes of waste generation.³⁰

Based on the issue, this research questions the extent to which the concepts and norms in Perda 3/2013 align with the principles of the circular economy. This study aims to evaluate the conceptual alignment between regional regulations and the eight main criteria of the circular economy, namely waste prevention, product lifespan extension, product value maintenance, material cycle closure, resource efficiency, life cycle approach, producer responsibility, and supporting governance. The novelty of this research lies in the use of normative-conceptual fit evaluation to assess not only the existence of waste management norms but also the coherence of their substance with the circular economy structure. This approach offers an analytical framework that can identify the level of alignment, normative

²⁹ Peraturan Daerah Provinsi Gorontalo Nomor 3 Tahun 2013 tentang Pengelolaan Sampah, ditetapkan 8 April 2013, Lembaran Daerah Provinsi Gorontalo Tahun 2013 Nomor 3.

³⁰ Amalina, "Pendekatan quadruplehelix dalam menanggulangi problematika sampah makanan di Indonesia ditinjau perspektif hukum"; Rezi and Rahayu, "Transformasi kebijakan pengelolaan sampah plastik global pasca Global Plastics Treaty: Implikasi bagi regulasi nasional di Indonesia."

gaps, and the direction for reformulating regional laws, so that waste management in Gorontalo can shift from a waste control pattern toward regenerative resource governance.

2. Method

This research uses a normative legal research design to assess the alignment of waste management norms in Gorontalo Province with the principles of a circular economy. Normative legal research was chosen because the focus of the study lies on the structure, content, orientation, and coherence of the legal norms contained in Perda 3/2013. This normative legal research approach has also been used in prior scholarship to evaluate the relationship between waste management regulations, producer responsibility, and the principles of the circular economy in various environmental law contexts.³¹ The methodology of this research uses Normative-Conceptual Fit Evaluation. The framework assesses the level of alignment between positive norms in a regulation and a set of predetermined conceptual principles. The evaluation not only examines the presence of specific terms or provisions but also assesses the depth, consistency, and operational capability of the norms in supporting the transformation from a linear economy to a circular economy. The use of this framework is relevant because several waste management regulations still maintain a conventional orientation of collection, transportation, processing, and final disposal, while the dimensions of product design, reuse, remanufacturing, secondary material markets, and post-consumer responsibility have not been adequately regulated.³²

This instrument-specific coding approach can be distinguished from several related but different methods. Legal gap analysis typically inventories the presence or absence of provisions without assigning a graded score or an explicit decision rule, while policy-coherence or regulatory-scoring approaches, more common in public policy research, compare alignment across multiple instruments or institutions rather than evaluating the internal substance of a single regulation. Conceptual frameworks such as Kirchherr, Reike, and Hekkert's synthesis of circular economy definitions³³ and Potting et al.'s R-ladder of circularity strategies—refuse, rethink, reduce, reuse, repair, refurbish, remanufacture, repurpose, recycle, and recover—³⁴ as well as the European Commission's Monitoring Framework for the Circular Economy³⁵, supply conceptual benchmarks against which norms can be assessed, but they are not themselves designed to score the substance of a specific legal text. The Normative-Conceptual Fit Evaluation applied in this study takes those benchmarks as its point of departure but translates each circular economy dimension

³¹ Ali and Shirazi, "The Paradigm of Circular Economy and an Effective Electronic Waste Management"; Oyewale et al., "A Comparative Bibliometric Analysis on Plastic Waste Recycling."

³² Javed et al., "Circular Economy Implementation Status of Selected ASEAN Countries."

³³ Julian Kirchherr, Denise Reike, and Marko Hekkert, "Conceptualizing the Circular Economy: An Analysis of 114 Definitions," *Resources, Conservation and Recycling* 127 (2017): 221–232, <https://doi.org/10.1016/j.resconrec.2017.09.005>.

³⁴ José Potting, Marko Hekkert, Ernst Worrell, and Aldert Hanemaaijer, *Circular Economy: Measuring Innovation in the Product Chain*, PBL Publication No. 2544 (The Hague: PBL Netherlands Environmental Assessment Agency, 2017).

³⁵ European Commission, *Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: A Monitoring Framework for the Circular Economy*, COM(2018) 29 final (Strasbourg, 16 January 2018).

into an operational indicator and an explicit High/Moderate/Low decision rule, set out below, against which the provisions of Perda 3/2013 are then coded.

The analysis is conducted through a statutory and conceptual approach. The statutory approach is used to examine the objectives, principles, division of authority, waste reduction instruments, handling mechanisms, community participation, business actor responsibilities, and environmental risk control in Gorontalo Province Regional Regulation Number 3 of 2013. The conceptual approach is used to build evaluation indicators based on the literature of circular economy, environmental law, producer responsibility, and sustainable development. Such evaluations can reveal gaps between the domestic legal framework and the conceptual standards of the circular economy.³⁶ The primary legal materials for the research include Perda 3/2013 on Waste Management, read in light of its parent legislation, Law Number 18 of 2008 on Waste Management, and the general environmental framework under Law Number 32 of 2009 on Environmental Protection and Management.³⁷ The secondary legal materials encompass journal articles, academic books, research results, and policy documents on circular economy, environmental law, waste management, and sustainable development. The literature is used to formulate eight evaluation criteria, namely waste generation prevention, product lifespan extension, product value maintenance, material cycle closure, resource efficiency, life cycle approach, producer responsibility, and supporting governance. The analysis process is carried out through the identification of norms, grouping of provisions based on circular economy criteria, assessment of alignment levels, and normative synthesis. The evaluation results are then used to identify regulatory strengths, normative gaps, and the need for legal reformulation. These findings serve as the basis for formulating recommendations for regulatory harmonization through the strengthening of targets, incentives, standardization, producer responsibility, technology, and material management information systems.³⁸

Table 1 operationalizes each of the eight circular economy dimensions into a core indicator, drawn from the circular economy criteria discussed in Section 3, together with the scoring anchor the dimension received when that indicator was applied to Perda 3/2013 in the coding exercise reported in Table 2.

Table 1. Operational Indicators and Scoring Anchors for the Eight Circular Economy Dimensions

Circular economy dimension	Score anchor	Core indicator	Basis for the score (illustrative; see Table 2)
D1. Waste generation prevention	High	Waste generation is reduced from the design and	Restrictions on waste generation and mandated use of recyclable materials are regulated, but design-stage standards remain undeveloped.

³⁶ Ali and Shirazi, "The Paradigm of Circular Economy and an Effective Electronic Waste Management"; Oyewale et al., "A Comparative Bibliometric Analysis on Plastic Waste Recycling."

³⁷ Undang-Undang Nomor 32 Tahun 2009 tentang Perlindungan dan Pengelolaan Lingkungan Hidup, as amended by Undang-Undang Nomor 6 Tahun 2023 tentang Penetapan Peraturan Pemerintah Pengganti Undang-Undang Nomor 2 Tahun 2022 tentang Cipta Kerja menjadi Undang-Undang.

³⁸ Javed et al., "Circular Economy Implementation Status of Selected ASEAN Countries"; Jin et al., "Some Methodological Issues in Assessing the Efforts for the Circular Economy by Region or Country."

		production stage onward	
D2. Product lifespan extension	Low	Products are durable and can be maintained and repaired	No standards exist for product durability, maintenance, or the right to repair.
D3. Product value maintenance	Moderate	Products and materials are reused and remanufactured	Reuse is regulated, but remanufacturing activities and dedicated reuse centers are not yet developed.
D4. Material cycle closure	High	Waste is sorted and recycled to a defined quality standard	Waste sorting and recycling are regulated, but quality standards and markets for recycled products are not yet established.
D5. Resource efficiency	Moderate	Use of new (virgin) raw materials is reduced	Reduction of virgin raw-material use is addressed implicitly, without a measurable obligation.
D6. Life-cycle approach	Moderate	Coverage extends from production through post-consumption	Waste reduction nominally spans the pre-production to post-consumption period, but the linkage between stages is not fully operationalized.
D7. Producer responsibility	Moderate	Producers take back products and finance post-consumption management	Producer responsibilities before and after consumption have begun to emerge, but the linkages among the relevant stages remain unclear.
D8. Supporting governance	High	Targets, data, technology, incentives, regulation, and participation are in place	Incentives, technology, stakeholder participation, data systems, and financing mechanisms are provided for at the framework level.

Source: Authors' operationalization of the circular economy criteria discussed in Section 3, cross-referenced against the coding reported in Table 2.

Three decision rules were applied consistently across the eight dimensions when coding Table 2. A dimension is scored High when the relevant provision imposes a binding

obligation accompanied by an implementation mechanism (for example, a designated instrument, procedure, or target) addressing the core indicator, even if secondary details are delegated to implementing regulations. A dimension is scored Moderate when the provision addresses the core indicator only partially or implicitly, or without a complete operational mechanism—for instance, when an obligation exists but its measurable target, procedure, or sanction is not specified. A dimension is scored Low when the core indicator is not regulated, or is mentioned only nominally without an attached normative consequence. ‘Depth’ refers to whether a provision goes beyond a general statement of principle to impose a specific, actionable obligation; ‘consistency’ refers to whether the provision’s substance aligns with, rather than contradicts, the circular economy indicator it is meant to operationalize; and ‘operational capability’ refers to the presence of an implementing mechanism—a designated authority, procedure, timeline, or sanction—capable of giving the provision practical effect. Because this is a single-instrument doctrinal analysis rather than a multi-coder empirical study, the coding in Table 2 was performed by the authors through repeated, independent re-reading of Perda 3/2013 against its parent legislation; divergent initial readings were resolved by returning to the statutory text and, where ambiguity persisted, by adopting the more conservative (lower) score. This procedure is reported so that the coding may be replicated or contested by other researchers applying the same rubric to other regional regulations.

3. Normative Structure and Alignment of the Circular Economy Concept with Perda 3/2013

3.1 Theoretical Framework. Circular economy is an economic paradigm that places material flows in a closed cycle so that resources can be used efficiently, repeatedly, and sustainably.³⁹ Its main orientation is not only to reduce waste volume at the end stage but also to maintain the utility value of materials, components, and products for as long as possible within the economic system. This approach is carried out through the optimization of resource use, waste generation prevention, product reuse, material recycling, and remanufacturing components that still have functional value.⁴⁰ This framework positions waste not merely as a residue to be discarded, but as a potential resource that can be reintegrated into the production and consumption processes.⁴¹ The concept of the circular economy has developed in response to the limitations of the linear economy, which operates through the take-make-use-dispose pattern.⁴² The linear system relies on the extraction of new raw materials, processing them into products, using them for a certain period, and then disposal once the products are no longer considered valuable. This pattern has the potential to accelerate the exploitation of natural resources while also increasing the amount of waste

³⁹ Fenty Puluhulawa and Amanda Adelina Harun, “Enabling Circular Economy: Towards Sustainable Electronic Waste Management Regulation,” *Jambura Law Review* 6, no. 1 (2024): 33–65, <https://doi.org/10.33756/jlr.v6i1.24024>.

⁴⁰ Kurnia W. Oktarini et al., “Pajak ekonomi sirkular dan keberlanjutan lingkungan,” *Jemasi Jurnal Ekonomi Manajemen Dan Akuntansi* 19, no. 2 (2023): 198–208, <https://doi.org/10.35449/jemasi.v19i2.672>.

⁴¹ Bénédicte Bakan et al., “Circular Economy Applied to Organic Residues and Wastewater: Research Challenges,” *Waste and Biomass Valorization* 13, no. 2 (2022): 1267–76, <https://doi.org/10.1007/s12649-021-01549-0>.

⁴² Puluhulawa and Harun, “Enabling Circular Economy.”

that ends up in landfills.⁴³ The circular economy seeks to break this pattern by linking economic goals and environmental protection within a single resource management system. This integration allows the lifespan of products to be extended through maintenance, reuse, repair, or recycling before the materials completely lose their functionality.⁴⁴ The implementation of a circular economy is often formulated through the 5R approach, namely reduce, reuse, recycle, refurbish, and renew. Reduce focuses on minimizing the use of raw materials and waste generation from the outset. Reuse encourages the repeated use of products or materials without undergoing complex processing. Recycle transforms waste into new materials or products. Refurbish maintains the function of a product through repair and component renewal, while renew directs the use of renewable resources and energy.⁴⁵ The principles show that the circular economy is not limited to recycling activities, but rather encompasses changes in design, production patterns, consumption behavior, and post-consumption governance.

The character of a circular economy can be understood as a set of principles that guide production and consumption systems to use resources more efficiently, maintain material value for as long as possible, and minimize environmental impact from the early stages. Its main characteristics include the following:

- (1) prevention and reduction of waste generation from the design, production, and consumption processes so that the burden of downstream management can be minimized;⁴⁶
- (2) reuse of products and materials that still have functional use to extend their period of utilization;⁴⁷
- (3) recycling materials into new resources so that residues do not directly end up as waste;⁴⁸
- (4) development of durable products so that the frequency of replacement can be reduced;⁴⁹

⁴³ Fadhila Abidah et al., "Perkembangan Rantai Pasok Sirkular: Kajian Literatur," *Jurnal Sains dan Seni ITS* 11, no. 5 (2023), <https://doi.org/10.12962/j23373520.v11i5.90758>; Yuni M. Manik, "Ekonomi sirkular, pola berfikir dan pendidikan untuk keberlanjutan ekonomi," *Promosi (Jurnal Pendidikan Ekonomi)* 10, no. 1 (2022), <https://doi.org/10.24127/pro.v10i1.5418>.

⁴⁴ Rahmat Syarif et al., "Pengenalan konsep ekonomi sirkular melalui webinar 'Ekonomi Sirkular: Solusi Masalah Persampahan Di Indonesia,'" *Celeb* 1, no. 1 (2022): 28–35, <https://doi.org/10.37531/celeb.v1i1.176>.

⁴⁵ Muhammad H. Fadhillah and Mohammad Fahreza, "Pendekatan ekonomi sirkular sebagai model pengembangan bisnis melalui pemanfaatan aplikasi pada usaha kecil dan menengah pasca Covid-19," *Coopetition Jurnal Ilmiah Manajemen* 14, no. 1 (2023): 55–66, <https://doi.org/10.32670/coopetition.v14i1.2269>.

⁴⁶ Carlos Scheel and Bernardo Bello, "Transforming Linear Production Chains into Circular Value Extended Systems," *Sustainability* 14, no. 7 (2022): 3726, <https://doi.org/10.3390/su14073726>.

⁴⁷ Amanda Adelina Harun, "Circular Economy and Legal Frameworks for Balancing Ecology and Economy," in *Circular Economy. Business, Technology, and Policy*, Part 2 (Bentham Books, 2026), <https://doi.org/10.2174/9798898816636126010006>.

⁴⁸ Harun, "Circular Economy and Legal Frameworks"; Scheel and Bello, "Transforming Linear Production Chains into Circular Value Extended Systems."

⁴⁹ Mehrnaz Kouhihabibi, "Linear Economy versus Circular Economy: New Raw Material," *Turk Turizm Arastirmalari Dergisi*, August 17, 2022, 4, <https://doi.org/10.26677/TR1010.2022.1057>; Amanda Adelina

- (5) product and component design that allows for repair and re-manufacturing so that its economic value does not diminish too quickly;⁵⁰
- (6) reducing the use of new raw materials through the utilization of secondary materials and available resources;⁵¹
- (7) the application of a life cycle approach that encompasses the upstream to post-consumption stages;⁵²
- (8) strengthening the producer's responsibility for products and packaging after consumer use;⁵³
- (9) regulatory support, incentives, and disincentives so that the circular transition does not solely depend on market willingness; and⁵⁴
- (10) the creation of environmental and economic benefits simultaneously through resource efficiency, waste reduction, and the formation of new added value.⁵⁵

The implementation of a circular economy can be applied in various sectors. In household waste management, waste banks and TPS3R (Integrated Waste Management Sites) can serve as means for sorting, collecting, reusing, and processing economically valuable waste.⁵⁶ They illustrate that economic and environmental objectives can be pursued together: participating households gain income while reducing the volume of waste that reaches final disposal sites.⁵⁷ The success of the transition to a circular economy requires the involvement of many parties. The government plays a role in building regulations and infrastructure, the private sector develops production innovations, academics provide the scientific basis, while the community becomes the main actor in changing consumption patterns and waste sorting.⁵⁸ Policy support is also needed through tax incentives for

Harun and Fenty U. Puluhalawa, "Legal Frameworks for the Circular Economy: Identifying Waste Governance Policies and Resilience Gaps in Indonesia," *Manhaj: Jurnal Penelitian dan Pengabdian Masyarakat* 15, no. 1 (2026): 188–204, <https://ejournal.uinfasbengkulu.ac.id/index.php/manhaj/article/view/9323>.

⁵⁰ Harun, "Circular Economy and Legal Frameworks for Balancing Ecology and Economy"; Scheel and Bello, "Transforming Linear Production Chains into Circular Value Extended Systems."

⁵¹ Scheel and Bello, "Transforming Linear Production Chains into Circular Value Extended Systems."

⁵² Harun, "Circular Economy and Legal Frameworks for Balancing Ecology and Economy."

⁵³ Taiz Viviane Dos Santos et al., "The Circularity Paradox: The Rebound Effect, Governance, and the Limits of Corporate Sustainability," *Corporate Social Responsibility and Environmental Management* 33, no. 1 (2026): 616–46, <https://doi.org/10.1002/csr.70181>.

⁵⁴ Baoting Peng and Xin Shen, "Does Environmental Regulation Affect Circular Economy Performance? Evidence from China," *Sustainability* 16, no. 11 (2024): 4406, <https://doi.org/10.3390/su16114406>.

⁵⁵ Harun, "Circular Economy and Legal Frameworks for Balancing Ecology and Economy."

⁵⁶ Kristianto et al., "Potensi Pengembangan Ekonomi Sirkular Kerakyatan dan Solusi Permasalahan Sampah Tidak Terkelola (Studi Kasus Desa Sungai Duri Kabupaten Bengkayang)"; Aida F. Larasati and Eko B. Santoso, "Jaringan Pengelolaan Sampah Rumah Tangga Sebagai Bentuk Transisi Ekonomi Sirkular di Kota Surabaya," *Jurnal Ilmu Lingkungan* 22, no. 1 (2023): 248–57, <https://doi.org/10.14710/jil.22.1.248-257>.

⁵⁷ Mohamad Hidayat Muhtar et al., "Addressing the Paradox: Why Environmental Constitutionalism Is More than Just Rights?," *E3S Web of Conferences* 506 (2024): 06004, <https://doi.org/10.1051/e3sconf/202450606004>.

⁵⁸ Kristianto et al., "Potensi Pengembangan Ekonomi Sirkular Kerakyatan dan Solusi Permasalahan Sampah Tidak Terkelola (Studi Kasus Desa Sungai Duri Kabupaten Bengkayang)"; Syarif et al., "Pengenalan Konsep Ekonomi Sirkular Melalui Webinar 'Ekonomi Sirkular: Solusi Masalah Persampahan Di Indonesia.'"

businesses that implement circular practices.⁵⁹ Through a combination of innovation, collaboration, and regulation, a circular economy can become the foundation for more efficient, low-waste, and sustainable development.

3.2 Normative Structure of Perda 3/2013. The assessment of normative structure in this study is grounded in Hans Kelsen's Stufenbau theory, which conceives a legal system as a hierarchical order in which the validity of each norm rests on a higher norm.⁶⁰ Hans Nawiasky's elaboration of this hierarchy into a tiered structure of legal norms is reflected in Indonesia's own legislative hierarchy under Law Number 12 of 2011 on the Formation of Legislation, as amended by Law Number 13 of 2022, in which a provincial regulation such as Perda 3/2013 occupies a position subordinate to, and deriving its validity from, Law Number 18 of 2008.⁶¹ Read through this lens, a regional regulation's validity depends not only on procedural conformity with higher-level norms but also on the substantive coherence of its content with them, which is the premise underlying the vertical-consistency assessment in Section 5.1 below.

Perda 3/2013 places waste management as part of public health protection, environmental quality improvement, and the utilization of waste as a resource. This orientation shows an initial shift from the conventional view that places waste as residue to the understanding that post-consumption materials still have utility and economic value. The regulatory structure includes waste reduction, reuse, recycling, sorting, collection, transportation, processing, and final disposal. Other materials include producer responsibility, community participation, financing, compensation, incentives and disincentives, technology, cooperation, partnerships, information systems, supervision, prohibitions, and sanctions. The scope has formally gone beyond the management pattern that only focuses on transportation and disposal. Recognition of waste reduction and reuse aligns with the fundamental principles of the circular economy, which aims to retain materials in the economic system for as long as possible. The circular economy prioritizes technical and ecological efficiency through reducing environmental impact, resource conservation, and the use of technology that supports sustainability.⁶² The orientation of the regional regulation is also consistent with the idea that waste management needs to generate both ecological and economic benefits through residue reduction and resource value optimization. The regional regulation's provisions still show a strong influence of the conventional waste management framework. Most provisions still regulate the flow of waste after the material enters the waste category. Interventions in product design, durability of goods, ease of repair, and the use of secondary raw materials have not yet been placed as central parts of the regulation. The circular economy actually demands changes from the stages of design, production, distribution, consumption, to post-consumption

⁵⁹ Oktarini et al., "Pajak Ekonomi Sirkular Dan Keberlanjutan Lingkungan."

⁶⁰ Hans Kelsen, *General Theory of Law and State*, trans. Anders Wedberg (Cambridge, MA: Harvard University Press, 1945).

⁶¹ Hans Nawiasky, *Allgemeine Rechtslehre als System der rechtlichen Grundbegriffe*, 2nd ed. (Einsiedeln: Benziger, 1948); Undang-Undang Nomor 12 Tahun 2011 tentang Pembentukan Peraturan Perundang-Undangan, as amended by Undang-Undang Nomor 13 Tahun 2022, Pasal 7 ayat (1).

⁶² T. Siderius and T. Zink, "Markets and the Future of the Circular Economy," *Circular Economy and Sustainability* 3, no. 3 (2023): 1569–95, <https://doi.org/10.1007/s43615-022-00196-4>.

management. This orientation is necessary so that waste prevention does not solely depend on consumer behaviour after the product is marketed.⁶³

4. Level of Alignment with Circular Economy Principles

The evaluation uses eight main dimensions, namely waste prevention, product lifespan extension, product value maintenance, material cycle closure, resource efficiency, life cycle approach, producer responsibility, and supporting governance. The assessment does not stop at the presence of terms in the regional regulation. The analysis also considers the clarity of obligations, targets, implementation mechanisms, supervision, and the consequences of non-compliance. For each dimension, Table 2 identifies the relevant provisions (pasal), the assigned score, and the reasoning behind it, functioning as a norm-coding matrix; the summary of the evaluation results is presented in Table 2.

Table 2. Norm-Coding Matrix: Alignment of Perda 3/2013 with Circular Economy Principles

Circular economy dimension	Relevant provisions	Degree of alignment	Key findings
D1. Waste generation prevention	Articles 5–7, Article 25, and Articles 35–36	High	Restrictions on waste generation and the use of recyclable materials have been regulated; however, these provisions are not accompanied by quantitative targets.
D2. Product lifespan extension (durability and reparability)	Not specifically regulated (cf. Article 9 on reuse)	Low	The Regulation does not establish standards concerning product durability, maintenance, the right to repair, or minimum product lifespans. No provisions address modular design, ease of disassembly, reparability, the availability of spare parts, refurbishment, or remanufacturing; Article 9 regulates only the reuse of products and packaging.
D3. Product value maintenance (reuse and repair)	Articles 6 and 9	Moderate	Reuse is regulated; however, remanufacturing activities and dedicated reuse centers have not yet been developed.
D4. Material cycle closure (recycling)	Articles 8 and 10, and	High	Waste separation and recycling are regulated; however, quality standards

⁶³ Harun, “Circular Economy and Legal Frameworks for Balancing Ecology and Economy”; Scheel and Bello, “Transforming Linear Production Chains into Circular Value Extended Systems.”

	Articles 13–14		and markets for recycled products have not yet been established.
D5. Resource efficiency	Articles 5–9 and Articles 13–14	Moderate	The reduction of virgin raw material use is implicitly addressed, but it has not been established as a measurable obligation.
D6. Life-cycle approach	Article 1 numbers 18–19, and Articles 6–9	Moderate	Waste reduction encompasses the period before a product is generated through to the end of the useful life of the product or its packaging. However, the life-cycle approach does not yet comprehensively address durability-oriented design, maintenance, repair, product upgrading, and remanufacturing.
D7. Producer responsibility	Articles 6–9 and Article 31	Moderate	Producer responsibilities before and after consumption have begun to emerge, but the linkages among the relevant stages remain incomplete. Product take-back and financing obligations are partially regulated, without specific targets, producer registration, auditing, or reporting requirements.
D8. Supporting governance	Articles 25–31 and the provisions concerning supervision	High	Incentives, technology, stakeholder participation, data systems, partnerships, and financing mechanisms are provided for at the framework level; however, they have not yet been fully operationalized through implementing regulations.

Source: Authors' analysis based on Perda 3/2013 and circular economy criteria; article and paragraph references verified against the official text of Perda 3/2013.

4.1 Waste Generation Prevention. The strongest alignment is found in waste prevention, reuse, and recycling. Article 7 requires producers to develop waste reduction programs and use packaging that is easily biodegradable or generates as little waste as possible. The obligation aligns with the character of a circular economy, which prioritizes prevention over downstream processing.

4.2 Product Lifespan Extension. The weakest alignment relates to product lifespan extension, repair, and remanufacturing.⁶⁴ No specific norms were found regarding product

⁶⁴ Harun, "Circular Economy and Legal Frameworks for Balancing Ecology and Economy"; Kouhihabibi, "Linear Economy versus Circular Economy."

durability standards, availability of spare parts, repair information, repairability guarantees, or consumer rights to repair products. This condition can be understood as a consequence of the Regional Regulation's focus on waste management, which has not yet adequately covered upstream aspects of the circular economy, such as product durability standards, availability of spare parts, access to repair information, guarantee of repair ease, and the consumer's right to repair products. The absence of these aspects maintains space for the production of short-lived goods that quickly enter the waste stream. Design for durability is an important element of the circular economy because waste reduction is most effectively achieved by extending the product's lifespan before it requires recycling.

4.3 Product Value Maintenance. Reuse gains normative grounding through the obligation of producers to develop reuse programs, use reusable materials, and retrieve products or packaging to return them to the utilization cycle. The norm shows the recognition that the value of a product should not be lost after its first use. Its weakness lies in the absence of reuse targets, standards for the safety of reused products, deposit mechanisms, and collection centers that can support reverse logistics. This formulation makes reuse a general obligation without a legal infrastructure to ensure its implementation.

4.4 Material Cycle Closure. The recycling process also achieves a high level of alignment with the concept of a circular economy. The regional regulation governs the use of recyclable materials, producer recycling programs, product and packaging take-back, sorting, and material processing. The structure supports the closure of the material cycle at a basic level. The absence of targets for recycled material content, quality standards, certification, market guarantees, and material volume recording limits the effectiveness of the norms. Recycling risks remaining an incidental activity if the results are not reintegrated into the production system.

4.5 Resource Efficiency. A moderate level of alignment was found in resource efficiency. The regional regulation recognizes waste as a resource and opens up the utilization of processed waste as fuel. The framework has not yet clearly distinguished between material recovery, biological recovery, and energy recovery. The management hierarchy that prioritizes prevention, reuse, and recycling before energy recovery has also not been formulated. A less clear hierarchy can encourage end-of-life processing technologies that consume materials before higher-value circular options are utilized. Resource efficiency will not be achieved if policies only increase recycling capacity without controlling the amount of material entering the market.⁶⁵

4.6 Life-Cycle Approach. Article 1 numbers 18–19 and Articles 6–9 of Perda 3/2013 give the life-cycle approach a moderate level of alignment: waste reduction obligations are linked to the period before a product is generated through to the end of its useful life or that of its packaging. This approach, however, does not yet comprehensively address durability-oriented design, maintenance, repair, product upgrading, and remanufacturing, so that the connection between upstream design and post-consumption stages remains only partially operationalized.

4.7 Producer Responsibility. EPR is present in substance, although it has not yet formed a complete system. Producers are obligated to limit waste generation, use recyclable materials, take back products or packaging, and finance waste management. These findings

⁶⁵ Scheel and Bello, "Transforming Linear Production Chains into Circular Value Extended Systems."

correct the view that regional regulations do not regulate producer responsibility at all. Gaps are evident in individual producer targets, registration, roadmaps, periodic reports, audits, cost-sharing, data transparency, producer responsibility organizations, and specific sanctions. EPR requires mechanisms that can transform abstract obligations into verifiable financial and operational responsibilities.⁶⁶

4.8 Supporting Governance. Articles 25–31 of Perda 3/2013, together with its supervisory provisions, give supporting governance a high level of alignment: the Regulation provides for incentives, technology, stakeholder participation, data systems, partnerships, and financing mechanisms. These instruments, however, remain framed mainly at the level of general authorization and have not yet been fully operationalized through implementing regulations that specify targets, reporting formats, or monitoring indicators.

5. Reformulation of Waste Management Based on Circular Economy

5.1 Vertical Consistency and Division of Authority.

Perda 3/2013 has a relatively strong vertical consistency with Law Number 18 of 2008. The alignment is evident in the goals of improving health, protecting the environment, and transforming waste into a resource. The division of management into reduction and handling also follows the structure of national law. Regulations regarding waste generation limits, reuse, recycling, sorting, processing, participation, incentives, licensing, supervision, and prohibitions demonstrate the process of translating the national framework to the regional level. This consistency also causes regional regulations to inherit the conceptual limitations of national regulations. Law Number 18 of 2008 was enacted before circular design, the right to repair, material traceability, secondary raw material markets, and recycled material content targets became the main instruments of the circular economy. The orientation of national law still heavily relies on waste management after the product has been used.⁶⁷ The regional regulation replicates that orientation, making its alignment with national law stronger than its alignment with the contemporary circular economy. The division of authority also requires reorganization.⁶⁸ The provincial government essentially plays a role in the formulation of regional policies, coordination, guidance, supervision, facilitation of inter-regional cooperation, and resolution of disputes across districts or cities. Operational services, the establishment of local facilities, as well as some prohibitions and sanctions fall within the jurisdiction of districts or cities. The new regulations need to separate regional policy norms from operational obligations to avoid overlapping authorities. Regional landfill management, integrated data, cross-regional financing, and residue standards can be placed as the main focus of the provincial regional regulation. The strength of the regional regulation lies in the breadth of governance instruments. Community participation, incentives and disincentives, environmentally friendly technology, cooperation, financing, data, education, and campaigns have obtained a legal

⁶⁶ Saurandri P. Cahyati et al., “Rencana aksi nasional memerangi sampah laut sebagai bentuk implementasi SDGs 14: Kehidupan di bawah laut,” *Jurnal Isip Jurnal Ilmu Sosial Dan Ilmu Politik* 17, no. 2 (2023): 96–106, <https://doi.org/10.36451/jisip.v17i2.44>.

⁶⁷ Amalina, “Pendekatan quadruplehelix dalam menanggulangi problematika sampah makanan di Indonesia ditinjau perspektif hukum.”

⁶⁸ Undang-Undang Nomor 23 Tahun 2014 tentang Pemerintahan Daerah, which allocates environmental and waste-management sub-affairs between provincial and district/municipal governments.

basis. These instruments can support the circular transition if translated into measurable targets and programs. Regulation plays an important role in creating incentives for producers and society because changes in the material system cannot be fully left to market voluntarism.⁶⁹

An article-by-article comparison supports this claim for at least two of the eight dimensions. For waste generation prevention (D1), Law Number 18 of 2008 addresses the obligation in Article 20⁷⁰, while Perda 3/2013 operationalizes the same dimension at the regional level through Articles 5–7, Article 25, and Articles 35–36, each scored High in Table 2. For producer responsibility (D7), Law Number 18 of 2008 establishes the obligation in Articles 14–15⁷¹, which Perda 3/2013 translates into Articles 6–9 and Article 31, scored Moderate in Table 2. In both instances the regional regulation extends, without contradicting, its parent legislation, which is consistent with the vertical-consistency claim above. A complete article-by-article mapping for the remaining six dimensions, verified against the consolidated text of Law Number 18 of 2008 and its implementing regulations, is beyond the scope of this article.

5.2 Recommended Reformulation.

The reformulation of Perda 3/2013 should adopt the circular economy as its guiding orientation, organized here by the level of government competent to act, consistent with the division of authority discussed above. At the provincial level — achievable through a direct revision of Perda 3/2013, or, where the scope of change is substantial, a new regional regulation grounded in an academic draft (Naskah Akademik) and included in the Regional Legislation Program (Prolegda) — the management hierarchy needs to place prevention as the first priority, followed by reuse, recycling, resource recovery, and residue processing; this approach will limit the tendency of management to quickly choose destruction or final disposal technologies. Producer responsibility can be strengthened through reduction targets per product category, producer registration, recall obligations, post-consumer financing, periodic reporting, audits, and sanctions for non-compliance, with technical detail delegated to an implementing Gubernatorial Regulation (Peraturan Gubernur). A deposit-return system can likewise be introduced for certain packaging categories, and supporting governance strengthened through a digital data system that records waste generation, composition, material flow, facility performance, producer achievements, and the volume successfully reused or recycled. Fiscal incentives can be directed toward waste banks, 3R waste management sites, recycling SMEs, the informal sector, and businesses that achieve circular economy targets, within the limits that Law Number 1 of 2022 on Financial Relations between the Central Government and Regional Governments⁷² places on provincial taxing, levying, and retribution powers; instruments such as a deposit-return scheme or a landfill tax accordingly require closer examination of their legal basis before they can be adopted at the provincial level. Enforcing these provincial-level norms falls primarily to the Provincial Environmental Agency (Dinas Lingkungan Hidup) for technical supervision and, where the regulation carries administrative sanctions, the Civil Service

⁶⁹ Peng and Shen, “Does Environmental Regulation Affect Circular Economy Performance?”

⁷⁰ Undang-Undang Nomor 18 Tahun 2008 tentang Pengelolaan Sampah, Pasal 20.

⁷¹ Undang-Undang Nomor 18 Tahun 2008 tentang Pengelolaan Sampah, Pasal 14–15.

⁷² Undang-Undang Nomor 1 Tahun 2022 tentang Hubungan Keuangan antara Pemerintah Pusat dan Pemerintahan Daerah.

Police Unit (Satuan Polisi Pamong Praja); the reformulation should specify which agency is responsible for which obligation, since diffuse accountability has limited the enforcement of the current Perda. At the level requiring coordination with district/municipal governments, regional landfill management, cross-regional financing, and harmonized residue standards should be developed jointly. Although village regulations (Peraturan Desa) are not a direct instrument of Perda 3/2013, the province can encourage community-based management at the village level—for example, the establishment and management of waste banks—through its coordinating and capacity-building (pembinaan) role over village governments, rather than through direct regulatory authority over village-level norms.⁷³ Product durability standards, the availability of spare parts, ease of repair, and the use of recycled materials remain upstream matters of product design and national industrial standardization; because these fall outside provincial competence, the more appropriate course is for Gorontalo Province to advocate their adoption to the central government (for example, through the Ministry of Environment and Forestry and the Ministry of Industry) rather than to incorporate them directly into Perda 3/2013, consistent with the authority filter set out in Section 2.

A multi-stakeholder (pentahelix) collaboration model needs to involve the government, industry, the community, higher education institutions, and the informal sector, connecting technological innovation, community capacity, material markets, and policy oversight to support implementation of the reformulated hierarchy described above.

6. Conclusion

This research concludes that Perda 3/2013 has a normative foundation that supports the transition to a circular economy, but its alignment is not yet comprehensive. Of the eight evaluated dimensions, three achieved a high level of alignment (waste generation prevention, material cycle closure, and supporting governance), four a moderate level (product value maintenance, resource efficiency, the life-cycle approach, and producer responsibility), and one a low level (product lifespan extension). The regulation is therefore best characterized as partially rather than fully aligned with the circular economy framework: it retains stronger normative footing at the post-consumption stage than at the upstream, design-based stage where waste prevention originates.

Three concrete steps are recommended. First, Perda 3/2013 should be revised to place the waste management hierarchy—prevention, reuse, repair, recycling, resource recovery, and final processing—as an explicit guiding principle, and to strengthen producer-responsibility provisions through registration, reporting, and auditing mechanisms within provincial authority. Second, the Gorontalo provincial government should issue an implementing gubernatorial regulation setting measurable targets, reporting formats, and a provincial waste information system, since these operational matters do not require statutory amendment. Third, on matters that exceed provincial competence—product durability standards, the right to repair, and recycled-content requirements—the province should pursue policy advocacy to the central government rather than attempt to regulate

⁷³ Novendri M. Nggilu and Mellisa Towadi, “Desain yuridis peraturan desa dalam penanganan sampah melalui bank sampah di Desa Bongo Nol-Gorontalo,” *Das Sein Jurnal Pengabdian Hukum Dan Humaniora* 1, no. 1 (2022): 25–37, <https://doi.org/10.33756/jds.v1i1.9827>.

them directly. This study is limited to a single regional regulation and to documentary analysis without empirical data on implementation; future research could examine implementation outcomes and extend the normative–conceptual fit evaluation to other regional waste regulations in Indonesia.

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