From Legal Rules to Systemic Regulation: The Role of Feedback Loops and Holism in Modern Governance

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> Without changing our patterns of thought, we will not be able to solve the problems we created with our current patterns of thought.
>
> *Albert Einstein*

This paper examines the integration of system theory and cybernetics into legal regulation, highlighting the importance of intangible assets, particularly institutions, in a country's wealth and stability. Emphasising the rule of law, it argues that effective public reforms must prioritise institutional functionality. By applying critical systems thinking, the paper suggests that regulation should be adaptive,

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incorporating feedback loops, dynamic systems modelling, and stakeholder engagement to address complex societal issues. It discusses the need for a holistic approach to legal systems, viewing them as interconnected entities influenced by various factors. The paper introduces the approach to systemic regulation that uses principles of systems theory, such as holism, interconnectedness, and dynamic equilibrium, to create more robust and adaptable legal frameworks. The paper concludes that systemic regulation can enhance the effectiveness of public institutions, ensuring they can navigate and respond to complex challenges, thereby fostering better governance and societal well-being.

Keywords: systems theory, cybernetics, systemic regulation, critical systems thinking, dynamic relationships

1. Introduction

The World Bank (2006) estimates that natural and capital assets of countries account for only 24% of the country's wealth. The rest (76%) are intangible assets (human capital [skills, know-how], formal and informal institutions [governance and trust of people, ability to cooperate with each other], and foreign financial investment), with the most important element being institutions, i.e., the social capital. A country may have abundant natural and other wealth (land, oil, minerals, and capital assets), but it must first ensure the rule of law as the most important source of wealth. Public reforms should thus primarily focus on the legal functioning of institutions, i.e. on the effective and efficient legal system, before implementing any kind of specific reform (e.g., tax, health). A successful state is a strong state (able to achieve its objectives), a state governed by the rule of law (achieving the mentioned objectives in accordance with the legal rules) and an accountable state (democratic accountability mechanisms are in place, i.e. an effective system of perceiving, demanding, and enforcing accountability, which is again based on the rule of law) at the same time. These three strands should be in balance with each other (Fukuyama, 2014). Political disintegration is inversely related to the absence of the three mentioned strands, which turn impartiality and equality into a network of friends and family, leading to a hijacked deep state; based also on Darwin's theory of

evolution by natural selection that fundamentally explains how organisms adapt to their environments (survival of the fittest) (Darwin, 2009), this paper posits that the strands are balanced, when systems in which they act exhibit "adaptability" within the predefined legal frames.

Various authors describe the good functioning of the state in similar, albeit different words: the problem of maladaptation is not caused only by dysfunctional public institutions (Holmberg & Rothstein, 2012) or the forms of government *per se*, but by their degree of government (the embodiment of consensus, community, legitimacy, organisation, efficiency, stability) (Huntington, 1968). Institutions as a set of beliefs or behaviours created by a collective (Durkheim, 1984), as stable, repetitive patterns of behaviour (Huntington, 1968), as persistent rules that shape, constrain, and guide human behaviour (Fukuyama, 2014), which determine what is and what is not similar (Douglas, 1986; Foucault, 2002), as creators of preferences and beliefs that can result in a form of unfreedom (Sunstein, 2017), and as actors that play an important instrumental role in the quest for justice (Sen, 2009), are in this paper seen as the main elements of adaptability and/or the mentioned degree of government they reflect. Public institutions should be at the centre of attention (Lownpes, 1996) – when people talk about the rule of law, they are referring primarily to the functioning of public institutions (Waldron, 2011). On the other hand, major social problems are also associated with the practical problems of public institutions that do not know how to prevent social and societal crises, how to end wars, prevent poverty, ensure access to clean water, safe food, and similar complex problems caused by the so-called VUCA characteristics (volatility, uncertainty, complexity, and ambiguity). The proper functioning of institutions should hence be linked to the adaptability and stability of the state at the same time.

Despite many advances (e.g., the membership of countries in international organisations, the emphasis on free markets, competition, and good governance), public institutions have not changed their modes of regulation significantly over the years. Radical reforms, at their core, require changes in depth; simply changing the rules in the same way, according to the same method, structure, and mindset as they were made, leads to similar results.[1] When regulations fail to achieve their objectives, they lead to new ones, again and again, creating the regulatory cycle of the "hamster in the

[1] Systemic corruption by its name requires a change in the system, and a change in the structure by which rules and institutions operate.

wheel". Understanding institutions as regulatory mechanisms – both formal and informal – can improve their doings through systemic regulation, "that is, understanding/regulate" them through the prism of a system. Systemic thinking hit the headlines in the 1990s with Senge's book "The Fifth Discipline" (Senge, 2010),which identifies five core disciplines required to build a learning organisation: personal mastery, mental models, shared vision, team learning, and systems thinking. The latter integrates the other four and sees the organisation as the underlying structure of interrelationships between its parts. It includes patterns and structures, rather than just events, and recognises the impact of feedback loops and delays in systems. In our day and age of artificial intelligence, machine learning, deep learning, neural networks, and similar notions, system theory and cybernetics provide relevant concepts and methodologies focused on the understanding of interconnectedness and interdependencies, holistic perspective, feedback mechanisms, hierarchical structure, control and regulation, adaptation, learning, information processing, homeostasis, stability, and other notions from the system theory.

This paper is based on the premise that institutions should adapt their actions *vis-ā-vis* their environment with the help of systems theory and cybernetics which are both built on the notion of (systemic) "regulation", with which government is tightly connected.[2] The paper also acknowledges the importance of critical systems thinking (CST) with its emphasis on critical examination and improvement of complex systems, considering the diverse perspectives and power dynamics involved in growing complexity. The CST's understanding and management of complex, interconnected systems that could be holistically used by simultaneously acknowledging the limitations and potential biases of different methodologies and paradigms

[2] Cybernetics as the science of communication and control (Wiener, 1961) comes from the latinized form of Greek *kybernetes* "steersman" (metaphorical "guide, governor"), equal to Latin *gubernare* "to direct, rule, guide, govern" (Douglas-Harper, 2024). A system is an "organised complexity" (Bertalanffy, 1968) and/or a complex set of interacting elements, where the whole is more than the sum of its parts. Both concepts relate to regulation through direction and leading: Latin *regulates* is a past participle of *regulare* "to control by rule, direct" (Douglas-Harper, 2001). The organised, interconnected parts, communication and control are based on (in)formal rules, on their relations and combinations. Systemic mindset encourages organizations to "regularly" assess their processes and outcomes, learn from their experiences, and make necessary adjustments; its tight (etymological) connection with Latin *regula*, or "rule" makes a constant relation between attention, rules and regularity. It should also not be overlooked that systems theory emerged in the aftermath of the Second World War, at the same time as the importance of respect for human rights. The latter could be respected to a greater extent by applying systems theory in regulation.

(Jackson, 2024), makes it the natural candidate also for papers that address the adaptability of regulations. To have effective and efficient regulation, a regulator (technical, social or country's) should incorporate the concepts of systems theory in their actions; in a time of "organised complexity" (the synonym of a system), the systemic perspective is highly relevant for the practice of government regulation. The aim of cybernetics (that combines regulation with control) is to comprehend how systems handle data, control themselves, and adjust to fluctuations; its focus is on the control and communication mechanisms in systems (feedback loop, self-regulation, information), while systems theory (holism, interconnectedness, hierarchy, emergence) offers a comprehensive perspective on systems, highlighting their interrelations and emergent characteristics. Despite good intentions, only public values and legal principles are not suitable equivalents to social problems that will persist as long as current regulatory and mental frameworks remain unchanged. Regulation (in the sense of primary and secondary legislation) is a system *per se,* and the system is morally neutral. The rule of law hence depends more on the functioning of public institutions and their regulation in the sense of inputs, processing, outputs, feedback, and other parts of the system, than on values (which are similar in various, more and less successful countries) which are formally proclaimed. The key concepts of systems theory with the cybernetics are based on a "structuralist" perspective in which regulation is more about "how systems are "technically", not morally "organized",[3] and by applying CST, regulators can design more effective, adaptive, and robust systems capable of addressing the complex, real-world problems. When regulation does not achieve objectives, this *ipso facto* reflects the absence of an effective and efficient system, i.e. the existence of problems *per se* points to the unsuccessfulness of present frames that cannot handle them. The idea of this paper is to design "a regulation as a (mixed)[4] system" that can – through its predefined or required elements – act as a kind of mathematical formula that "forces" a regulator to apply parts in their relations to a regulatory outcome.

[3] This brings systemic regulation into the frame of the Ulysses pact and/or choice architecture (Sunstein, 2016; Thaler & Sunstein, 2008).

[4] The regulatory model will use all system approaches focused on better goal seeking and viability; hard systems from the operational research area which are focused on approaches that try to solve real-world problems; system dynamic has its strenght in feedback loops and dynamic interrelationships between the many elements that form a complicated system, cybernetics as the science of effective organisation and complexity theory with its emphasis on incorporated randomness and irregularity.

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2. A Holistic Approach to Dynamic Legal Systems

Systems thinking nowadays covers various holistic methods with different perspectives and emphases.[5] A perspective on holism can be used to simultaneously incorporate various systems methodologies, each with its own holistic viewpoint, into a unified and specified strategy *vis-ã-vis* the problem, environment, organisation, and all of them together, that change themelves and others at the same time. Various systemic approaches help organisations cultivate a culture of adaptability, enabling them to thrive in an ever-changing environment.

These paths encourage organisations to view challenges from multiple perspectives, fostering innovation and resilience. By integrating different methodologies, such as feedback loops, scenario planning, and participatory design, organisations can create more robust strategies that can respond to complex and dynamic situations. Systemic elements can enhance the objectivity of regulation in the ways of quantitative analysis (data-driven decisions, metrics, and indicators), predictive modelling, optimisation (resource allocation and cost-benefit analysis), risk assessment and management, standardisation and consistency, transparency, and accountability. These approaches and similar principles can lead to more informed, consistent, and justifiable regulations in the face of increasing complexity in nature and society.

The operational efficiency of public institutions and their decision-making processes can be improved by usinga holistic understanding of interconnectedness, feedback loops, adaptability, preventive and proactive measures, consensus and community building, institutional behaviour, stability, and regulation observed through a systemic prism. Systems thinking also offers a more holistic approach to understanding the law that goes beyond the traditional division between substantive and procedural elements. It emphasises that each part of a system interacts with other parts at multiple levels and in different directions, creating a new entity or the "personality" of the system. By using Aristotle's causes – by which the nature of things[6]

[5] The fifth discipline fits into the Type A of system approaches (along the hard systems thinking, system dynamics [the fifth discipline], organizational cybernetics and complexity theory). There are also Type B (Exploring Purposes: Strategic Assumption, Surfacing and Testing, Interactive Planning, Soft Systems Methodology), Type C (Ensuring Fairness: Critical Systems Heuristics, Team Syntegrity) and Type D (Promoting Diversity: Postmodern Systems Thinking) system approaches. Total Systems Intervention and Critical Systems Practice fits within creative holism (Jackson, 2003, p. 23).

[6] The nature of things consists of four explanatory roles that a phenomenon can possess. Consequently, there are four different causes: the material cause, or that which is given

can be understood – the system's parts can be seen as its substance (material cause), form (formal cause), both dynamically related/connected by communication (movement or efficient cause) to manage or control the course of events to achieve desired ends (final cause). This definition shows a legal (binary) division (only) between the substantive and procedural law as insufficient, as it does not reflect the overall nature of the legal matter: the procedural part encompasses (or rather hides) the formal, efficient, and final cause at the same time, without giving attention to their "intertwined relations"; the legal binary division does not have the organisational-operational weight or significance that it should from the systems theory viewpoint. Aristotle's causes help us understand that a system provides a deeper insight into how regulation works – the material cause is the substance or parts of the system, the formal cause is the form or structure of the system, the efficient cause is the communication or dynamics that connect the parts, and the final cause is goals or purposes of the system. In the legal context, this means that the substantive law represents substance (norms and rules), while procedural law includes not only formal procedures, but also the effectiveness of communication, linkages and goals of the legal system. Procedural law thus combines the formal, efficient, and final cause, suggesting that the traditional binary division is insufficient for a comprehensive understanding of the legal system.

The nature of systemic thinking and its implication on effective organisation and management should be more aligned with the law; the first two took place already in the 1970s and 1990s (Ackoff, 1974; 1994; 1999; Beer, 1966, 1981, 1995), while systems theory is present in the law mostly in theory (Luhmann, 2004; Nobles & Schiff, 2012). In practice, regulators are often faced with a blank sheet of paper (*tabula rasa*), instead of having knowledge on system elements. The common approach thus still follows mainly common sense that unfortunately often unknowingly overlooks the holistic view on a regulated situation. It overlooks a number of various factors for which the "ways of perceiving, reacting, and correcting" according to the desired objectives (which are already important at the first stage, how, in what manner, by what means they are identified as desired in the

in an answer to the question, "What is it made of?" The formal cause (form, pattern) is given in answer to the question "What is it?". It is the essence or that which is already formed or which is to be formed. The movement cause is what is given in an answer to the question "Where does change (or movement) come from?". It is the origin of change (or movement) that links the matter and form. The final cause is that which is given in an answer to the question, "What is its good?". It is that which makes something purposely done or happen (Aristotle, 1961, p. II, 3; Aristotle & Furth, 1985, p. V, 2, 1013).

first place) are crucial to the understanding of the latter (this can be confirmed simply by looking at the content or the way articles are written in legal acts). The application of systems theory, cybernetics, and their essential elements can provide public institutions with a comprehensive framework for addressing social problems. With other words, legal acts are not understood, drafted and implemented in a way which reflects a systemic, i.e., transdisciplinary and/or holistic approach. The latter understands characteristics and behaviour of various parts observed through the lens of the whole: "[d]isciplines do not constitute different parts of reality; they are different aspects of reality, different points of view. Any part of reality can be viewed from any of these aspects. The whole can be understood only by viewing it from all perspectives simultaneously" (Ackoff, 2015). A system is more than a collection of things connected by a network of relations, as it is usually perceived, but also a thing in which the entity or "personality" of a new system emerges, due to the mentioned relations in which each part affects other parts in multiple vertical, horizontal, diagonal, and other ways or directions; in law, the example could be the indeterminate legal notions (e.g., public interest, public security, fire safety, law and order), whose interpretation is inseparably linked not only to the legal framework, but also to understanding of people, their needs, environment, time, and/or the entire context of things in a specific time and place. Another example of emergence are individuals, who, grouped together, form a newly emerged collective entity that behaves differently than each person separately.

Without the systemic frames that enable an experimentally verified and established objective situation on which legal drafts are based, regulators (most often public officials who draft the material) are confronted with Thomas's theorem ("if people define subjective situations as real, they are [nevertheless actually] real in their consequences") (Thomas & Thomas, 1928, p. 572) which could be an older version of the fundamental attribution error, understood as "a general tendency to overestimate the importance of personal or dispositional factors compared to environmental influences" (Ross, 1977, p. 184). Merton called such a subjective definition a self-fulfilling prophecy or "a false definition of the situation evoking a new behaviour which makes the originally false conception come true" (Merton, 1948, p. 195). Consequences of such position are adverse and bring along negative side-effects, with examples also in regulation (e.g., a perverse incentive or the cobra effect, conflict of interest, instrumental convergence, moral hazard, social trap, Streisand effect, tragedy of the commons).

The question is how CST can be used to avoid such consequences, how regulation can be more adaptable to its surroundings. Newer concepts

such as agility (proactive and quick, emergent, and adapting institutions to change in real time and space), flexibility (reactive and moderate capacity to bend, stretch, or adjust without breaking), and adaptability (a long-term, strategic interactive ability to adjust, change, and thrive in evolving circumstances) are used to describe the capability of individuals, organisations, or systems to respond to change. From their perspectives, they describe different phases; if not put together, they are like the parable of blind men and an elephant, which serves as a metaphor for limited perception and subjective truths; caution must be hence exercised in drawing conclusions about the nature of things, as our observation depends on our methods of questioning.

2.1. Research Problem and Research Questions

Although CST offers a holistic approach that could improve understanding of complex social systems and their interactions, the challenge remains how this theory can be effectively put into a legal framework. Legal regulation is often designed to provide stability, predictability, and legal certainty; legislation/regulation is usually rigid and specific in nature, requiring clear guidelines and consistent implementation. In contrast, systems thinking emphasises flexibility, dynamism, and feedback loops that allow systems to respond to changes and uncertainties in the environment. Often the words "systemic", "system", "systematic" are used in the literature, not in the sense of a system theory and its elements in terms of achieving desired goals, but as a neutral set of any elements that can also represent a "bad" system, in the sense that no one controls and manages it. This can represent a version of violence being (even unconsciously) tolerated.[7]

A research problem that has not yet been resolved between CST and regulation concerns the effective integration of systems thinking into the process of designing and implementing legal regulation in a way that systemic elements are consciously integrated, monitored, and adjusted in regulation to achieve or to be at least near desired objectives. Models can simulate interactions between different components of social systems and predict effects of regulatory interventions; however, the use of them in a legal context is limited. The specific research problem is how to develop legal mecha-

[7] When systemic social mechanisms result in a highly disproportionate benefit to one group while preventing another from meeting basic needs, logic demands the acknowledgement that the effect is, indeed one of violence (Joseph, 2017, p. 185).

nisms and their procedures that allow flexible and adaptive regulation. This kind of regulation is responsive to dynamic changes in complex systems without compromising legal certainty and predictability. By addressing these issues and problems, a contribution can be made to the development of more dynamic, flexible, and efficient legal systems that can cope with complex challenges of modern society. Mentioned issues are addressed in the research questions.

RQ 1: How can legal systems incorporate the feedback loops and adaptive measures inherent in systems thinking into rigid legal structures?

RQ2: How can regulators use system models to predict the effects of regulatory interventions on complex social systems?

RQ3: What systems thinking methods are most useful for the design of legal policies dealing with multifaceted and intertwined social problems?

RQ4: How can legal solutions remain fair and effective in the context of unpredictable systemic change?

By addressing these RQs, regulatory advancements in the design, implementation, and adaptability of legal rules in response to complex and evolving social challenges could more successfully address the mentioned challenges. A range of methods drawn from systems thinking, legal theory, regulatory practice, and policy design can be used to adress the RQs: dynamic systems modelling (to simulate the impacts of legal changes and identify feedback loops), adaptive management (to periodically review and adjust rules based on observed outcomes), scenario planning (to analyse multiple scenarios to anticipate possible future states and prepare adaptable legal frameworks), stakeholder engagement (to gather feedback and incorporate diverse perspectives into legal reforms), iterative legal design (incremental development, testing, and refining of rules based on feedback), transdisciplinary approaches (to address complex social problems holistically), resilience thinking (to design legal solutions that can withstand and adapt to shocks and stresses), continuous monitoring and evaluation (to track the effectiveness of solutions and make timely adjustments), feedback mechanisms (to collect and analyse data about the performance of legal solutions) and legal experimentation (to test legal solutions in controlled environments before wider implementation). By applying these methods, more adaptive, predictive, and fair legal systems can be developed that are better equipped to handle the complexities of modern social challenges.

3. Steering Complexity and Dynamic Interconnectedness in Regulation

Complexity as an essential element in problems and in regulation. The classical legal drafting in which a bill consists of an introduction (with an assessment of a situation and reasons for adopting the bill, its objectives, principles and main solutions), a text of articles and their explanatory memorandum, is not enough when it comes to complex matters. Here, in situations or problems, multiple interrelated components are involved, making them difficult to understand, analyse, and solve. This holds for complex systems – with their interesting similarity to complex problems: the terms wicked problems (Churchman, 1967), a mess (Ackoff, 1974), or a social mess (Horn & Weber, 2007), connote the same thing as (complex, made of multiple related parts) systems: "complexity". The latter arises from a variety of factors, such as multiple variables, uncertainty and ambiguity, interdisciplinary nature, dynamic change, involvement of various stakeholders, and far-reaching implications. Understanding and predicting these implications requires not classical legal analysis, but systemic holism or synthesis of different parts, taken together as an ensemble that is focused on right goals achieved in the right manner.

Requisite variety. It turns out that a complex system and a wicked problem are both *systems* or similar things; if the former is the result of a human action, they are two systems viewed from different angles: the first from the conscious human application of methods and their combinations to achieve desired goals, the second as the accidental and/or bad (also combined with possible human action or passivity) result of the same methods without predetermined goals; the first works with conscious guidance, the second automatically as the result of accidental, emerging processes and combinations; the first represents a faster (technological, industrial) revolution, the second a slower (biological, cultural, natural) evolution. A wicked problem can be addressed only with the complex-like, human-made (also legal) system. This inference is based on one of the basic cybernetic laws, called Ashby's law of requisite variety: "only variety can manage variety".[8] A complex problem can only be managed with the same or similar measure of complexity, i.e. with a complex system.[9] An example of the latter that could be – with-

[8] "If the variety of the outcomes is to be reduced to some assigned number ... variety must be increased to at least the appropriate minimum. Only variety can force down the variety of the outcomes." (Ashby, 1957, p. 206).

[9] The same hence stands for "systemic corruption" that thrives in weak people's engagement with power and in weak institutions that fail to prevent or react too late to the effects

out monitoring its inputs and outputs and correcting the former to better achieve the desired objectives – a "wicked" black box: a system that can be understood based on what goes in and what comes out, without knowing its internal operations. Its implementation is hence hidden or black-boxed. This concept can be applied to various internal mechanisms such as the combustion engine, black-box algorithms, the human brain, institutions, public administration, or government. In the frame of systems theory and cybernetics, the black-box, human bounded rationality and cognitive biases (Ariely, 2008; Gigerenzer, 2002; Kahneman, 2013; Simon, 1983; Simon, 1997; Tetlock, 2006; Thaler & Sunstein, 2008; Tversky & Kahneman, 1974) are not so problematic when a decision maker's attention is based on feedback vs. wanted goals, when customising (by amplifying or filtering) the inputs according to the (non-)wanted outputs is applied.[10]

Interconnection and dynamic equilibrium. Systems theory focuses on understanding the complex and interconnected parts of a system that work together in various interactions and combinations to affect overall performance. Different elements influence each other and together shape a country's performance in terms of: i) the complexity of the country's asset system (because the elements are interconnected and influence each other, creating a network in which a change in one element affects the whole system), ii) the influence of the role of institutions as key components of the system (they act as regulatory mechanisms that maintain the stability and functioning of the entire system), iii) the dynamic balance between the different strands and homeostasis (as stability requires coordination between different elements for the system to function efficiently and adapt to change), iv) the adaptation of institutions to changes in the environment (that is crucial for the survival and success of the system), v) the integration of different disciplines to solve complex problems (because no part of the system operates in isolation), vi) the role of public institutions as key actors

of the former, while the latter is already at work elsewhere... Systemic corruption is named after systems theory because of the need to understand corruption as part of an integrated and complex system, where each part is important to the functioning of the whole. The systems theory provides an understanding of how corruption is integrated into structures and processes and how it can be effectively addressed and reduced. When corrupt practices use systems theory, the latter is only a rational "hired gun", the emergence of which suggests that public institutions are lagging in applying the same theory to their, for the corruption detrimental, practices

[10] Outside of individual procedures, legislation often acts also as a black box, with the legislator deciding to change it largely based on observed results, regardless of how well the articles *per se* may be written, without knowing what effects are really produced in time of articles' application or omission.

in the system that shape behaviour and interactions between individuals and influence the entire social system. The framework and systems theory described above are linked through complexity, interconnectedness and dynamic equilibrium; understanding a country or regulation as a system, where different elements are interconnected and interact, allows for a more holistic approach to public reforms that can improve the effectiveness of institutions, and better understand and address the contemporary complex societal challenges.

Regulation and information. Regulation is also tightly connected with information; accordind to Ashby, the first is essentially related with the flow of variety: "the quantity of regulation that can be achieved is bounded by the quantity of information that can be transmitted in a certain channel" (Ashby, 1957, p. 195). Information is an appropriate concept for systems that perceive it as such, process it, and respond to it appropriately. Legal regulation is hence also as good as perceived information itself – when things are regulated for which there is no information, it is regulated too much; when essential information is missed, it is regulated too little. An essential feature of a good regulator is that it uses the principle of requisite variety, that is, it "blocks the flow of variety from disturbances to essential variables" (Ashby, 1957, p. 201). Only in this way does information become a regulatory concept, and not just a personal view on certain phenomena (the same applies to measurement theory, as a specific physical process of quantifying, objectifying, and consequently weighting, evaluating information): "In complex systems, it is not enough to be informed. Such systems need to be informed in a way of a higher, collective awareness that they share the same information (the so-called metacommunication). This allows individuals and groups to self-control and to recognise themselves as a group, not just as individuals. A prerequisite for this is the communication effect by which everyone knows that everyone knows that everyone knows" (Malik, 2015, p. 301).

Dynamic relationships. Therefore, the legal analysis and synthesis should consider the interconnectedness and dynamic relationships between different elements of the system, which could lead to better management, control of legal processes, a more efficient and meaningful legal system, and the achievement of desired outcomes. This kind of consideration better reflects the complexity and dynamics of legal reality, where the essential elements of a system create a net, in which moving one part affects/shakes all others, as they are all connected (systems reform themselves through their own activities). If an element does not affect others in the system (e.g. as the car engine does), then it is not an essential element (e.g., a

storage space for an umbrella in a car). In a legal system, essential elements such as the constitution, statutory laws, and judicial decisions are intricately connected creating a network, where altering one component affects the entire system, and where changes, although made from the top down, have a feedback effect from the bottom up (*e.g.* where the content of a statute affects the meaning of a constitutional provision, or where the judicial judgment affects the substance of the statute). Conversely, minor substantive or procedural rules (*e.g.* the colour of licence plates/seating arrangements in a courtroom), do not have a widespread impact and are thus not considered as essential (system) elements.

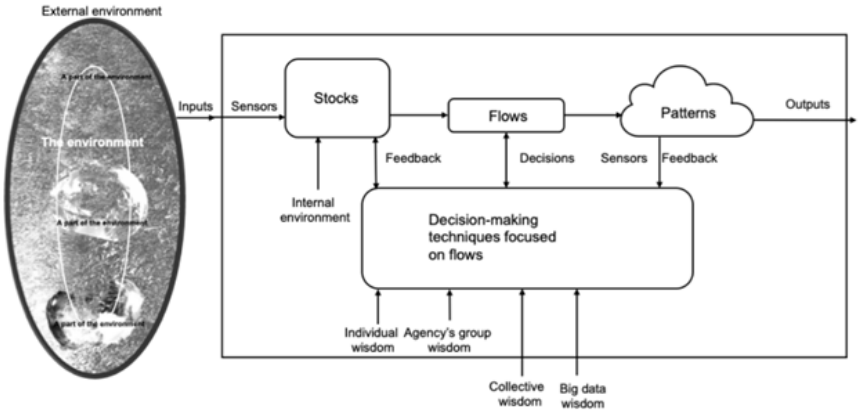
Metasystem, metaregulation. If any essential element of a system embedded in the net (as it performs specific functions within larger systems) affects the latter (moving one part affects/shakes the entire net), what needs to be observed or determined is not how the law communicates only with itself, different from the way other systems may talk about law (this is the essence of the law as the autopoietic or self-reproductive subsystem of a larger social system (Teubner, 1993)), but also how other systems affect the law, how their parts are considered to be essential for the law (e.g., the amount of finances from economy that affect legal determination and implementation of social transfers) as an open (contextual) system. A system that can produce itself in its external and internal environment can be autonomous. This kind of system is viable, i.e., it is organised in a way to survive and/or adapt to the changing environment (Beer, 1981); a system of systems is part of another higher, metasystem (second-, third- order system, etc.) in which problems of the lower system can be resolved because it operates through worldviews, perspectives, beliefs, i.e. frames of reference, from which knowledge is derived. One of the central concepts of cybernetics is that of evolution in the most general sense that is produced by the mechanism of variation and selection. Joslyn, Heylighen and Turchin added to this control (as the basic mode of organisation in complex system) and developed the Metasystem Transition (MST), the evolutionary process by which higher levels of complexity and control are generated (Joslyn, Heylighen & Turchin, 1997).

Regulatory homeostat, autonomy and ultrastability. The purpose of systemic regulation is to establish a comprehensive legal framework for the regulation of internal system's homeostasis[11] and/or (cybernetic) adaptability that

[11] Homeostasis is the state of maintaining steady internal conditions resulting from the optimal functioning of an organism, includes keeping many variables within certain preset limits (homeostatic range).

"means the maintenance of essential variables within physiological limits" (Ashby, 1966, p. 58) that in the law ensures the coordination of various legal mechanisms to maintain a stable and lawful internal environment, despite alterations within institutions. This kind of a "regulatory homeostat" can act on a series of events: the pre-established reaction, then an alteration made in the environment by the regulator, and finally a reorganisation within the system itself, compensating for the experimental alteration. The homeostat in the third phase thus shows the power of self-reorganisation (as in the nervous system) or autonomy. As systems are embedded in other systems, more difficult problems of one system can be solved in a higher system. This is the condition of *ultrastability*, where the higher system places the main variables of the lower system back into a stable position (a decision of the second-instance body in the appeal proceedings is a typical example of this). The stability of a legal system thus never rests fully solely within it; it is supported by other systems, like the political system of the country, which in turn is supported by the interstate and then the international system (multi-level governance), etc. Based on the fundamental ideas of each paragraph in this chapter (or the characteristics of the system in the context of complexity), the link between the system's environment and the decision-makers can be described as shown in Figure 1.

Figure 1: *Systemic operations*

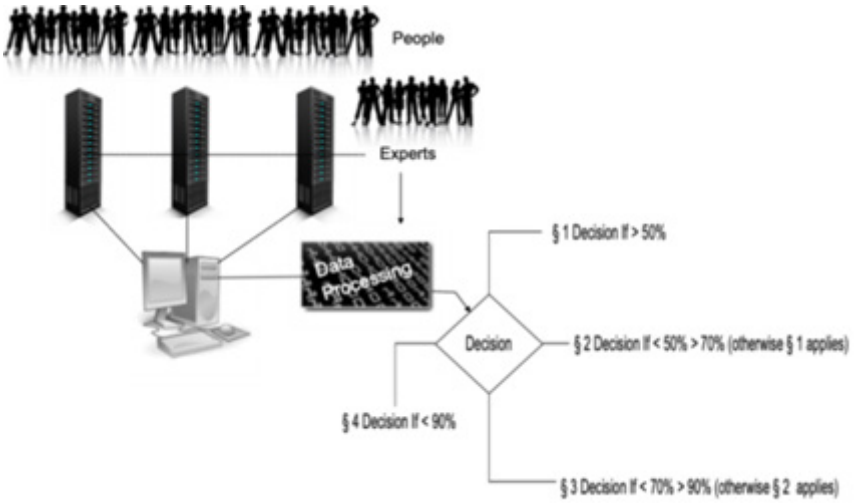


Source: Author.

Systemic operations (Figure 1) and a version of an adaptable legal norm based on the former (see Figure 2 below) represent a way of adapting the (legal) system to changes in the environment. One of the largest systems

is the people themselves, grouped around some goal, who produce results based on their various inputs on the goal's means, content, procedure, etc., in the form of collective wisdom.

Figure 2: *Adaptable norm via collective wisdom*



Source: Author.

The charm of collective wisdom lies in the fact that it can – within the appropriate settings – emerge from the collaboration of people: "people should not be complete laics". The essence of the Condorcet theorem (Condorcet, 1988) is when individuals have some knowledge on a crucial issue, they are probably correct, even if they are not experts. This makes people more likely to share their unique information and pay attention to others' information, talk about both the pros and cons of different options, and carefully analyse information (McLeod, 2013). Mutual independence between individuals is essential, as it ensures that opinions are formed through individual rational thought, rather than being influenced by others. Groups tend to collectively amplify existing information, often leading to extreme positions as confidence grows. When people encounter confirmation of their own views within a homogenous group, those views typically intensify and their propensity for risk increases – this phenomenon is referred to as enclave deliberation (Sunstein, 2019). There should be a variety of people present without imposing their opinions on others. Final decisions are reached through statistical groups constructed by collecting different viewpoints, as diverse

opinions can cancel out each other's errors. *Individual* predictions contain some truth and some errors, with the accumulated truths forming a larger truth (like standing on the shoulders of giants) and the errors negating one another (negative correlation). The greater the diversity of opinions, the more opportunities to combine complementary truths (Lamberson & Page, 2012; Landemore & Elster, 2012; Page, 2008; Surowiecki, 2005). Figure 2 can be further presented in a regulatory frame: an example of a flexible, adaptable rule is given in the context of road safety, as it is familiar to all drivers (be attentive to paragraphs 3–7 that show adaptability embedded in the norm):

(1) On roads outside settlements, the maximum allowable vehicle speeds are:
   1. 130 km/h on motorways.
   2. 110 km/h on highways.
   3. 90 km/h on all other roads.

(2) A driver who exceeds the speed limit on a motorway or highway with separated directional lanes, will be fined as follows:
   1. EUR 40 for exceeding the limit by up to 10 km/h;
   2. EUR 80 for exceeding the limit by 10 to 30 km/h inclusive;
   3. EUR 160 for exceeding the limit by 30 to 40 km/h inclusive;
   4. EUR 250 for exceeding the limit by 40 to 50 km/h inclusive, plus 3 penalty points;
   5. EUR 500 for exceeding the limit by 50 to 60 km/h inclusive, plus 5 penalty points;
   6. EUR 1,200 for exceeding the limit by more than 60 km/h, plus 9 penalty points.

(3) The fines mentioned in the above paragraph apply when the number of violations on these roads does not exceed a specified limit (e.g., a certain number, percentage or number of victims).

(4) If the number of violations exceeds the specified limit in paragraph 3, the fines in paragraph 2 are increased by 50%. The increased fines will apply from January 1 of the following year and will revert to the amounts in paragraph 2 on the next January 1 if the number of violations falls below the specified limit.

(5) If violations further exceed an even higher specified limit, the fines in paragraph 2 are increased by 75%. The higher fines will also apply from January 1 of the following year and will revert to the amounts in

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HKJU-CCPA, 25(4), 591–618, https://doi.org/10.31297/hkju.25.4.6

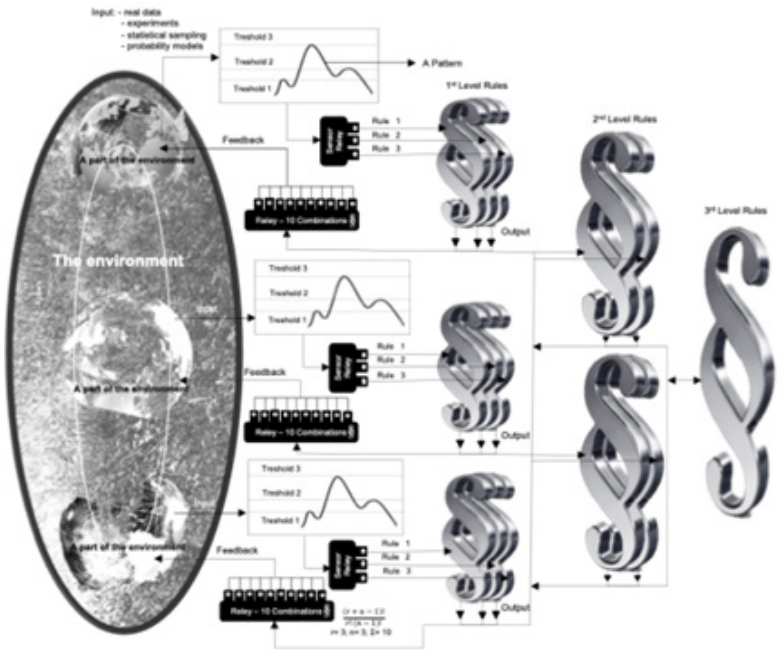
paragraphs 2 or 4 if the number of violations falls below the specified limit in paragraph 3 or this paragraph.

(6) In addition to higher fines, other measures to ensure road safety may be implemented (e.g., a driving licence or a car confiscation, mandatory medical examination, additional safe driving training).

(7) The minister responsible for road safety publishes a notice on changes in fines in the Official Gazette. A road maintenance company also publishes this notice on electronic bulletin boards along the roads.

A fully automated rule, almost in the sense of deep, self-learning neural algorithms (where internal processes are unknown, although their methods of operations are known), is presented in Figure 3 below.

Figure 3: *Fully adaptable, self-learning rule*



Source: Author.

If we have three rules based on three thresholds, their combinations already form ten rules which, by virtue of their action and feedback against them, affect not only the original three thresholds, but also the rule at the second level, etc. In such complex situations, black-box management can

be applied, where only input parameters can be changed or adjusted without knowing what outputs will be produced. Unlike the current situation, where it is often assumed that decision-makers know what is going on but in fact they do not, such a self-learning system, or rule, at least allows for a known outcome, which is almost always available at the click of "Enter". When a result is known, further changes can be made in a shorter period, such as a manual search of radio stations.

4. Results and Discussion

The answer to RQ1: the integration of systemic feedback loops and adaptive measures into regulation leads to a balance between flexibility and stability and/or the creation of adaptable legal arrangements. Regulation should be put under regular review and adjustment of laws to facts when needed, in the form of sunset clauses, adaptable legal norms, or legal experiments. Public consultation is also an integral part of the process to ensure that a wide variety of perspectives are collected from the public, industry experts, advocacy groups, and thus converted into regulation – citizen assemblies or juries can provide direct input to the law-making process (collective wisdom). Another critical component is data-driven decision making that involves comprehensive impact assessment frameworks that address the expected and demonstrated impacts of regulation, along with real-time monitoring and evaluation systems to monitor performance and make necessary course corrections. Administrative agencies can be granted wider discretion to give more relevant meaning in particular contexts, along with insuring accountability through judicial review and oversight. Adaptable design can also allow for trying out ideas, and even new regulations, on a small scale first to test how they work in the real world and help improve those which might be more widely implemented (the so-called legal experiments). Boosting collaboration across sectors is vital to ensuring that rules can effectively address issues. Trainings on systems thinking to lawmakers, judges, and administrators can help them consider the implications of their decisions. IT, such as tools and platforms, plays a role in facilitating the collection and analysis of information for better decision-making processes. Also leveraging intelligence and predictive analytics can help anticipate trends that may require legal adjustments. Establishing feedback mechanisms (e.g. complaint systems, making proposals) allows input from individuals and organisations on regulatory effectiveness. Regular, automatic reporting on legal implementation can reveal areas that need improvement.

Involving stakeholders in decision making through collaborative governance models ensures that laws remain relevant and adaptive. Embracing adaptable regulation enables responses to new information and changing circumstances, enhancing the resilience of legal systems while maintaining stability. All mentioned elements can be used as adaptability criteria of the present regulation, i.e. its level of adaptability.

The answer to RQ2: regulators can leverage system models to forecast the impacts of regulatory actions on complex social systems by creating detailed simulations that consider a range of social, economic, environmental, and other factors. These models can compile data from various sources, helping regulators grasp how different elements interact with and within the system. By testing different scenarios, regulators can foresee potential outcomes and spot unintended consequences of proposed regulations. This helps visualise the broader effects of interventions, which shows how changes in one area influence others. In addition, regulators can use models to assess the effectiveness of various strategies and adjust their plans based on simulated results, making interventions more precise and impactful. Regular updates of models with real-world data keep them relevant and accurate, helping regulators make informed decisions that adapt to changing conditions. Collaboration with various experts can further strengthen the models, ensuring an accurate reflection of complexity of social systems. This data-driven approach enables regulators manage and adapt to the ever-changing nature of social systems, enhancing the effectiveness of their regulatory efforts.

The answer to RQ3: systems thinking that is particularly useful for designing legal policies addressing complex and intertwined social problems includes several key approaches. One of them is causal loop diagrams, which help identify and understand feedback loops within a system. These diagrams show how different variables influence one other, highlighting potential intervention points. Another valuable tool are stock and flow diagrams that provide a detailed visualisation of how resources, information, or other elements accumulate and change over time; this allows policymakers to observe the dynamic behaviour of systems. Scenario planning is also effective, as it enables lawmakers to explore and evaluate the outcomes of various regulatory actions under different conditions. This method encourages the design of adaptive and resilient policies by considering a wide range of possibilities and uncertainties. Systems mapping is crucial to capture the complex interrelationships and dependencies between different components of social problems, offering a holistic view that supports comprehensive policy development. Finally, participatory modelling, which involves stakeholders

in the modelling process, ensures that diverse perspectives and knowledge are incorporated, enhancing the relevance and acceptability of policies. Collectively, these methods support the creation of more effective, adaptive, and sustainable legal policies by which complex social issues can be addressed.

The answer to RQ4: to keep legal solutions fair and effective in the face of unpredictable changes, it is crucial to build flexibility and adaptability into the legal framework. This involves establishing mechanisms for regular review and revision of regulations that can evolve with new information and changing circumstances. A diverse range of stakeholders in regulation ensures the consideration of various perspectives within the aim of basic legal principles of fairness and inclusivity. Using data-driven decision-making allows for continuous monitoring of regulatory impacts and makes evidence-based adjustments possible. Clear principles and guidelines for discretionary decision making enable case-by-case adjustments while maintaining consistency and accountability. Interdisciplinary collaboration can also bring expertise from different fields, addressing complex issues in a more comprehensive way. Scenario planning and predictive analytics help to anticipate future developments and prepare adaptable responses. Fostering a culture of transparency and open communication keeps the public informed and involved, enhancing the legitimacy and acceptance of legal solutions. By integrating these steps, legal and regulatory systems can remain fair and effective even amid unpredictable changes.

5. Conclusion

Einstein's advice at the beginning of this paper can be understood through the lens of systems theory: a problem can only be better understood, and consequently solved, at a higher (meta) level that includes the lower one as well. It is not results that need to be intervened in, but the underlying structure that enables them. Bad results reduce opportunities, energy, and resources; they arise from bad governance (the concealment of mistakes, abuse/misuse of power, manipulation of rules as bias and favouritism) – similar as corruption, but as previously stated, the problem lies in the ongoing basic (regulatory) structure that allows such results. Regulation needs not only clear frameworks, but also comprehensive mechanisms for its design and implementation. Without effective alternatives, citizens are more vulnerable and susceptible to exploitation and dependence (poor reasoning leads to poor implementation of rights).

Incorporating systemic approaches promotes collaboration across different levels and functions within the organisation. It helps break down silos, ensuring that all parts of the organisation are aligned and working towards common goals. This holistic perspective improves the overall coherence and effectiveness of the organisation. As a result, organisations become more agile and better equipped to navigate uncertainties and disruptions. The same stands for regulation: the legal system cannot be fully self-referential, as legal decisions are not made only according to legal rules, but the latter are made (not only influenced and embedded) by the social, economic and political regulators. Even if it could be debated whether legal rules are co-made or merely influenced by other non-legal factors, it is *ipso facto* that content of legal norms depends on and is embedded in many other factors that crucially impact the first. Apart from abstract theories, this is what matters from the point of legal pragmatism. All (be named autopoietic or not) complex systems are up to a point (as they are all part of other systems and/or embedded in larger systems) self-referential and self-generating (self-created), operationally closed (a network of communications distinct from other systems), structurally coupled with their environment, structured with their own rules, reflexive (capable of self-observation and self-reflection) and able to communicate, but they are all embedded in or part of other systems that can resolve matters of the lower ones on a higher level.

The primary challenge lies in systemic maintenance of the delicate balance required for optimal function of institutional systems and in preventing dysregulation that can lead to legal and administrative issues. The second challenge is to gain knowledge from ongoing research within a regulatory framework that shall serve as a foundation even for future legal research aimed at addressing unresolved legal problems and developing innovative regulatory strategies to prevent and address systemic failures. The future of legal regulation includes precise legal frameworks tailored to specific institutional needs, legal provisions to enhance institutional resilience and regeneration, regulatory pathways to optimise legal compliance, research on the impact of evolving legal standards on ageing institutional structures, innovative legal delivery systems to enhance regulatory efficacy, and the integration of artificial intelligence for complex legal data analytics. The description of systemic regulation that wants to maintain stability and transparency in complex systems resembles the challenge posed by the black box problem and/or the application of deep algorithms in AI. It also raises concerns about transparency, interpretability, and ethical issues. However, scientists are actively researching methods to tackle this issue by using explainable AI and machine learning strategies. As AI progresses, resolving

the black-box problem will be essential to guarantee the ethical and transparent use of AI. Encouragement of cooperation among researchers, developers, policymakers, and industry stakeholders can lead to the creation of solutions that improve transparency, accountability, and trust not only in AI, but also in all types of systems.

Ongoing research and technological innovations are imperative to develop more targeted and effective legal approaches to maintain internal system homeostasis and address a wide range of institutional challenges. Institutions are required to implement these regulatory measures to maintain system homeostasis and comply with established legal standards. Regular audits and reviews are conducted to ensure compliance and identify areas for improvement in regulatory practices. Regulation shall be subject to periodic review and may be amended as necessary to reflect new research findings and technological advances. Non-compliance with regulation shall result in appropriate legal action as defined by existing legal frameworks. The aim of such regulatory framework is to create a stable and effective legal environment that ensures optimal functioning of institutions, prevents systemic failures, and promotes continuous improvement through research and innovation.

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FROM LEGAL RULES TO SYSTEMIC REGULATION: THE ROLE OF FEEDBACK LOOPS AND HOLISM IN MODERN GOVERNANCE

Summary

The text argues that a country's real wealth lies less in natural and physical assets, and far more in intangible assets, above all institutions and social capital. According to World Bank estimates, only about a quarter of national wealth is "tangible"; the rest is human capital, institutional quality, and trust. Therefore, reforms should first target the rule of law and the functioning of public institutions, before implementing sectoral changes such as tax or health reform. A successful state must simultaneously be strong, law-governed, and accountable, and these three strands must be kept in balance through institutional "adaptability". Institutions are presented as structured patterns of behaviour and belief that shape preferences, constrain action, and play a central role in justice. Many social failures stem not just from "wrong policies", but from maladapted institutions unable to cope with today's VUCA conditions (volatility, uncertainty, complexity, ambiguity). Although governance discourse has advanced (good governance, markets, international organisations), the underlying regulatory style has often remained static, producing a "hamster wheel" of ever-new but similarly designed rules. To break this cycle, the paper proposes viewing regulation itself as a system, using systems theory, cybernetics, and critical systems thinking (CST). Systems thinking focuses on interdependence, feedback loops, emergence, and homeostasis; cybernetics adds control, information, and self-regulation. Regulation should incorporate feedback, learning, and Ashby's law of requisite variety–only complexity can manage complexity. Legal norms can be designed as adaptable mechanisms with built-in thresholds, feedback, and automatic adjustment, rather than static commands. The key research problem is how to integrate these systemic elements into inherently rigid legal frameworks without sacrificing certainty. The text sketches research questions and methods (dynamic modelling, adaptive management, scenario planning, participatory design) for making legal systems more responsive, data-driven, and resilient. Ultimately, the quality of the rule of law depends less on the values proclaimed in statutes, and more on the systemic design and operation of institutions that process information, learn from outcomes, and continuously adjust to a complex environment.

Keywords: *systems theory, cybernetics, systemic regulation, critical systems thinking, dynamic relationships*

OD PRAVNIH PRAVILA DO SISTEMSKE REGULACIJE: ULOGA POVRATNIH SPREGA I HOLIZMA U SUVREMENOM UPRAVLJANJU

Sažetak

U ovom se radu raspravlja o tome kako se stvarno bogatstvo neke države manje temelji na prirodnim i materijalnim resursima, a mnogo više na nematerijalnoj imovini, prije svega institucijama i društvenom kapitalu. Prema procjenama Svjetske banke, tek oko četvrtine nacionalnog bogatstva čine „opipljiva" dobra, dok ostatak čine ljudski kapital, kvaliteta institucija i povjerenje. Iz tog bi razloga reforme prije svega trebale biti usmjerene na vladavinu prava i funkcioniranje javnih institucija, prije sektorskih promjena poput poreznih ili zdravstvenih reformi. Uspješna država mora istodobno biti snažna, utemeljena na pravu i odgovorna, a te tri dimenzije moraju se održavati u ravnoteži putem institucionalne prilagodljivosti. Institucije se prikazuju kao strukturirani obrasci ponašanja i uvjerenja koji oblikuju preferencije, ograničavaju djelovanje i imaju središnju ulogu u ostvarivanju pravde. Mnogi društveni neuspjesi ne proizlaze samo iz „pogrešnih politika", već iz neprilagođenih institucija koje nisu sposobne nositi se s današnjim VUCA uvjetima ((volatility, uncertainty, complexity, ambiguity). Iako je upravljački diskurs napredovao (dobro upravljanje, tržišta, međunarodne organizacije), temeljni regulatorni stil često je ostao statičan, stvarajući stalno nova, ali strukturno slična pravila. Kako bi se prekinuo taj ciklus, u radu se predlaže da se regulacija promatra kao sustav, uz primjenu teorije sustava, kibernetike i kritičkoga sistemskog mišljenja. Sistemsko mišljenje usmjereno je na međuovisnost, povratne sprege, emergenciju i homeostazu, dok kibernetika objašnjava dimenzije kontrole, informacija i samoregulacije. Regulacija bi trebala uključivati povratne informacije, učenje i Ashbyjev zakon nužne raznolikosti – samo složenost može upravljati složenošću. Pravne norme mogu se oblikovati kao prilagodljivi mehanizmi koji sadrže određene granice, povratne informacije i mogućnost automatske prilagodbe, umjesto da su formulirane kao statične zapovijedi. Ključni istraživački problem jest kako integrirati ove sistemske elemente u inherentno rigidne pravne okvire bez narušavanja pravne sigurnosti. Tekst iznosi istraživačka pitanja i metode za razvoj pravnih sustava koji su odazivniji, utemeljeni na podacima i otporniji. U konačnici, kvaliteta vladavine prava manje ovisi o vrijednostima proklamiranim u zakonima, a više o sistemskom dizajnu i funkcioniranju institucija koje obrađuju informacije, uče iz ishoda i kontinuirano se prilagođavaju složenom okruženju.

Ključne riječi: *teorija sustava, kibernetika, sistemska regulacija, kritičko sistemsko mišljenje, dinamički odnosi*