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Developing Legal Metrics for Economic Instruments in Waste Management: A Methodological Proposal

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Abstract

The enforcement of EU environmental law, particularly in waste management, faces persistent challenges of multi-level governance and institutional coordination. The revised Waste Framework Directive (Directive (EU) 2018/851) introduced binding recycling and landfill targets, requiring Member States to combine legal and economic instruments. Spain responded with *Ley 7/2022 de Residuos y Suelos Contaminados para una Economía Circular (LRSCEC)*, which strengthened economic tools such as plastic packaging and landfill taxes, differentiated municipal fees, and extended producer responsibility (EPR) schemes. This paper advances a novel methodological approach to evaluate the effectiveness of these instruments through legal performance indicators (Legal KPIs). While economic and technical assessments are common in environmental policy, standardized tools to measure regulatory effectiveness remain underdeveloped in the legal domain. This gap limits the ability of municipalities and environmental agencies to monitor compliance and enforce obligations effectively.

The proposed framework identifies key dimensions for Legal KPIs, including legal compliance, regulatory coherence, and the behavioural impact of economic instruments. Drawing on doctrinal analysis and interdisciplinary insights from compliance studies and socio-legal theory, it highlights criteria that indicators should capture to assess whether legal obligations translate into effective outcomes. From an enforcement perspective, Legal KPIs can enhance the capacity of local and national authorities by offering objective criteria to detect implementation bottlenecks, improve coordination, and increase transparency. Ultimately, this approach seeks to strengthen the legitimacy and intelligibility of EU environmental law, bridging the gap between formal legal norms and their practical effectiveness in decentralized governance contexts.

Keywords:

Legal indicators, waste management, enforcement, circular economy, regulatory effectiveness.

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I. Introduction

The enforcement of European Union (EU) environmental law has long been recognized as a central challenge for the realization of the Union's ambitious sustainability objectives². Waste management, in particular, stands out as an area where regulatory effectiveness is crucial but complex³. The Circular Economy Action Plan, adopted in 2015 and revised in 2020⁴, marked a decisive shift in EU waste law, leading to the adoption of the amended Waste Framework Directive in 2018 through Directives (EU) 2018/850, 2018/851, and 2018/852, collectively known as the Circular Economy Package. This revised framework aims to improve resource efficiency, encourage the use of waste as a valuable resource, decrease dependence on imported raw materials, and support the transition towards more sustainable material management and a circular economy. To meet the established EU targets, Member States must ensure the preparation of municipal waste for reuse and recycling at a minimum of 55% by weight by 2025, 60% by 2030, and 65% by 2035. These objectives embody not only a technical ambition but also a profound legal transformation, requiring Member States to deploy a mix of regulatory and economic instruments capable of reshaping local practices and citizen behaviour. Spain illustrates the magnitude of these challenges and also provides the context in which this paper situates its analysis. Despite substantial reforms, including the enactment of *Ley 7/2022 de Residuos y Suelos Contaminados para una Economía Circular (LRSCEC)*, the country's municipal waste recycling rate stood at 39% in 2022—significantly below the estimated EU-27 average of 49%⁵. LRSCEC seeks to address this structural deficit by introducing a new generation of instruments, notably taxes on single-use plastic packaging and landfill disposal, differentiated municipal waste fees, and an enhanced extended producer responsibility (EPR) regime. These measures are designed to incentivize prevention, reuse, and recycling, while disincentivizing landfilling. Yet, their success ultimately depends on effective enforcement and on the capacity of institutions at multiple governance levels to translate legal norms into practice⁶. For this reason, the Spanish case is not treated here merely as a national example, but as a representative context to illustrate the broader argument: the need for legal performance indicators that can provide objective criteria to assess regulatory effectiveness and guide local governance under the EU's circular economy framework.

It is precisely here that a persistent gap emerges. Whereas economic and technical indicators of performance are well-established in waste management, the legal dimension of effectiveness remains underdeveloped. To date, the development of legal indicators for evaluating the effectiveness of regulations has been limited. Partial approaches exist, such as economic indicators developed by the International Finance Corporation of the World Bank Group or those related to the psychological perception of law⁷. Legal literature has also examined questions about the timing and rationale for developing such indicators, their reliability, and even the advisability of regulating them⁸. A broader approach has been proposed by Michel Prieur and Christophe

² Florentin Blanc and others, 'Environmental Law', *Research Handbook on the Enforcement of EU Law* (Edward Elgar Publishing 2023).

³ Grazia Cecere and Nicoletta Corrocher, 'Stringency of Regulation and Innovation in Waste Management: An Empirical Analysis on EU Countries' (2016) 23 *Industry and Innovation* 625; Itziar Sobrino García, 'Fomentando Una Economía Circular En La Unión Europea: Experiencias Anteriores y Comienzo Del Sistema de Depósito, Devolución y Retorno En Portugal Para La Gestión de Residuos de Envases' (2023) 23 *A&C - Revista de Direito Administrativo & Constitucional* 11.

⁴ Looking forward, the Commission launched in August 2025 a public consultation on the forthcoming Circular Economy Act, expected in 2026, which seeks to strengthen the Single Market for secondary raw materials and stimulate both supply and demand for high-quality recycled content across the EU.

⁵ Data extracted from the report "Waste management country profile with a focus on municipal and packaging waste. Spain" (March 2025), published by the European Environment Agency.

⁶ Juan José Pernas, 'El Impacto Transformador de La Ley 7/2022, de 8 de Abril, de Residuos y Suelos Contaminados Para Una Economía Circular En La Gestión Municipal de Residuos de Competencia Local' [2023] *Anuario de Derecho Municipal* 105.

⁷ Balmer Nigel J and Pleasence Pascoe, *Legal Confidence and Attitudes to Law: Baseline Measures and Social Patterning* (PPSR 2018).

⁸ Kevin E Davis, 'Legal Indicators: The Power of Quantitative Measures of Law' (2014) 10 *Annual Review of Law and Social Science* 37; David Restrepo Amariles, 'Legal Indicators, Global Law and Legal Pluralism: An Introduction' (2015) 47 *The Journal of Legal Pluralism and Unofficial Law* 9; Mila Versteeg and Tom Ginsburg, 'Measuring the Rule of Law: A Comparison of Indicators' (2017) 42 *Law & Social Inquiry* 100.

Bastin⁹, who developed a methodological foundation for measuring effectiveness in environmental law in general. Yet, its specific application to waste management remains an unexplored area. In the absence of standardized tools for measuring legal compliance and regulatory coherence, enforcement agencies—particularly municipalities entrusted with waste collection and management—lack objective criteria to monitor progress, identify bottlenecks, and ensure coordination with national and EU obligations.

Against this background, this paper explores the potential of Legal Key Performance Indicators (Legal KPIs) as a methodological innovation for strengthening the enforcement of EU waste law. Legal KPIs are conceived as structured tools for assessing whether legal obligations are complied with, coherent across governance levels, and capable of generating the behavioural effects for which they were designed. The central argument is that Legal KPIs can complement existing economic and technical evaluations by explicitly addressing the normative dimension of waste regulation. By offering objective and transparent criteria, they can enhance the capacity of municipalities, environmental agencies, and national authorities to monitor compliance, identify bottlenecks, and coordinate more effectively.

The contribution proceeds in three main steps. First, it situates waste law within the broader literature on multi-level governance and regulatory effectiveness, identifying the theoretical foundations for Legal KPIs. Second, it turns to the Spanish case, not as an empirical study but as an illustrative context of the tensions and questions that justify the need for new evaluative tools. Third, it develops a preliminary framework for Legal KPIs, proposing dimensions and criteria—compliance, coherence, institutional capacity, behavioural impact, and legitimacy—that can guide future research. The paper concludes by underlining the preliminary character of this proposal, which will be progressively developed and tested within the framework of the LEGISWASTE project, funded by the Spanish Ministry of Science and Innovation.

II. Multi-level Governance and Regulatory Effectiveness in Waste Management

II.1 Multi-level governance in EU waste law

The governance of environmental law in EU is characterized by a distribution of competences across several levels of authority. The EU sets binding objectives through directives; Member States are responsible for transposition and coordination; and local entities—above all municipalities—are tasked with the operational realities of implementation. This model reflects the principles of subsidiarity and proportionality but introduces significant challenges of coordination and accountability. Waste management exemplifies these dynamics. At the EU level, the Waste Framework Directive (Directive (EU) 2018/851) defines recycling targets, obligations for separate collection, and the promotion of economic instruments consistent with the waste hierarchy. National governments, in turn, must adapt these provisions to their legal systems, often through complex frameworks involving multiple ministries and agencies. At the local level, municipalities provide collection services, regulate local waste fees, and contract waste operators. This creates a multi-tiered enforcement system that can lead to duplication, inconsistency, or weak monitoring.

The literature on multi-level governance¹⁰ highlights both opportunities and risks in such arrangements. On one hand, multi-level governance allows flexibility and contextual adaptation; on the other, it creates fragmentation, blame-shifting, and uneven compliance across territories. These tensions are particularly acute in waste management, where enforcement relies heavily on municipal resources and where disparities between large and small municipalities are stark.

II.2 Effectiveness and compliance in environmental regulation

⁹ Michel Prieur, Christophe Bastin and Ali Mekouar, *Midiendo La Efectividad Del Derecho Ambiental: Indicadores Jurídicos Para El Desarrollo Sostenible* (Michel Prieur, Christophe Bastin and Ali Mekouar eds, Peter Lang Verlag 2021).

¹⁰ Jenny Fairbrass and Andrew Jordan, 'Multi-Level Governance and Environmental Policy' in I Bache and M Flinders (eds), *Multi-Level Governance* (Oxford University Press 2004); Gianluca Ferraro and Pierre Failler, 'Biodiversity, Multi-Level Governance, and Policy Implementation in Europe: A Comparative Analysis at the Subnational Level' (2024) 44 *Journal of Public Policy* 546; Jens Newig and Tomas M Koontz, 'Multi-Level Governance, Policy Implementation and Participation: The EU's Mandated Participatory Planning Approach to Implementing Environmental Policy' (2014) 21 *Journal of European Public Policy* 248.

The effectiveness of environmental law is often evaluated through compliance theory, which focuses on the adherence of regulated entities to legal requirements¹¹. Compliance, however, is not solely a matter of legal obligation; it is influenced by economic incentives, social norms, and the perceived legitimacy of regulation¹². In the environmental field, effectiveness is often measured in terms of outcomes—such as recycling rates or reductions in landfill use—yet these indicators capture only part of the picture. Legal scholars have increasingly argued that effectiveness must also encompass the quality of legal design and enforcement¹³. A directive may set ambitious targets, but without coherent transposition or adequate enforcement tools, the expected results may not materialize. Moreover, enforcement agencies often face resource constraints, political pressures, or conflicting priorities, which affect their ability to ensure compliance¹⁴. This is especially problematic in multi-level governance systems, where vertical inconsistencies (between EU, national, and local norms) and horizontal inconsistencies (between municipalities) coexist. For instance, ambitious EU targets may not consider the resource constraints of rural municipalities, while national transposition may leave excessive discretion that leads to fragmented local practice¹⁵.

Legal scholarship has noted the lack of standardized methodologies for assessing the regulatory effectiveness of law. Although economic indicators exist (e.g. IFC, World Bank), and socio-legal studies have examined perceptions of law¹⁶.

Prieur, Bastin and Mekouar¹⁷ have advanced a methodological foundation for measuring effectiveness in environmental law, but its application to waste management is still unexplored. The Spanish case illustrates this regulatory gap: despite comprehensive reforms under LRSCEC, progress towards EU recycling targets remains insufficient, reflecting not only infrastructural deficits but also limitations in enforcement capacity and legal design. This reinforces the need for an evaluative framework that captures the normative dimension of regulation.

II.3 Conceptual foundations for developing Legal KPIs

Building on the discussion of effectiveness and compliance, it becomes clear that traditional approaches—whether based on recycling rates, technical efficiency, or economic instruments—offer only a partial account of how environmental law operates in practice. What remains underexplored is a systematic way of evaluating the legal dimension of effectiveness: whether rules are coherent across governance levels, enforceable by institutions with limited resources, and legitimate in the eyes of those subject to them. This gap calls for the development of *Legal Key Performance Indicators* (Legal KPIs), conceived as structured tools to capture not only compliance outcomes but also the normative, institutional, and behavioural conditions that determine whether waste legislation fulfils its intended objectives.

The rationale for Legal KPIs emerges directly from the challenges highlighted in the previous sections. The analysis of multi-level governance showed how fragmentation creates vertical inconsistencies between EU, national, and local levels, as well as horizontal disparities between municipalities. The discussion on effectiveness and compliance revealed the insufficiency of outcome-based measures to explain why legal obligations succeed or fail, pointing instead to issues of institutional capacity, regulatory design, and perceived legitimacy. Legal KPIs respond to these shortcomings by offering a set of evaluative dimensions that reflect both the normative qualities of regulation and the institutional conditions of enforcement. While discussions

¹¹ Dyah Mustika Prasetyaningsih and others, 'Effectiveness of Environmental Law Implementation: Compliance and Enforcement' [2022] *Volkgeist: Jurnal Ilmu Hukum dan Konstitusi* 215.

¹² N Gunningham, 'Enforcing Environmental Regulation' (2011) 23 *Journal of Environmental Law* 169.

¹³ Maria De Benedetto, 'Effective Law from a Regulatory and Administrative Law Perspective' (2018) 9 *European Journal of Risk Regulation* 391; Mousmouti Maria, 'Effectiveness as an Aspect of Quality of EU Legislation: Is It Feasible?' (2014) 2 *The Theory and Practice of Legislation*, 309.

¹⁴ Marie-Thérèse Wilhelm, 'Subnational Trouble? Party System Nationalisation, Issue Salience, and Capacity Constraints in Spain's Infringements of European Environmental Directives' [2025] *South European Society and Politics* 1.

¹⁵ Itziar Sobrino-García, 'European Waste Management Regulations in Spanish Local Administrations: Compliance Assessment and Integration Frontiers' (2025) 33 *Sustainable Development* 2553.

¹⁶ Davis (n 5); Restrepo Amariles (n 5).

¹⁷ Prieur, Bastin and Mekouar (n 6).

on legal indicators are not new¹⁸, their adaptation as *Key Performance Indicators* in environmental and regulatory contexts remains largely unexplored. The proposal advanced here is innovative because it draws from the managerial logic of performance measurement—familiar from corporate governance, the Sustainable Development Goals (SDGs), and international law reporting—but reorients it towards the internal logic of law. Instead of focusing on efficiency or outputs, Legal KPIs are designed to assess compliance, coherence, and behavioural change. This methodological shift transforms performance evaluation from an economic exercise into a tool for understanding how legal norms operate within complex governance systems. Consequently, Legal KPIs should capture at least five interrelated dimensions:

- Legal compliance addresses the most basic measure of effectiveness—whether obligations are fulfilled in practice.
- Regulatory coherence captures the need for consistency in multi-level governance, reducing contradictions between EU directives, national laws, and local ordinances.
- Institutional capacity highlights that effectiveness depends not only on legal design but also on the ability of institutions, particularly municipalities, to implement and monitor compliance.
- Behavioural impact ensures that indicators account for the extent to which instruments such as landfill taxes or EPR schemes achieve their intended effect of modifying conduct.
- Legitimacy and transparency reflect the insight that compliance is influenced not only by deterrence but also by whether regulated actors perceive legal obligations as fair, clear, and enforceable.

Together, these dimensions shift the focus from outcomes alone to the structural and normative qualities that determine whether EU waste law can be effectively implemented in a fragmented, multi-level governance system.

III. The Spanish Case: LRSCEC as a Context for Legal KPIs

Spain provides a particularly revealing context in which to consider the challenges of evaluating the effectiveness of waste regulation. For more than a decade, the country has struggled to meet EU recycling targets: in 2022, municipal recycling stood at just 39%, compared with an EU-27 average of 49%. Nearly half of Spain's municipal waste continues to be landfilled. These figures suggest that the problem cannot be explained solely in terms of infrastructure or citizen behaviour. They also point to questions about how legal obligations are designed, coordinated, and enforced.

The *Ley 7/2022 de Residuos y Suelos Contaminados para una Economía Circular* (LRSCEC) was intended to be a turning point. It transposes the EU Circular Economy Package and introduces a suite of new legal and economic instruments: taxes on landfill and incineration, a levy on non-reusable plastic packaging, reinforced extended producer responsibility (EPR), and new obligations for separate collection. Most strikingly, Article 11 requires municipalities to create a specific, non-deficit fee for waste management, reflecting the real costs of collection, transport, treatment, monitoring, awareness campaigns, and post-closure landfill maintenance. It also opens the door to pay-as-you-throw (PAYT) systems, linking household charges to the quantity of waste generated. These provisions reflect the ambition of aligning Spanish law with EU objectives while reshaping the incentives faced by households, municipalities, and producers. Yet, when viewed through the lens of enforcement, they expose deeper legal and institutional tensions.

The new economic instruments introduced by LRSCEC illustrate well the potential—and the limits—of regulation. A landfill tax may internalise environmental costs, but its effectiveness depends on whether municipalities have viable alternatives to disposal. A tax on plastic packaging may encourage substitution, but only if enforcement is consistent and monitoring is robust. EPR schemes extend producer liability, yet their performance often hinges on the strength of oversight and the avoidance of free-riding. Article 11 provides perhaps the clearest example. On paper, it is a powerful innovation: by obliging municipalities to align fees with real costs, it promises to end the practice of under-pricing waste services and create the conditions for behavioural change. But its practical implementation reveals multiple layers of difficulty. Large urban municipalities such as Madrid or Barcelona face the technical challenge of individualising PAYT in dense

¹⁸ Restrepo Amariles (n 5); Versteeg and Ginsburg (n 5); Bilal Butt, 'Environmental Indicators and Governance' (2018) 32 *Current Opinion in Environmental Sustainability* 84; Charles Tremper, Sue Thomas and Alexander C Wagenaar, 'Measuring Law for Evaluation Research' (2010) 34 *Evaluation Review* 242; Davis (n 5).

housing contexts, where distinguishing waste generation per household is far from straightforward. Smaller municipalities, by contrast, often lack the financial and technical capacity to design cost-reflective fees at all. In both cases, the obligation exposes the disparities in municipal capacity¹⁹.

Secondly, legal uncertainty and delay have historically hindered Spain's compliance with EU waste legislation²⁰. The late transposition of the Waste Framework Directive created uncertainty regarding local obligations and led to inconsistent enforcement across regions. LRSCEC has sought to close these gaps, but ambiguities remain, particularly concerning the coordination between municipal and regional authorities. Finally, political and social resistance poses an additional barrier²¹. Waste fees and PAYT schemes often face opposition from citizens and local stakeholders, who perceive them as new taxes rather than cost-reflective instruments. Similarly, the siting of waste facilities continues to generate local conflicts, undermining political will to enforce unpopular measures. Collectively, these challenges demonstrate that legal effectiveness cannot be assessed solely through recycling rates or landfill figures. The obstacles lie as much in legal design, coherence, and institutional capacity as in technical performance. Hence, Spain provides an appropriate context to illustrate the added value of Legal KPIs.

III.2. Why the Spanish case matters for Legal KPIs

The Spanish case does not provide definitive answers, but it helps us to sharpen the questions. Its recent reforms illustrate the ambition of the EU Circular Economy Package and the willingness of Member States to experiment with economic and legal tools such as landfill taxes, packaging levies, and PAYT fees. Yet the difficulties faced by municipalities in applying these instruments expose the limits of measuring effectiveness through technical or economic outcomes alone. The discussion in this section suggests that what is at stake is not simply whether recycling rates increase, but whether the *legal system itself* is functioning as intended. Are municipalities complying with their obligation to create cost-reflective fees within the prescribed timeframe? Are national, regional, and local rules coherent, or do they pull in different directions? Do municipalities have the institutional capacity to implement PAYT fairly, and do these instruments actually change household behaviour? Finally, do citizens perceive the resulting fees as transparent and equitable, or as arbitrary impositions?

These are precisely the types of questions that Legal KPIs are intended to address. They shift the focus from outcomes to the *conditions of legality*—compliance, coherence, capacity, behavioural impact, and legitimacy—that determine whether formal norms translate into effective governance. Spain, with its ambitious but unevenly implemented legal reforms, offers a concrete context in which these dimensions become visible. The value of the Spanish case, then, lies not in its uniqueness but in its representativeness. The tensions it reveals—between ambition and capacity, centralisation and local discretion, legality and legitimacy—are likely to be found across the EU. By highlighting these tensions, Spain functions as a testing ground for the methodological approach proposed in this paper. It shows why law must be made measurable in its own terms, and why the development of Legal KPIs is necessary to bridge the gap between legal norms and their practical effectiveness in decentralised governance contexts. The Spanish case has not been analysed here to test the Legal KPIs themselves, but rather to expose the types of legal and institutional tensions that such indicators should be able to capture. At this preliminary stage, it functions as an illustrative context that informs the conceptual development presented in Section IV, helping to reveal where and why law's effectiveness can weaken in practice. However, Spain will also serve a more substantive role in the future: within the framework of the LEGISWASTE project, it will operate as a testing ground—a “living laboratory”—for the progressive development and empirical application of the Legal KPI methodology. In this way, the Spanish experience bridges the current theoretical proposal and its forthcoming implementation, linking conceptual reflection with future methodological experimentation.

IV. Towards a Framework for Legal Performance Indicators

¹⁹ Juan Jose Pernas-García and Jennifer Sánchez-González, ‘Hacia Una Gestión Local Estratégica de Los Residuos Municipales: Los Programas Locales de Prevención y Gestión y Su Interrelación Con Los Instrumentos Jurídicos de La Ley 7/2022’ [2024] Cuadernos de Derecho Local 75.

²⁰ Sobrino-García (n 12).

²¹ Wilhelm (n 11).

The purpose of this section is not to provide a definitive set of legal metrics, but rather to outline a methodological proposal to guide future research. The development of legal key performance indicators (Legal KPIs) is still in its infancy, and their empirical application will necessarily depend on the LEGISWASTE project's ongoing work. For now, we can identify the key dimensions that such indicators should capture by drawing on legal doctrine and insights from compliance studies and socio-legal theory. The starting point is a simple yet frequently overlooked observation: the effectiveness of economic instruments in waste management is not only a technical or financial matter, but a legal one too. Taxes on landfill or plastic packaging, PAYT schemes and EPR systems all rely on legal obligations. Whether these instruments succeed or fail depends largely on whether these obligations are complied with, whether they are coherent across different levels of governance, and whether they can produce the behavioural changes they were designed to achieve.

This section constitutes the methodological core of the paper. It develops a preliminary framework for Legal KPIs, identifying their guiding principles and substantive dimensions. The aim is not to propose operational indicators, but to lay the conceptual groundwork for their future development. The framework combines doctrinal legal reasoning with insights from compliance studies and socio-legal theory, situating law within a broader understanding of behavioural, institutional, and normative effectiveness.

However, the law lacks the kind of structured evaluative tools that economics and engineering have long relied on. While recycling rates, cost recovery ratios and landfill figures tell us something about outcomes, they tell us little about whether the legal mechanisms underpinning those outcomes are functioning effectively. To address this issue, Legal KPIs have been developed to make the legal dimension of effectiveness more visible.

But this requires more than just measuring compliance. A methodological framework must consider three interrelated dimensions. The first is legal compliance, which is understood not only as formal conformity, but also as the capacity of institutions and individuals to fulfil their obligations in practice. Secondly, regulatory coherence must be addressed, which involves ensuring consistency of legal rules across governance levels and avoiding contradictions that would weaken enforcement. Thirdly, we must consider the behavioural impact of economic instruments, recognising that their effectiveness ultimately depends on whether they shape the practices of producers, consumers and public authorities. While these dimensions do not exhaust the possibilities, they provide a preliminary foundation. They are not indicators themselves, but rather criteria for developing indicators — a conceptual map that highlights what needs to be captured in order to assess whether legal obligations result in effective outcomes.

This is not to suggest that law should be reduced to numbers, or that complexity can be eliminated through measurement. The ambition behind Legal KPIs is more modest but also more urgent: to find ways of asking whether legal obligations are functioning — whether they are coherent, enforceable, and capable of producing the behavioural effects they were designed for. Indicators are not ends in themselves but tools for reflection, coordination, and accountability.

IV.1. Principles for Legal KPIs

If Legal KPIs are to make a meaningful contribution to the evaluation of economic instruments in waste management, they cannot simply replicate the logic of economic or technical indicators. Rather than measuring tonnes recycled or costs recovered — valuable as these data are — their purpose is to illuminate the specifically legal dimensions of effectiveness: how obligations are defined, how they operate within complex governance systems, and how they are experienced by those subject to them. For this reason, any methodological framework for legal KPIs must be guided by a set of principles that safeguard the normative integrity of law, while enabling that integrity to be translated into evaluative criteria. Five principles are particularly important at this preliminary stage: normativity, operationalisability, comparability, transparency and legitimacy, and complementarity.

The first and most fundamental principle is that Legal KPIs must be rooted in the normative content of law. Unlike technical indicators, which capture material outputs (e.g. recycling rates), or economic indicators, which measure financial performance (e.g. cost recovery), Legal KPIs must ask whether legal obligations are being fulfilled as law. This requires careful attention to the way norms are articulated in legislation, regulations, and administrative practice. By mapping the specific obligations that apply to municipalities, producers, or consumers—for example, the obligation to establish differentiated waste fees or to ensure separate collection—researchers can identify points where legal compliance is either achieved or undermined. This approach guards

against the risk of reducing law to a series of functional outcomes. Instead, it treats law as a normative system with its own criteria of validity, coherence, and enforceability.

At the same time, indicators must be operationalisable. A purely doctrinal framework would struggle to inform policy or practice. The challenge lies in translating normative requirements into criteria that can be observed and assessed without losing their legal meaning. In this regard, insights from compliance studies are valuable. Research in this field has shown that compliance is not a binary phenomenon of obeying or disobeying, but rather a spectrum shaped by clarity, feasibility, monitoring and enforcement. Legal KPIs should therefore capture not only whether an obligation exists, but also whether the institutional and behavioural conditions necessary for its fulfilment are present. For instance, rather than simply asking whether municipalities “have” a PAYT fee, indicators might look at whether the fee structure reflects the actual costs of waste management, whether it is accompanied by adequate monitoring mechanisms, and whether it has been implemented within the timeframe required by law.

A third principle is comparability. For Legal KPIs to be useful in multi-level governance systems such as the EU, they must allow meaningful analysis across different jurisdictions—between municipalities, regions, or Member States. Without comparability, indicators risk becoming parochial, capturing only local peculiarities rather than broader patterns of effectiveness. Comparability does not mean uniformity. It is unrealistic to expect that every municipality can or should perform in the same way. But it does require a common framework for assessing whether legal obligations are being met. For example, one could compare the proportion of municipalities that have adopted waste ordinances within a legally prescribed timeframe, while recognising that the content of those ordinances may vary.

Fourth, Legal KPIs must embody the principles of transparency and legitimacy. Indicators are not only tools for monitoring; they are also instruments of accountability. If poorly designed, they risk reinforcing technocratic control or obscuring the reasons why certain actors struggle to comply. If designed with care, they can strengthen the legitimacy of enforcement by making the criteria of evaluation visible, accessible, and contestable. Socio-legal theory offers important insights here. Scholars have shown that compliance often depends less on fear of sanctions than on perceptions of fairness and procedural justice²². Legal KPIs should therefore not only measure whether rules are applied but also consider whether those rules are intelligible and whether enforcement practices are perceived as equitable. For example, an indicator might assess the degree to which municipalities provide transparent information about waste fees, or whether citizens have access to mechanisms for challenging them. Such measures would not only track compliance but also evaluate the legitimacy of the legal framework itself.

Finally, it is important to understand that Legal KPIs are complementary, not substitute, to existing economic or technical metrics. The intention is not to create an alternative universe of legal data, but rather to provide an additional dimension to the evaluative toolkit. Working alongside recycling rates, cost-recovery figures or environmental impact assessments, Legal KPIs can explain why certain targets are met or missed and identify legal or institutional bottlenecks. Indicators that ignore technical or financial realities would be as incomplete as purely technical or economic ones. The strength of Legal KPIs lies in their ability to integrate with other forms of knowledge to produce a more comprehensive understanding of regulatory effectiveness.

IV.2. Core dimensions for Legal KPIs

The principles outlined above establish the epistemological foundations for Legal KPIs, how they should be constructed and what they must respect as evaluative tools. The dimensions that follow translate those principles into substantive areas of assessment. Whereas the principles address *how* indicators should be built (normativity, operationalisability, comparability, transparency, complementarity), the dimensions describe *what* they should measure (compliance, coherence, capacity, behavioural impact, legitimacy). These dimensions are not finished indicators, nor should they be read as definitive categories. They function instead as conceptual lenses that highlight the legal and institutional conditions that shape effectiveness. Their value lies in drawing attention to what is too often overlooked in technical and economic assessments: that law has its own criteria of validity, coherence, and enforceability. This proposal builds on the pioneering work of

²² Shubhangi Roy, ‘Understanding the Role of Procedural Justice in Compliance Through the Integrated Framework’ (2024); Kristina Murphy, Ben Bradford and Jonathan Jackson, ‘Motivating Compliance Behavior Among Offenders’ (2016) 43 *Criminal Justice and Behavior* 102.

Prieur, Bastin and Mekouar²³, who identified six factors for evaluating the application of environmental law: the existence and sources of regulations, the applicability of legal provisions, the substance of laws, the organizational and institutional structures, the enforcement and control mechanisms, and the non-legal factors influencing implementation. These factors provide a valuable starting point for thinking about effectiveness in environmental law more generally. The framework advanced here adapts this insight to the specific case of waste regulation and economic instruments, condensing and reorienting the analysis into five interconnected dimensions: legal compliance, regulatory coherence, institutional capacity, behavioural impact, and legitimacy and transparency.

The first dimension is legal compliance. At its most basic level, compliance means meeting obligations: for example, whether municipalities establish waste fees on time, whether producers fulfil their extended responsibility duties, and whether households participate in separate waste collection. However, compliance is rarely so straightforward. As studies of compliance have shown, actors may formally comply with the law while undermining its spirit or fail to comply for reasons unrelated to intentional resistance. For Legal KPIs, the challenge lies in capturing not just the presence or absence of compliance, but also its quality. Are obligations being fulfilled in substance as well as in form? Were failures due to a lack of clarity, insufficient resources or ineffective monitoring? Treating compliance as a process rather than a binary outcome enables us to ascertain whether legal obligations are functioning effectively.

The second dimension is regulatory coherence. In multi-level governance systems, effectiveness depends not only on compliance, but also on whether the rules fit together to form a consistent whole. EU directives must be transposed into national legislation, filtered through regional regulation and implemented by municipalities. At any of these levels, gaps or inconsistencies can weaken enforcement. Horizontally, divergence among municipalities can create uncertainty or inequality. In this area, legal KPIs would not demand uniformity, but would highlight where fragmentation or contradiction undermines effectiveness. For example, do municipal ordinances align with national frameworks? Do regional variations reflect legitimate adaptation or problematic divergence? Coherence reveals the hidden architecture of governance.

Thirdly, institutional capacity is essential. The effectiveness of law enforcement depends on the institutions responsible for it. Municipalities cannot be expected to create cost-reflective waste fees or operate PAYT schemes if they lack the financial means or technical expertise. Similarly, ambitious producer responsibility systems will collapse if the relevant agencies lack the staff to monitor them. Institutional capacity is a prerequisite for compliance and a catalyst for behavioural change. Legal KPIs would therefore assess whether institutions have the necessary resources, authority and organisational structures to fulfil their legal duties. This dimension is directly connected to Prieur, Bastin and Mekouar's emphasis on institutional structures and enforcement mechanisms.

Fourthly, behavioural impact reflects the fact that economic instruments are designed to influence practices. Taxes and fees are not ends in themselves; they are tools designed to discourage disposal, encourage prevention or incentivise separation. However, their success depends on their legal enforceability and intelligibility. For example, a landfill tax without monitoring would be ineffective, and a PAYT scheme that is perceived as unfair could lead to resistance or illegal dumping. As March and Olsen's theory of the "logic of appropriateness"²⁴ suggests, actors do not simply respond to material incentives but to social norms and perceptions of legitimacy. Understanding behavioural impact in law therefore requires examining whether legal obligations are seen as appropriate, expected, and fair, rather than merely calculating economic reactions to sanctions or rewards.

Finally, for the law to be durable, legitimacy and transparency are critical. Legal effectiveness cannot rely solely on coercion; it depends on whether those subject to the law perceive it to be fair, understandable, and open to challenge. Socio-legal research has long demonstrated that compliance is higher when rules are perceived as legitimate and procedures are transparent. In the context of waste regulation, this means ensuring that citizens understand how fees are set, have access to information on enforcement and can contest unfair treatment. Legal KPIs should therefore incorporate legitimacy as a measurable criterion, not a vague aspiration. Without this, even technically sound and economically efficient instruments may falter.

²³ Prieur, Bastin and Mekouar (n 6).

²⁴ James G March and Johan P Olsen, 'The New Institutionalism: Organizational Factors in Political Life' (1983) 78 *American Political Science Review* 734.

These five dimensions overlap and reinforce one another. Compliance depends on capacity, coherence supports legitimacy and behavioural impact is shaped by perceptions of fairness. Together, they adapt Prieur, Bastin and Mekouar's broad evaluative categories to the specific challenge of economic instruments in waste management, providing a conceptual foundation for developing legal KPIs. The purpose of these KPIs is not to close the debate, but to open it by offering criteria that can be refined, tested and contested by future research. Each dimension reframes the question 'Is the law working?' into more specific questions: Are obligations being fulfilled? Are the rules coherent? Are the institutions equipped? Have behaviours changed? Are citizens engaged? By articulating these dimensions, this proposal aims to shift the focus of the debate from outcomes to the conditions that make them possible. Understood in this way, Legal KPIs complement technical and economic indicators by revealing the legal structures that shape effectiveness. Rather than competing with other forms of measurement, they provide a structured way to evaluate the functioning of legal norms themselves.

Legal KPIs are conceived as interdisciplinary tools serving both research and policy practice. For academics, they provide a structured method to analyse the functioning of legal systems; for policymakers and regulators, they can act as diagnostic instruments to identify legal bottlenecks, coordinate enforcement, and enhance accountability. These indicators could be integrated into interpretative guidance, ex post policy evaluations, or comparative legal studies. Although this framework is developed in the context of waste management, its logic can be extended to other policy areas where economic instruments play a key role—such as water pricing, energy efficiency, or air pollution control—offering a transferable approach to assessing legal effectiveness across sectors.

V. Conclusions

This paper argues for the development of Legal Key Performance Indicators (Legal KPIs) as a methodological innovation for assessing the effectiveness of economic instruments in waste management. Although recycling rates, landfill statistics and cost-recovery ratios offer valuable insights into technical and economic performance, they do not address the question of compliance with legal obligations, the coherence of governance systems, or the behavioural and legitimacy effects of instruments. Legal KPIs address this gap by offering structured criteria for evaluating the legal dimension of effectiveness — criteria that complement existing forms of assessment rather than replacing them. The framework proposed here is necessarily preliminary. It does not yet deliver operational indicators, but it identifies the key dimensions that should guide their development: compliance, coherence, institutional capacity, behavioural impact and legitimacy. Grounded in doctrinal analysis and informed by compliance studies and socio-legal theory, these dimensions emphasise that effectiveness is not only about outcomes, but also about the institutional and normative conditions that enable those outcomes to occur. By making these conditions visible, legal KPIs can strengthen enforcement, improve coordination across governance levels and enhance the legitimacy of environmental law. Spain provides a particularly relevant context in which to advance this research agenda. The ambitious reforms introduced by Ley 7/2022, and the challenges involved in implementing them at a municipal level, provide a concrete testing ground for identifying how legal KPIs might be designed and applied. While the Spanish case is illustrative rather than definitive, it sheds light on the wider issues of compliance, coherence and capacity affecting waste governance throughout the European Union. Ultimately, this proposal marks the start of a longer process. The empirical development and testing of legal KPIs will be carried out progressively within the framework of the LEGISWASTE project, which is funded by the Spanish Ministry of Science and Innovation and directed by the author as principal investigator. Therefore, the contribution of this paper is not to close the debate, but to open it, providing a foundation for future research and a pathway towards making law measurable in its own terms. As a preliminary methodological proposal, this framework opens the way for future theoretical refinement and empirical testing. These next stages will be carried out within the LEGISWASTE project, where Legal KPIs will be progressively developed and adapted for comparative application beyond Spain.

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