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A Comprehensive Taxonomy of Rules for Nuanced Analysis of Governance Systems

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Palabras Clave: acción colectiva | marco IAD | instituciones | normas | tipología de reglas | sistema socioecológico

ABSTRACT

Understanding how institutions shape collective action requires analytical tools that capture the complexity of governance arrangements. Ostrom's typology of rules provides a foundational framework for examining institutional configurations, yet limited specificity in rule types reduces its effectiveness in comparative analysis. To address this, we present a detailed classification of the seven rule types into subtypes, enhancing the study of institutional diversity and structure. Based on the initial description of the seven rule types, a systematic review of scientific articles, an analysis of written regulations, and an internal mutual exclusivity check, we propose a taxonomy that expands the seven types into subtypes. Utilizing these detailed subtypes enables a more comprehensive characterization of institutional configurations, thereby strengthening comparisons of governance systems.

摘要

为了理解制度如何影响集体行动, 需要能够描述治理安排复杂性的分析工具。奥斯特罗姆(Ostrom)提出的规则类型学为考察制度配置一事提供了一个基础框架, 但其规则类型划分的精细度有限, 从而削弱了其在比较分析中的效力。为解决这一问题, 我们对七类规则进行了细致的子类型划分, 以深化对制度多样性及结构的探讨。基于对这七类规则的既有描述、对相关学术文献的系统性综述、对成文规则的分析以及内部互斥性检验, 我们提出了一套将七类规则扩展为若干子类型的分类体系。利用这些详尽的子类型, 能够更全面地刻画制度配置特征, 进而增强对不同治理体系进行比较分析的能力。

RESUMEN

Para comprender cómo las instituciones configuran la acción colectiva, se requieren herramientas analíticas que capten la complejidad de los mecanismos de gobernanza. La tipología de reglas de Ostrom proporciona un marco fundamental para examinar las configuraciones institucionales; sin embargo, la especificidad limitada de los tipos de reglas reduce su eficacia en el análisis comparativo. Para abordar esta limitación, presentamos una clasificación detallada de los siete tipos de reglas en subtipos, lo que enriquece el estudio de la diversidad y la estructura institucional. A partir de la descripción inicial de los siete tipos de reglas, una revisión sistemática de artículos científicos, un análisis de reglamentos escritos y una verificación interna de exclusividad mutua, proponemos una taxonomía que amplía los siete tipos a subtipos. La utilización de estos subtipos detallados permite una caracterización más completa de las configuraciones institucionales, fortaleciendo así las comparaciones entre los sistemas de gobernanza.

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1 | Introduction

Effective governance relies on well-aligned institutions that guide individuals in organizing repeated and structured interactions. Institutions comprise the set of statements, including rules, norms, and shared strategies, that dictate required, prohibited, or permitted actions, in specific contexts such as the use of common-pool and public resources. Their diversity is considerable, reflecting differences in organizational forms, cultural and historical trajectories, ecological settings, and goals that shape institutions adapted to particular governance challenges. Capturing this diversity requires systematic classifications that allow both longitudinal and cross-sectional analysis, enabling researchers to qualitatively and quantitatively compare governance structures, trace their evolution across time and space, inform policy design, or examine their governance outcomes, among other applications. Such comprehensive analysis advances understanding of collective action and the institutional conditions that foster sustainability, resilience, equity, and wellbeing (Agrawal and Benson 2011; Baggio et al. 2016).

The typology of rules, developed by Ostrom and Crawford (2005), has become the standard framework to systematically group rules (as a general term to denote institutional statements), supporting cumulative and comparative analysis of governance systems. They classified rules into seven types based on their direct impact on the operational components (participants, positions, actions, information, control, net benefits and costs, and potential outcomes) of an action situation, which is the social space where actors interact(Ostrom 2005): *position rules* create positions, *boundary rules* affect how participants are assigned to or leave positions, *choice rules* affect the assignment of particular action sets to positions, *aggregation rules* determine whether a decision of a single participant or of multiple participants is needed prior to an action at a node in a decision process, *information rules* affect the level of information available in a situation about actions and the link between actions and outcomes, *payoff rules* affect the benefits and costs assigned to outcomes given the actions chosen, and *scope rules* affect which outcomes must, must not, or may be affected within a domain (Ostrom and Crawford 2005, 190).

Applications of the rule typology reach into multiple fields of research, including the analysis of policy design and effectiveness (Ruiz-Ballesteros and Brondizio 2013; Lien et al. 2018; Vitale et al. 2020), the study of institutional change (Vitale and Meijerink 2021; Pérez-Ibarra et al. 2023; Ambrose et al. 2024; Parajuli et al. 2024), the exploration of institutional diversity (Lien et al. 2018; Chen et al. 2023; Pérez-Ibarra et al. 2023), the analysis of polycentric governance and the importance of power (Heikkila and Weible 2018; Chen et al. 2023), or the comparison of rule structure (Dunlop et al. 2022). A consistent finding across these studies is the considerable heterogeneity that exists within each rule type. For example, boundary rules define the criteria for both entering and leaving a position, and entry can depend on factors such as residency, prior membership, personal characteristics or relationship with a resource (Ostrom 1999; Ostrom and Crawford 2005, 224). This internal diversity often complicates cross-case comparisons, as the granularity of variation is not adequately captured. Two regulations may both sanction actors yet differ in either the type of sanction imposed or the action being sanctioned; however, both would be coded as payoff rules, despite their potentially divergent governance implications.

This has motivated efforts to refine or expand the original classification of rule types in order to develop finer-grained subclassifications that capture within-type variation and reveal these nuanced differences. Lien et al. (2018), for example, introduced "constitutive rules" to group definitional rules specifying what something is or describing states of the world. They also coded second-level rules, enabling more precise comparisons of the effectiveness of different payments for ecosystem services schemes. Similarly, Heikkila and Weible (2018) adapted the typology to incorporate authority, enforcement, and constitutive rules, while De Moor et al. (2021) subclassified payoff rules to trace the long-term evolution of sanctioning in historical commons. These efforts yielded important contributions, but their classifications were tailored to specific research objectives or case studies, limiting generalizability. Building on previous efforts to code and classify rules in diverse contexts, as well as on the codification of a variety of regulations, we propose a taxonomy that hierarchically organizes rule types into subtypes, providing a framework applicable across disciplines and research objectives. The taxonomy of rules is particularly relevant for conducting comparative analyses of governance systems, helping to better understand diversity, evolution, adaptation, and efficiency of institutions. It can also provide valuable insights for policy design, as it makes explicit the fine-grained composition of rules within an action situation, considering not only individual components but also their complex interconnections, governance outcomes, and potential long-term goals and domains of application.

In the following sections, we describe the process used to develop the taxonomy, define the rule subtypes, provide illustrative examples, and discuss their applicability, implications for advancing the study of governance systems, and the limitations of this approach. A detailed description of the process used to construct the taxonomy, along with a dictionary and additional examples of each subtype, is provided in Supporting Informations S1 and S2, respectively, while Supporting Information S3 highlights critical considerations for coding with the taxonomy of rules.

2 | Process for Creating the Taxonomy of Rules

We used a four-step process to develop the taxonomy of rules, which builds on previous subclassifications of rule types and includes the coding of written regulations from diverse governance systems, along with internal checks to ensure exclusivity (Figure 1). Below, we provide a brief overview of this process, while Supporting Information S1 describes each step in detail, presents the preliminary versions of the taxonomy developed at each methodological step (Figures S1, S4, and S5), and summarizes the classification decisions made from one step to the next.

In the first step, building on Ostrom and Crawford's (2005) original description of the seven types of rules, we generated an initial set of subtypes of each rule (Figure S1).

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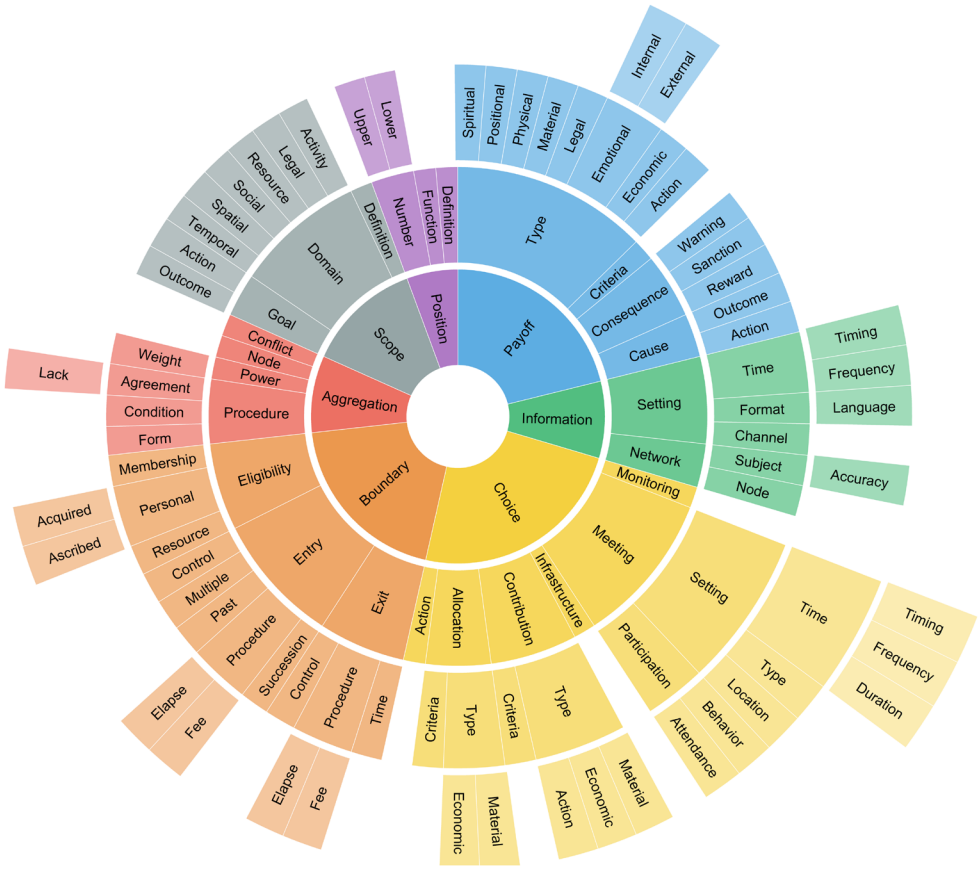

FIGURE 1 | Graphical representation of the types and subtypes of rules. A dynamic version of this figure can be found in Pérez-Ibarra et al. (2025).

In the second step, we refined and extended the subtypes to produce a more comprehensive taxonomy that draws on rule types previously coded by other authors. We extracted and coded the rules mentioned in 77 papers that were selected through a systematic review of scientific articles (see details in Supporting Information S1) by applying the approach to classify rules as described by Ostrom and Crawford (2005, 187). During the classification process, a list of potential new subtypes was created and discussed among all coders, including those subtypes proposed in the reviewed papers. We used a deductive approach to classify the rules into the initial proposal of subtypes, and when necessary, a new subtype was proposed inductively. At this stage, previous classifications of rule types from specific case studies were considered and incorporated into the list of potential subtypes. Comparison of coding results and discussion of discrepancies among all coders resulted in a second proposal of subtypes of rules (Figure S4).

The resulting proposal of subtypes of rules was applied, in the third step, to written regulations from diverse governance systems. We used the taxonomy of rules to code four written regulations of a fishery (Gobierno de la Región de Murcia 2021), forestry (Gobierno de Aragón 2007), irrigation (Gobierno de Aragón 1998), and pastoral (Registro Agrario Nacional de México 2012) systems from Spain and Mexico (see details in Supporting Information S1). Each regulation was independently coded by two of the authors (ATP, DAI, IPI, LXEM) following the coding protocol described in Supporting Information S1. Disagreements and non-straightforward coding were used to refine or propose new subtypes inductively if necessary (Figure S5).

Finally, to validate the version resulting from the third step, we conducted an internal mutual exclusivity test to eliminate overlap among subtypes and to confirm that each subtype of rule could be assigned unambiguously. First, the authors compiled a list of potentially overlapping rule subtypes, drawing on their experience coding the taxonomy of rules. This list was then discussed collectively, and overlapping subtypes were reorganized to guarantee category exclusivity. Second, the revised taxonomy was applied to a random selection of regulatory texts on common-pool resources to further confirm its exclusivity. This process produced four types of changes (Figure S3): Non-overlapping subtypes were retained as distinct subtypes, subtypes with fuzzy distinctions were clarified, fully overlapping subtypes were merged, and hierarchical relationships were adjusted for nested subtypes. This final step resulted in the taxonomy of rules (Figure 1).

3 | Description and Examples of the Taxonomy of Rules

The proposed taxonomy establishes a hierarchical classification that organizes the seven types of rules into subtypes (Figure 1). In this section, we provide a general description of the taxonomy along with hypothetical, integrated examples that illustrate the subtypes of each rule type. Detailed definitions and examples of

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each rule subtype, drawn from written regulations, are provided in Supporting Information S2, whereas more complex examples that highlight the intricate and interconnected nature of rules are presented in Section 4 and Supporting Information S3.

3.1 | Taxonomy of Aggregation Rules

Aggregation rules include four first-order subtypes that define the existence of a decision node (*node*), describe power sharing in the decision-making process (*power-sharing*), specify the implementation of decision-making procedures (*procedure*), and outline the actions to be taken in the event of a conflict (*conflict*). The *power* subtype includes one second-order subtype that defines the weights given to actors participating in the decision process (*weight*). The *procedure* subtype includes three second-order subtypes that define the decision conveyance (*form*), the manner of agreement (*agreement*), and conditions to make decisions (*condition*). *Agreement* is further divided into one third-order subtype that outlines the actions to be taken in the event of a lack of agreement (*lack*).

As a hypothetical example, an aggregation rule may involve decisions made by a council (*node*), following an established procedure (*procedure*) defined in the internal regulations. Regulations also specify the required quorum and the presence of observers (*condition*). Votes are cast by secret ballot (*form*), and the voting power (*power*) of each member is weighted according to the size of their landholdings (*weight*). Decisions are reached by majority vote (*agreement*). In the event of a tie, the matter is resolved by the casting vote of the council president (*lack*). Once a decision has been made by the council, it may not be appealed by any member of the community (*conflict*).

3.2 | Taxonomy of Boundary Rules

Boundary rules consist of three first-order subtypes that define the eligibility criteria to enter a position (*eligibility*) and describe the processes of entering (*entry*) and leaving (*exit*) a position. The *eligibility* subtype includes personal attributes (*personal*), both ascribed (*ascribed*) and acquired (*acquired*), as well as other requirements related to association with a place or organization (*membership*) or a resource (*resource*), and all necessary credentialing processes to validate the required attributes for entering a position (*credential*). The *entry* and *exit* subtypes include five and three second-order subtypes, respectively. They specify the processes to control who can enter or exit a position (*control*) and the procedures or steps for eligible actors to enter or exit a position (*procedure*), including assigning a fee for entering or exiting a position (*fee*) and the time frame that must elapse between announcing the decision to enter/exit a position before the action (*elapse*). The *entry* subtype also specifies if participants can hold multiple positions (*multiple*), describes the succession procedure of positions (*succession*), and sets the entry criteria for participants who have held specific positions before (*past*). On the other hand, the *exit* subtype sets the duration of time a participant can remain in a position (*time*).

To illustrate the proposed boundary rules subtypes, consider a hypothetical community council. Its internal regulations may specify eligibility requirements (*eligibility*), including personal characteristics (*personal*) such as being over 21 years of age (*ascribed*), holding a university degree (*acquired*), owning property (*resource*), and belonging to the local association (*membership*), all verified through official documentation (*credential*). Entry is likewise defined in the regulations (*entry*), which specify that entry is managed through a nomination process (*control*) and that the process involves some requirements (*procedure*), including a small registration fee (*fee*). Elected members must wait 2 weeks before formally taking office (*elapse*). Council members are prohibited from simultaneously holding another political office (*multiple*), and when a seat becomes vacant, the next candidate in line assumes the position (*succession*). Individuals who have resigned within the previous 2 years are not allowed to run again (*past*). Exit rules established in the regulations (*exit*) stipulate that members may serve for a maximum of 4 years (*time*), after which they must vacate their position unless they formally resign earlier (*procedure*). Departures take effect 1 month after notice is given (*elapse*) and are subject to verification by the electoral committee (*control*).

3.3 | Taxonomy of Choice Rules

Choice rules include six first-order subtypes that outline prohibited or permitted actions (*action*) and infrastructure (*infrastructure*), establish allocation (*allocation*), contribution (*contribution*), and monitoring (*monitoring*) processes, and describe all aspects of meetings (*meeting*). *Allocation* and *contribution* each include two second-order subtypes that specify criteria for setting allocations and contributions (*criteria*) and the type of contribution and allocation (*type*). These types can be economic (*economic*) or non-economic (*material*) for both allocation and contribution, and time or effort-based (*action*) for contribution. The *meeting* taxonomy includes two second-order subtypes specifying the settings (*setting*) and actors' participation (*participation*) in meetings. *Setting* is further divided into three third-order subtypes specifying the type of meeting (*type*), the location of meetings (*location*), and the timing of meetings (*time*), including the frequency (*frequency*), timing (*timing*), and duration (*duration*) of meetings. *Participation* is further divided into two third-order subtypes indicating the mandatory nature of attendance (*attendance*) and the required behaviors during meetings (*behavior*).

To illustrate the proposed subtypes of rules, consider a hypothetical scenario involving a fishery cooperative. Members are permitted to fish (*action*) using nets of limited size (*infrastructure*). The cooperative is responsible for allocating resources (*allocation*), including (*type*) fish quotas (*material*) and economic surplus (*economic*), which are distributed based on household size (*criteria*). Members must contribute (*contribution*) in three different ways (*type*): by providing voluntary patrol service (*action*), by paying an annual fee (*economic*), and by sharing their private fishing equipment if requested by the cooperative (*material*), with these obligations determined according to income level (*criteria*). Compliance is monitored by an elected oversight committee (*monitoring*). The cooperative holds meetings (*meeting*) as specified in its bylaws, which define the organizational settings (*setting*), including where (*location*) and when (*time*) meetings are held, as well as the participation requirements

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(*participation*) for each type of meeting (*type*). For example, ordinary meetings (*type*) are stipulated to take place monthly (*frequency*), on the first Monday (*timing*), at the cooperative's premises (*location*), lasting 2 h (*duration*). Attendance is mandatory (*participation*); in case of absence, members are required to notify the board at least 2 days in advance and provide valid justification (*attendance*). Late arrival or leaving before the meeting ends is not allowed (*behavior*).

3.4 | Taxonomy of Information Rules

Information rules include two first-order subtypes that set the communication network (*network*) and the settings for information exchange (*setting*). The *network* subtype specifies the positions involved in the information process (*node*) and the information being shared (*subject*). The subject subtype also specifies the accuracy of information (*accuracy*). The *setting* subtype specifies implementation in terms of timing (*time*), channel (e.g., assemblies or newsletters) (*channel*), format (e.g., oral, duration) (*format*), and language (*language*). The *time* subtype includes two second-order subtypes that define the frequency (*frequency*) and timing (*timing*) for information exchange.

To illustrate the information rule subtypes, consider a hypothetical water users' association. Its internal regulations might specify how communication (*setting*) between the board and the members (*network*) should take place. The regulations establish that the board is responsible for informing members (*node*) about irrigation schedules (*subject*) which must follow a rigorously maintained calendar based on the most reliable register of water use rights (*accuracy*). Updates (*time*) are provided through monthly assemblies (*frequency*), scheduled at the beginning of each planting season (*timing*). Information is disseminated through the association's newsletter (*channel*), printed on paper (*format*), and published in the local language (*language*).

3.5 | Taxonomy of Payoff Rules

Payoff rules include four first-order subtypes that establish the nature of the cause (*cause*), the nature of the consequence (*consequence*), the type of consequences (*type*), and the criteria (*criteria*) for defining them. The *cause* subtype includes actions (*action*) or outcomes (*outcome*), while the *consequence* subtype includes rewards (*reward*), sanctions (*sanction*), and warnings (*warning*). The *type* subtype is further divided into the following second-order subtypes, which specify the kinds of consequences: *material*, *economic*, *action, legal*, *physical, positional*, *spiritual*, and *emotional*. *Emotional* consequences are further classified as internal (*internal*) or external (*external*). *Internal* refers to the feelings a person experiences when receiving a reward or sanction, while *external* refers to how they believe others perceive them and how they feel under external observation when receiving a reward or sanction (Schlüter and Theesfeld 2010; Sidikki et al. 2012).

As a hypothetical example, consider a community forestry group. Members who sign a forest conservation agreement (*cause-action*) receive (*consequence-reward*) access to a larger plot (*type-material*). Those who fail to meet the tree planting quota (*cause-outcome*) are temporarily suspended (*consequence-sanction*) from voting rights (*type-positional*) and required to contribute additional labor days (*type-action*). Warnings are issued for minor delays (*consequence-warning*), while repeated negligence may result in the payment of a fine (*type-economic*) or even in legal action (*type-legal*). Conversely, consistent compliance (*consequence-reward*) is publicly acknowledged (*type-emotional-external*) and fosters a sense of pride among members (*type-emotional-internal*). All specific sanctions and rewards are detailed in the cooperative's bylaws (*criteria*).

3.6 | Taxonomy of Position Rules

Position rules consist of three first-order subtypes that define the different positions that participants in an action situation can hold (*definition*), the functions of each position (*function*), and the number of participants that can hold each position (*number*). The *number* subtype is broken into two second-order taxonomies, indicating the lower (*lower*) and upper (*upper*) bounds on the number of participants that each position can hold.

For illustration, consider a hypothetical river basin committee in which participants may hold positions such as chairperson, secretary, or community representative (*definition*). The chairperson leads meetings and sets the agenda, the secretary records decisions, and representatives voice the concerns of their constituencies (*function*). Each committee has at least one chairperson (*number-lower*), while the number of community representatives is limited to a maximum of 10 (*number-upper*).

3.7 | Taxonomy of Scope Rules

Scope rules include three first-order subtypes that define and describe activities, infrastructure, resources, and symbols (*definition*), set the goals (*goal*), and establish the domain of the regulation (*domain*). The *goal* taxonomy is further divided into two second-order subtypes depending on whether the goal is an action (*action*) or an outcome (*outcome*). The *domain* can be defined spatially (*spatial*), temporally (*temporal*), legally (*legal*), socially (*social*), or based on the resource (*resource*) or activity (*activity*).

As an example, consider a protected forest area. The regulation defines activities such as tree harvesting and ecotourism (*definition*), with specific goals (*goal*) of permitting logging (*action*) while maintaining biodiversity (*outcome*). The scope of the regulation (*domain*) is limited to the forest boundaries (*spatial*), applies throughout a 20-year conservation program (*temporal*), is grounded in national forestry law (*legal*), specifically governs timber (*resource*) extraction (*activity*), and complies with cultural logging traditions (*social*).

4 | Coding Examples of the Taxonomy of Rules

In the previous section, we presented hypothetical examples of the taxonomy of rules for illustrative purposes. Here, we provide examples drawn from the four regulations used to develop the taxonomy (see Section 2 and Supporting Information S1),

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identifying the specific excerpt of each regulation (Pérez Ibarra et al. 2025) to illustrate the complex nature of rules and to present the coding of selected exemplar statements (Figure 2). With these examples, we briefly demonstrate the hand-coding approach for coding the taxonomy of rules, while further details and comparison with other codifications of rule typology approaches (Ostrom and Crawford 2005; Basurto et al. 2010; Carter et al. 2016; Feiock et al. 2016; Brady et al. 2018; Heikkila and Weible 2018; Lien et al. 2018) are provided in Supporting Information S3.

Following standard procedures of rule typology hand-coding (Ostrom and Crawford 2005; Basurto et al. 2010; Carter et al. 2016; Brady et al. 2018; Pérez-Ibarra et al. 2023), coding with the taxonomy of rules is guided by the institutional grammar (Crawford and Ostrom 1995) as the aim/function elements (Frantz and Siddiki 2021, 2022) are used to identify institutional statements and, together with the intention of each statement, determine which component of the action situation the statement affects. This component specifies the type of rule and its particular intention with the taxonomy. For example, the institutional statement: "The members of the auxiliary commissions and secretariats that in their case has been appointed by the assembly, will serve for a term of 3 (three) years," from the regulation of the pastoral system (excerpt #4.90), is coded as a boundary rule because it specifies the conditions under which actors leave a given position within the community. More precisely, it corresponds to the *exit.time* subtype, since the aim element refers to the duration of the mandate, thereby defining the time frame that determines when an individual exits the position. This example represents the simplest coding situation in which one institutional statement with one type and subtype of rule.

More complex statements are classified into one rule and multiple subtypes. For example, the institutional statement: "The presence of protected species within the art, especially cetaceans and turtles, will be communicated in all cases urgently to the Wildlife Recovery Center", from the regulation of the fishery system (excerpt #1.44), is coded as an information rule with *network-subject*, *network-node*, and *setting-time* subtypes as it specifies what information needs to be shared (*subject*), to whom (*node*), and when (*time*). Another example, the institutional statement "*If the necessary quorum for the valid constitution of the Plega* [Governing body] *is not met on the first call, the session will be automatically rescheduled for the same time, two working days later*," from the forestry system regulation (excerpt #2.39), is coded as a choice rule with *meeting-setting-time* and *meeting-participation-attendance* subtypes, as it specifies the new meeting time (*time*) when the mandatory attendance is not met (*attendance*).

Finally, coding with the taxonomy of rules requires recognizing that each rule does not operate in isolation but rather interacts with others as part of a configuration (Ostrom and Crawford 2005, 191). For example, an information rule may inform boundary rules, a payoff rule can enforce a specific choice rule, or a position rule may outline the functions of positions that influence scope rules. We acknowledge these interdependencies by identifying other rules that are connected to the rule as defined by the component of the action situation impacted by the aim/function grammatical element. An example of the former is the excerpt "*The moruna gear* [trap-net] *may have a maximum length of 500 metres for the travesía* [leader net]. *In the case of the fishing ground known as La Arriba, located in the Maritime District of Mazarrón, the travesía* [leader net] *may not exceed a maximum length of 130 meters*" from the fishery system regulation (excerpt #1.9). The first statement is coded as a choice rule under the *infrastructure* subtype, as it specifies the physical characteristics that the fishing gear must meet. The second statement is likewise coded as *choice-infrastructure* subtype but linked to the *scope–domain–spatial* subtype, since it establishes differentiated requirements for the gear in a specific location within the system.

The interaction between types and subtypes of rules occurs within and across institutional statements. The previous example illustrated an interaction within a single institutional statement as one rule specified the physical characteristics that the fishing gear must meet (*infrastructure* subtype of the choice rule) in a specific location (*domain-spatial* subtype of the scope rule).

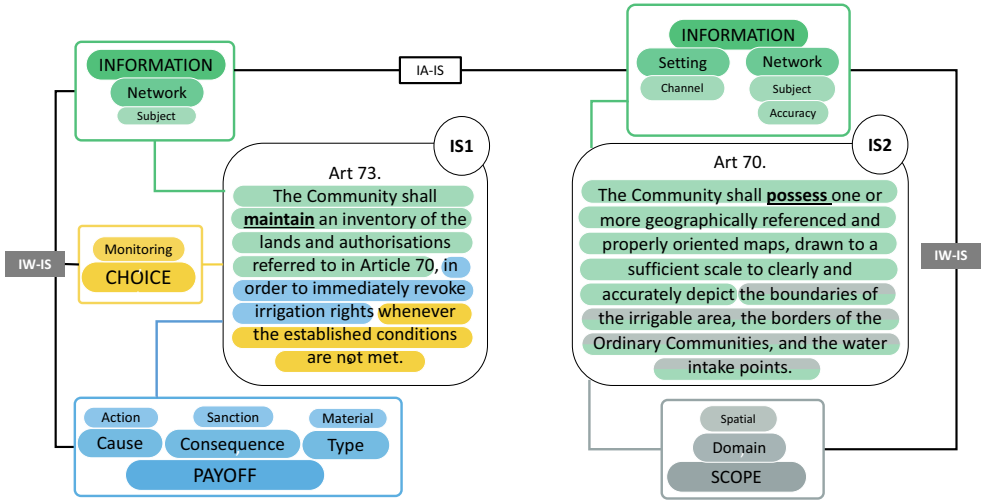

FIGURE 2 | Codification example using the taxonomy of rules, illustrating the interconnections between rule types and subtypes both within (IW) and across (IA) institutional statements (IS). Aim of IS are underlined. *Source:* Irrigation system regulation (IS1—Article 73 excerpt #3.220, IS2—Article 70 excerpt #3.199).

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The interaction of rules across institutional statements occurs, for example, when a statement calls another statement. For example, in the excerpt "The Jury established in Article 13 of these Ordinances is responsible for examining complaints submitted to it for infringements of the Ordinances" from the irrigation system regulation (excerpt #3.152), Article 13 is cross-referenced. That article defines several positions in the community: "The Community Assembly, convened in General Meeting, assumes all authority vested in it. For its governance and regulation, and in accordance with the law, a Governing Board and an Irrigation Jury are established" (excerpt #3.41). The first excerpt (excerpt #3.152) is coded as a position rule with the *function* subtype, since it defines one of the main responsibilities of the Irrigation Jury. It is linked to Article 13 (excerpt #3.41), where the position of the Irrigation Jury is defined (*position–definition* subtype). Figure 2 shows a visualization of the codification of subtypes of rules connected to different rules within and across statements (see Supporting Information S3 for additional examples).

5 | Potential Contributions of the Taxonomy of Rules to Advancing Governance Research

Designing robust institutions that sustain efficient governance systems while promoting long-term sustainability, resilience, equity, and wellbeing remains one of the central challenges of policy design. Systematic classifications and fine-grained institutional analyses are crucial in addressing this challenge, as they deepen our understanding of governance structures, the adaptive dynamics of governance systems, and their links to governance outcomes. While the rule typology (Ostrom and Crawford 2005) has been widely used to advance this agenda, its inherent generality constrains the level of nuance required for more detailed and comparative analyses.

By integrating previous classifications of rule types and expanding them to ensure both comprehensive coverage and internal mutual exclusivity, we developed a taxonomy of rules applicable across disciplines and contexts. Building on Ostrom and Crawford's typology (2005), the taxonomy hierarchically structures subtypes within the seven rule types, enabling fine-grained analysis of institutional dimensions, including the nature of agreements, entry criteria, or information requirements. In doing so, it brings together previously dispersed refinements into a unified framework that facilitates cumulative knowledge building and improves comparability across cases, domains, and over time. Its development draws on diverse empirical cases, from energy governance (Lammers and Hoppe 2019; Spijkerboer et al. 2019) and knowledge commons (Lemeilleur and Sermage 2020) to water quality (Lien et al. 2018), farming (Bastakoti and Shivakoti 2012; Carter et al. 2016), or transportation (Wang et al. 2022), among others, and its subsequent application to the regulations of common-pool resource systems is intended to support interdisciplinary use and adaptation across different contexts. Moreover, the taxonomy can be applied not only to formal rules but also to non-policy documents such as transcripts from interviews, surveys, or focus groups to code rules-in-use and informal rules (Watkins and Westphal 2016; Pérez-Ibarra et al. 2023; Parajuli et al. 2024). Of special interest are the subtypes of the payoff rules that can help to categorize institutional statements into strategies, norms, and rules, with the first having automatic consequences, the second adding internal (personal norms) or external (social norms) emotional consequences, and the third adding tangible consequences (Schlüter and Theesfeld 2010).

While not universally necessary or optimal for all research purposes, the taxonomy has the potential to be particularly valuable for comparative studies and for tracking institutional change over time. In future research, it may advance governance research by improving the identification of institutional archetypes, deepening the understanding of institutional diversity and change, and clarifying the association between institutional configurations and governance outcomes. The taxonomy also offers scope for more detailed analyses of research questions such as how specific rules affect outcomes or how particular governance challenges are addressed across contexts. For example, researchers may examine the different configurations of boundary rules present in specific settings, their diversity, and their relationship to outcomes. Another example would be to focus on how payoffs vary among cases or how clearly the scopes of regulations are specified. These potential applications are relevant for policy design, as they enable nuanced comparisons between successful and unsuccessful cases, across governance scales, or among different cultural perspectives on governance.

However, applying the taxonomy involves trade-offs. Taxonomies with fewer levels, such as the original rule typology, are faster to implement and more robust for broad analyses but may obscure subtle differences. In contrast, taxonomies with finer-grained subtypes require greater analytical effort yet enable richer and more precise coding, particularly for capturing variation within broad rule types. The accompanying dictionary of rule subtypes (Supporting Information S2) and the living GitHub repository, which includes training materials and dynamic tables and figures (Pérez-Ibarra et al. 2025), are intended to support the resolution of difficult boundary cases and improve coding consistency and transparency across applications. Despite these trade-offs, the taxonomy, while not intended as an ontological classification, serves as a well-documented expert coding aid that provides a structured framework for governance analysis. By specifying the components of each rule, it offers conceptual clarity and guidance for rule classification even when the full taxonomy is not applied, while also facilitating systematic comparison across cases to advance research on governance systems.

A key limitation is that the empirical base underpinning the taxonomy is unevenly distributed across regulatory contexts, with more extensive testing in common-pool resource systems than in other governance domains. Future work will examine its broader applicability, including its integration across a wider range of governance systems, its use in longitudinal, cross-sectional, and large-N comparative analyses, and its potential application in automated coding approaches. As with other analytical frameworks, including the social-ecological systems framework (Ostrom 2009), the taxonomy should be understood as dynamic, allowing adaptation to new contexts through the incorporation of additional subtypes while maintaining analytical coherence and consistent applicability across cases. We therefore welcome feedback on the taxonomy, which will inform future revisions made publicly available via GitHub

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(Pérez-Ibarra et al. 2025), ensuring transparency, traceability of changes, and comparability across versions. Ultimately, we envision the rules taxonomy as a tool that advances comparative governance research while also providing greater conceptual clarity for policy design and for foundational questions in systems governance.

Author Contributions

Diego Arahuetes-de la Iglesia: investigation, formal analysis, resources, data curation, writing – original draft. **Alicia Tenza-Peral:** investigation, writing – review and editing. **Laura Ximena Estévez-Moreno:** investigation, writing – review and editing. **Andrea Martín-Suárez:** investigation. **Francisco Javier Lacosta-García:** investigation. **Ismael Lare-David:** investigation, visualization. **Irene Pérez-Ibarra:** conceptualization, methodology, software, formal analysis, resources, investigation, writing – original draft, writing – review and editing, visualization, supervision, project administration, funding acquisition.

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Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

The data that support the findings of this study are openly available in Zenodo at http://doi.org/10.5281/zenodo.14557232.

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Supporting Information

Additional supporting information can be found online in the Supporting Information section. **Figure S1:** First version of the rules taxonomy. **Figure S2:** Flow diagram of included studies reporting rules. **Figure S3:** Location of the cases of the included studies. **Figure S4:** Second version of the rules taxonomy. **Figure S5:** Third version of the rules taxonomy. **Figure S6:** Graphical representation of the decisions made in the internal mutual exclusivity test. **Figure S7:** Forth version of the rules taxonomy. **Figure S8:** Example of hand-coding an excerpt from a written regulation using the rules taxonomy. This example is based on the regulation of an irrigation system in Spain (Article 19, excerpts #3.51-3.55; Gobierno de Aragón 1998). **Table S1:** Characteristics of the articles included in the systematic review. **Table S2:** Definition of each type and subtype of rules. **Table S3:** Example of each taxonomy of rules. **Table S4:** Main approaches to the classification of rules. **Supporting Information: S1** Process for creating the taxonomy of rules. **Supporting Information: S2** Dictionary and examples of subtypes of rules. **Supporting Information: S3** Protocol for hand-coding the rules taxonomy.

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