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HUNGARIAN ENERGY LAW AS AN EXAMPLE OF USING COMPLEX SYSTEM VIEWPOINTS TO UNDERSTAND RISKS IN PUBLIC ADMINISTRATION NORMATIVITY

A magyar energiajog mint a komplex rendszerek szemléletmódjainak alkalmazási példája a közigazgatási normativitás kockázatainak megértéséhez

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Complex networks and complex adaptive systems theories come from hard sciences. The question arises whether these viewpoints can add anything to the understanding of the operation and failures of continental normativity governing the public sector. In the first part, this paper intends to demonstrate for the first time via industry-specific examples that Hungarian energy law, one of the absolute extremes of the rigid continental law is per se following complex adaptive system attributes as being implemented by the public administration, thus refuting any reductionist and linear concepts of ‘classical’ continental public law routines and prejudice. This leads to such essential features of complex systems like emergence, the ‘robust yet fragile’ dilemma and the issue of systemic risk that we investigate in the second part, also covering unpublished case studies, letting us closer to identify risks within the law applied by public administration. This in our view can add a lot to the understanding and improvement of the quality of normativity in order to mitigate systemic risks within law and public administration.

KEYWORDS:

complex systems, public administration, energy law, systemic risk

A komplex hálózatok, illetve komplex adaptív rendszerek elméletei a természettudományokból származnak. Felmerül a kérdés, hogy ezek a nézőpontok hozzá tudnak-e adni valamit a közszférát irányító kontinentális normativitás működésének és kudarcainak megértéséhez. Az első részben ez a cikk az ágazatspecifikus példákon keresztül kívánja először bemutatni, hogy a magyar energiajog, a „merev” kontinentális jogrendszerek egyik abszolút szélsőértéke maga is a komplex adaptív rendszerek attribútumait követi, amelyeket a közigazgatás valósít meg, így cáfolva a „klasszikus” kontinentális közjogi rutinok és előítéletek bármilyen redukcionista és lineáris koncepcióját. Ez a komplex rendszerek olyan alapvető jellemzőihez vezet át, mint a felerősítő hatás (emergence), az „erőteljes, mégis törekeny” dilemma és a rendszerszintű kockázat kérdése, amelyeket a második részben vizsgálunk, még nem publikált esettanulmányokra is kiterjedően, melyek közelebb visznek bennünket a közigazgatás által alkalmazott jog kockázatainak azonosításához. Mindez véleményünk szerint sokat hozzáadhat a normativitás minőségének megértéséhez és javításához annak érdekében, hogy a rendszerszintű kockázatok csökkenthetőek legyenek a jogon és a közigazgatáson belül.

KULCSSZAVAK:

energiajog, komplex rendszerek, közigazgatás, rendszerszintű kockázat

1. INTRODUCTION: COMPLEX SYSTEMS AND LAW

There is still a significant gap between ‘hard sciences’ and ‘human sciences’. Whilst hard sciences are progressively advancing with empirically justified novelties, the latter domain is rather addicted to old habits, to Aristotelian binary logic, ontological-political motifs and expectations that are mainly egalitarian-behaviourist in nature. First, human sciences, especially legal thinking, seems to be stuck into linear and reductionist concepts. As such, institutions and norms of human-made law, especially public law and public administration are widely considered to be parts that sum exactly the whole and where one institution, public authority or norm in a legal hierarchy follows another in a unidirectional linear pattern. Second and beyond all, legal thinking cannot get rid of the myth that humanity is somehow exempt from the universal laws of nature. As such, we lawyers tend to believe that human-made law, states and other superstructures of humankind have nothing in common with hierarchy in animal groups, dominance (matter of power), fight, evolution, altruism, lineage and other phenomena of nature. This moralist and thus, unscientific approach in legal thinking is well-criticised by a minority of scholars, underlining the speculative,¹ arbitrary² and politically governed³ motifs resulting in the expressed omission of the findings of modern natural sciences.⁴ However, these voices cannot be considered well-recognised.

A stunning experiment to strike this reductionist, moralist and unscientific hegemony in legal thinking is the extension of *complex systems* theories to law. Complex systems theories came from hard sciences, especially from physics, mathematics and biology; partially deriving from chaos theory in deterministic systems, game theory (very apparent in nature), dynamical systems of nonlinearity, non-equilibrium thermodynamics and so on. Common examples of complex systems are the human brain, the internet, cancer, the entire universe and so on; however, complex system-related approaches are recently getting closer to sociology⁵ and economics⁶ as well. Such social constructs as the financial system are also well-connected to these approaches in scientific debates.⁷ Some contemporary legal thinkers outlined the relevance of complex system theories concerning *law*,⁸ especially complex adaptive systems, “*in which large networks of components with no central control and simple rules of operation give rise to complex collective behavior, sophisticated*

¹ J Kekes, *Az egalitarizmus illúziói* (Gödöllő: Attraktor, 2004).

² A Ross, *On Law and Justice* (Los Angeles: University of California Press, 1958), 259.

³ U Wesel, *Juristische Weltkunde. Eine Einführung in das Recht* (Frankfurt am Main: Suhrkamp, 1984), 72.

⁴ J Szmodis, ‘A jog multidiszciplináris megközelítéséről’, *Magyar Tudomány* 172, no 1 (2011), 15.

⁵ J H Miller and S E Page, *Complex Adaptive Systems: An Introduction to Computational Models of Social Life* (Princeton University Press, 2007).

⁶ R K Sawyer, *Social Emergence: Societies as Complex Systems* (New York: Cambridge University Press, 2005).

⁷ I Anabtawi and S L Schwarcz, ‘Regulating Systemic Risk: Towards an Analytical Framework’, *Notre Dame Law Review* 86, no 4 (2011).

⁸ For example J B Ruhl, D M Katz and M J Bommarito, ‘Harnessing legal complexity’, *Science* 355, no 6332 (2017), 1377–1378.

information processing, and adaptation via learning or evolution”⁹ However, to the extent one can be acquainted with the available literature, there is still a significant resistance to the application of complex system and complex adaptive system approaches, methods and theories in legal thinking.¹⁰ What is more, public administration especially has not made extensive use of the concepts and ideas of complexity theorists, so that the latter have had little influence on theories of public administration.¹¹ We cannot avoid a certain level of suspicion that resistance is also motivated by theoretic or even political arguments. It is indeed hard to realise that similar methodology is to be used to the ‘sacrosanct’ humanity and to the gliding of vast flocks of English starling gathering over the roost at dusk in a spatial coherence¹² or that complex systems’ development and evolution can be described as the ecosystem;¹³ thus, if legal systems are complex systems, their archetype *should be* the ecosystem, too.

Law as implied by public administration, whether being a complex system or not, is unique in a sense that it aims, in a normative way, to regulate *other* social (complex) systems. As such, one may presume that the law should therefore take into account the very (complex) nature of those systems regulated by it. This means that, arguably, in order to regulate a complex social system, the law should act as a complex system as well; however, given the *sui generis*¹⁴ nature of law, this might lead to a certain pre-conceptual fallacy. If legal systems are complex systems, frank confessions may also occur, such as that regulation just does not *always work*, many times it is part of what causes a failure cascade, within and beyond the legal system.¹⁵

2. DO CONTINENTAL LAWS AND PUBLIC ADMINISTRATION CLASSIFY AS COMPLEX SYSTEMS?

Just putting aside these general remarks for the time being, we can make one significant observation in this topic in connection with the available scientific publications concerning law as a complex system. Namely, that surprisingly, these publications deal

⁹ M Mitchell, *Complexity: A Guided Tour* (New York: Oxford University Press, 2009), 13.

¹⁰ For example A Vermeule, ‘Second Opinions.’ *Harvard Public Law Working Paper* no 10–38 (2010). <http://ssrn.com/abstract=1646414> (accessed 26 November 2020).

¹¹ E H Klijn and I Snellen, ‘Complexity Theory and Public Administration: A critical appraisal’, in *Managing Complex Governance Systems*, ed. by G R Teisman, M W van Buuren and L M Gerrits (Routledge, 2009), 2.

¹² Klijn and Snellen, ‘Complexity Theory and Public Administration.’

¹³ P K Yu, ‘Intellectual Property and the Information Ecosystem’, *Michigan State Law Review* no 1 (2005). <https://ssrn.com/abstract=578575> (accessed 26 November 2020).

¹⁴ I Katsuhito, *The Foundation for a Unified Theory of Fiduciary Relationships: ‘One May Not Contract with Oneself’*, August 5, 2016, https://papers.ssrn.com/sol3/Papers.cfm?abstract_id=2424098 (accessed 26 November 2020).

¹⁵ J B Ruhl, ‘Managing Systemic Risk in Legal Systems’, *Indiana Law Journal* 89, no 2 (2014). www.repository.law.indiana.edu/ilj/vol89/iss2/2 (accessed 26 November 2020).

almost exclusively with common law systems.¹⁶ The emphasis is on ‘common’ rather than on ‘law’ and ‘systems’ (the latter are both more genus proximum than the first), that is, the focus is on the *distinctive features* of the Anglo–Saxon legal realm, compared to European normative systems. This common law-related literature has achieved remarkable findings. Complex systems theories concerning common law have advanced even to map the emergent federal judicial social structure with graphs as well.¹⁷

It is beyond doubt that common law systems and continental law systems are very distinct in nature, and these differences may extend to the criteria of complex system classification. Complex systems symptoms are relatively easily identifiable in case of legal systems based on common law: where the complex, multi-level case law and legal theories are in a complex and clearly non-linear interaction with each other and where social structures of judges and courts matter (see the above graph as an example taken from Ruhl). Compared to this, *the continental law systems still endeavour linear normative chains in a binary, reductionist logic*. Cases, judges, law schools, and law reviews are less relevant in continental law, especially in public law: that is, those features are marginal compared to which complex systems criteria are ordinarily demonstrated in common law. The relevance, nature and inner logic of public administration is clearly a field exhibiting deep differences between common law and continental law systems. Thus, the question whether recent academic findings on the nature of (common) law as complex system are valid and applicable to a similar extent to continental law as well, is not that evident. The concept of continental law is based on the idea of ‘Rechtstaat’, where the regulatory and command chains are expressly expected to be clearly defined, linear, vertical, transparent and predictable, with as minimal horizontal interaction between the reductionist nodes as possible – at least in theory. What is more, continental law is considered (with more or less ground) to be more rigid than common law, and also more predictable, based on written codes – against which the main requirement is still their persistence, permanence, invariability and unchangeable nature to the bitter end. But do they manage to do so? Do these prescriptive expectations maintain the good-old concepts of law and normativity in continental law?

¹⁶ See for example S A Kauffman, *At Home in the Universe: The Search for Laws of Self-organization and Complexity* (New York: Oxford University Press, 1995); Katz et al., ‘Reproduction of Hierarchy? A Social Network Analysis of the American Law Professoriate’, *Journal of Legal Education* 61, no 1 (2011); M J Bommarito, *Exploring Relationships between Legal Concepts in the United States Supreme Court*. Unpublished manuscript, 2009. <http://ssrn.com/abstract=1814169>; J L Sohn, ‘The Case for Prudential Standing’, *University of Memphis Law Review* 39 (2009); C P McEvily, ‘Vested Interests: The Federal Felon Body-Armor Ban and the Continuing Vitality of *Scarborough v. United States*’, *Georgetown Law Journal* 100, no 4 (2012), 1341, 1398; J B Ruhl and J Salzman, ‘Mozart and the Red Queen: The Problem of Regulatory Accretion in the Administrative State’, *Georgetown Law Journal* 91 (2003); J B Ruhl, ‘Law’s Complexity – A Primer’, *Georgia State University Law Review Symposium Issue, Forthcoming FSU College of Law, Public Law Research Paper* no 313 (2008), <https://ssrn.com/abstract=1153514> (accessed 26 November 2020).

¹⁷ J B Ruhl and D M Katz, ‘Measuring, Monitoring, and Managing Legal Complexity’, *Iowa Law Review* 101, no 1 (2015), 191–244; *Vanderbilt Public Law Research Paper* no 15–1. <https://ssrn.com/abstract=2566535> (accessed 26 November 2020).

3. EXAMPLE: THE NATURE OF HUNGARIAN ENERGY LAW AND THE PUBLIC ADMINISTRATION IN CHARGE

In order to answer these questions, as well as to determine whether continental law systems are worth to be considered complex systems like their common law counterparts overseas, we have chosen a very rigid and proudly linear continental law system, the law of Hungary. To be consequent, we have obviously chosen public (administrative) law for the purpose of analysis, and within the realm of public law, the over-regulated energy law, one of the absolute extremes of rigid continental law still in force, as a field of investigation.

Perhaps not surprisingly, though the energy law of Hungary tries to be linear, the market it regulates is full of different level participants (all of them are highly regulated, as well as licensed apart from the consumer) being highly interconnected to each other. The *types* of market players in the electricity market are:

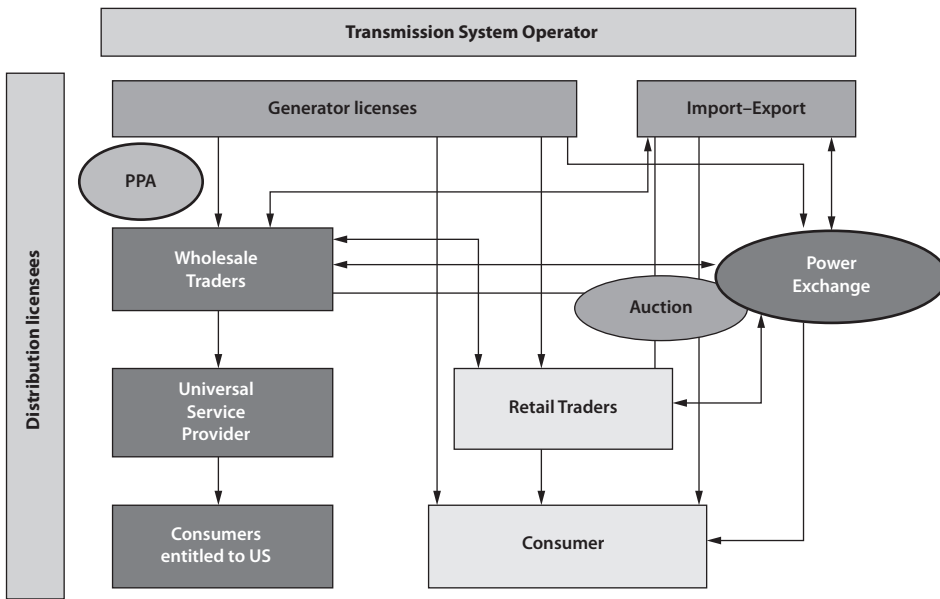


Figure 1 • Interconnections of the main types of the licensed market players in the electricity market (Source: Compiled by the authors.)

The basic relationships are presented here, though of course, in reality the hundreds or thousands of market players create a more sophisticated structure of operation. One key “player” is missing from this graph, as it is not a market player: the regulatory authority and deconcentrated public administrative body in charge, the Hungarian Energy and Public Utility Regulatory Authority (“HEA”). The HEA is in connection with all these market players, and it is the only (one-stop-shop) public administrative body in the industry in

charge of energy regulatory matters (environmental and construction licensing, as well as nuclear, belong to the competence of other authorities) and due to recent changes, has certain legislative power as well. Thus, as a matter of normativity, HEA is a non-market player representing public law for the energy sector.

So what about the law (legal system) governing the relationships of these entities? Of course, it is necessary to clarify what the term *legal system* practically means, just setting aside semantic, philosophical and even teleological aspects. A legal system in a *practical approach* is to be considered the collection of rules and regulations (that is, written law, which is the core of continental law, see the typical codes) the main product of the continental legal systems, accompanied by a collection of people and institutions, though with less relevance than in common law. Therefore law, in this sense, is mainly an emergent property of the *legal system* the same way prices are an emergent property of markets.¹⁸ Finally, as to regulation being just a part of a legal system and thus not regulation and purely regulation is to be considered the legal systems in question, it seems to be the right approach from a practical viewpoint to focus on its normativity, with the possibility of enforceability. Given that public law is apparently the field of unequal connections with vertical enforceability relations, the focus on normativity (enforceability) and its core nucleus, the ‘norm’ is of utmost importance for understanding this complicated public sector field. Thus, in our view, normativity is the key identifying the legal system in question.

Hungarian energy law as a typical semi-autonomous industry-specific public law field is governed by laws and bylaws enacted by Parliament, by the Cabinet, by certain ministries and by the HEA, whilst there are also directly enforceable EU regulations. Though it is not ‘law’ as a piece of legislation, but as a sense of normativity, the public administrative resolutions of HEA and certain other bodies of the public administration also matter, so do the network codes enacted by the transmission and the distribution system operators (that is, market players) operating as ‘quasi laws’. This is indeed complicated – but is it complex as well? According to Watkins, a system is complicated when the various elements that comprise the system still maintain a certain independence from each another, meaning that the removal of one element will not fundamentally change the system’s behaviour, all in all. Compared to this, in case of complexity, the clear dependencies among the elements are unavoidable where removing one element will alter the system behaviour “*to an extent that goes well beyond what is embodied by the particular element that is removed*”.¹⁹

¹⁸ Ruhl, ‘Law’s Complexity’.

¹⁹ N W Watkins and M P Freeman, ‘Natural Complexity’, *Science*, 320, no 5874 (2008), 324.

4. HETEROGENEITY, REMOVING ELEMENTS AND NON-LINEARITY

In order to assess this, we should consider *heterogeneity and agents* in Hungarian energy law (normativity), looking for whether it consists of a system with a number of different classes of autonomous agents. Just as a basic starting point, Hungarian public law is undoubtedly a system composed of many components that obviously highly interact with each other in tremendous amounts of links. The main nodes are the acts, decrees, regulations, then soft law and administrative decisions and finally, with a considerably weaker extent, courts and case law. *Energy law* with its norms is a subsection of this system, also being interconnected with other fields of public law externally, and its sources (acts, decrees, regulations, case law and so on) internally. What is more, public law is in interaction with private (contractual) law in many cases.

Consider the following case. When two gas traders in the wholesale scene agree to the prices in a contract (thus under private law), first they do so in compliance with their licenses (thus public law, issued by HEA), incorporating general provisions of Act XL of 2008 on natural gas and its implementation decree [Government Decree no. 19/2009 (I. 30.)]. Then they incorporate into the agreed contractual (!) prices the so-called system usage fees set by a decree of the HEA [Decree 13/2016 (XII. 20.) HEA], also taking into account the pricing principles under Decree 14/2016 (XII. 20.) HEA, that is, instruments of public law. Of course, they should also comply with industrial codes regarding physical delivery. If any of these elements, that is, compliance with licenses, incorporating system usage price, or any of the provisions of the listed laws and bylaws above is removed, *it will fundamentally alter the system behaviour*. We have the proper legal counterpart for this “fundamental alteration of system behaviour”. In legal terms, this would definitely render the agreed price, therefore the whole contract between the gas traders in our example *null and void*.

Another useful case is issuing license for electricity production exceeding 0.5MW in-build capacity. Act LXXXVI of 2007 on electricity (a law) as well as Government Decree no. 273/2007 (X. 19.) on its implementation (a bylaw) specify the HEA as a public administrative body whose task is to issue the licence. Doing this, the law and bylaw prescribe that the HEA should consider *all elements* of taxative lists (requirements to issue licenses) when making a decision to issue such a license, including business plans, certain technical and company law documents and so on. This might of course be a complicated decision-making process, however, removing one element from the list and thus making the licensing process less complicated *would not result in the less complex nature of the system*. What would affect the complexity and not (only) complicatedness in such a process? If the Hungarian electricity act or its implementation decree prescribed that the HEA must consider and evaluate all relevant factors and discretionally balance them in order to grant a license to an electricity producer, then the elements and factors would no longer be independent from each other,

and removing one could significantly alter the result.²⁰ However, and that is the key here: as a matter of normativity, such “if” scenario is not just unlikely, but simply unimaginable in energy law; licensing requirements are always taxative, due to the electricity balancing, security of supply and other evident industrial (both legal and not legal) considerations! Thus, the scientific difference between complexity and complicatedness is an expressed legal issue of taxativity/normativity. What is more, the legal system is more than just purely energy law, even just considering our licensing example. Therefore, licensing of a power plant would imply environmental and building licensing processes as well, in parallel with energy regulatory licensing. The cross-reference provisions internally and from other laws and bylaws (also in the electricity act and vis-à-vis environmental and building regulation) as well as the assignment of responsibilities to multiple public administrative agencies (environmental, building, energy) will result in the express interconnectedness of the whole licensing system.

Instruments are interconnected, hence institutions are also interconnected. What is more, agencies and public administrative bodies involved in the licensing will also further involve special authorities for special professional queries, such as fire protection, public defence and so on. These latter professional bodies do not connect directly vis-à-vis the power plant as a client in the production licensing process, only through the process of the leading licensing authority. For example, the fire protection authority or the public defence special authority is contacted only by the building authority in the licensing process. What is more, the decision of the special authorities, either positive or negative, cannot be appealed directly; only through an appeal against the decision of the leading licensing authority. Thus, we are now entering a complex system with *different levels of edges* between the nodes. In an important case, where we represented the claimant, a wind park operator, this claimant was rejected to prolong its building permit just because a special authority, the Ministry of Defence refused to grant consent to the permit renewal, because of a NATO locator radar that was started to be built nearby, but later then the claimant was originally granted by the building permit. The claimant was then forced to appeal against the resolution of the building authority, the latter becoming the defendant in a lawsuit where in fact they had nothing to do with the matter of fact at all: the law as an edge interconnected the nodes.²¹ Just for the record: finally and before the claimant could win the case, the Government passed a decree prohibiting the building of wind parks close to military objects. The Gordian knot was cut then.

It is also worth mentioning that against the decision of the HEA there is a different chain of legal remedies available than against decisions of other public administrative authorities (for example building authority, environmental authority and so on). However, usually both are applicable in case of energy law matters:

²⁰ Ruhl and Salzman, ‘Mozart and the Red Queen’, 796–806.

²¹ Kúria [Supreme Court] case no. Pfv. V.14.180/2016.

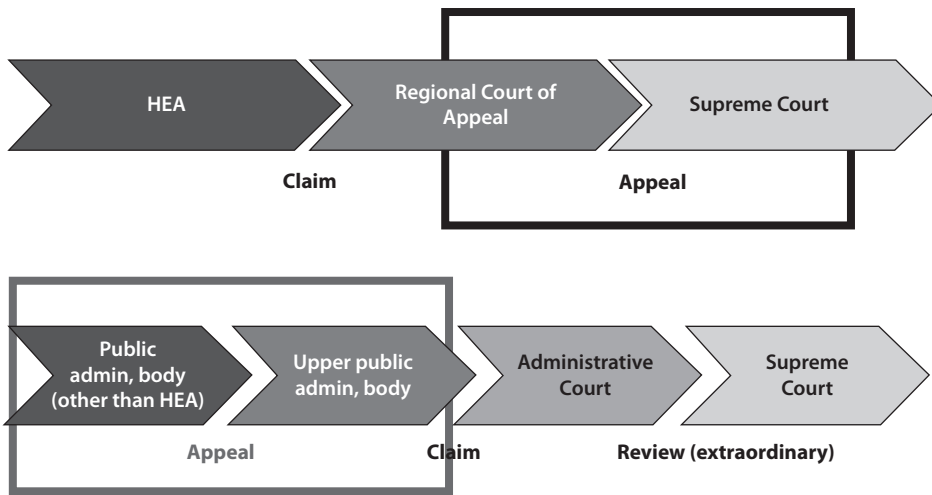


Figure 2 • Public administrative law remedy chains of the Hungarian energy market
 (Source: Compiled by the authors.)

Though at first sight the two remedy chains appear to be linear, in fact these legal remedy-chains are also interconnected and are further complicated with the involvement of the special authorities mentioned above, whose decisions cannot be appealed directly. These patterns of legal remedies introduce the unpredicted, interconnected deterministic rules into the system as upper public administration bodies (agents) interpret or overrule both legislative acts and the acts of the lower public administrative bodies (agents) or courts *creating connections and feedbacks in a multiple level*. The elements investigated so far are 1. the various sources of written law like the electricity act and its implementation decree, then 2. the various interconnections between agencies and public administrative bodies, as well as 3. the interconnected remedy chains available should be then also connected to and multiplied by 4. the different market player licensees. The latter licensees are the subjects of the system like distribution companies, transmission system operator, wholesale traders, universal service providers and so on, see the second chart above with their different position in the system, also being interconnected. Lawyers know that the above (public administrative) remedy chains have a high interconnectedness with civil law (that is, not public administrative) remedy chains as well. A public administrative claim is often rejected due to the lack of standing (*legitimatío ad causam*), rendering the whole case a purely commercial dispute on damages belonging to civil law courts, or in other cases the (positive) public administrative judgment is a prerequisite for damage claims (that is, civil law remedies). In a recent case at the Supreme Court, where I (Máté Tóth) represented MAVIR, the electricity transmission system operator, where the Supreme Court finally said in a commercial dispute that the claimed counterclaim of damages of the defendant

lacked legal grounds because of the public law nature of the case and dismissed all the previous judgments of the lower civil courts.²²

This high network connectivity and feedback between the agents, licensees and legislative acts creates a network of nodes and channels of information flow. Even just considering one flow of interactions, the legal remedy chain as charted above, the *path dependence* is obvious and transparent. Though less transparent, the same is true of the enactment of laws and bylaws of the energy sector, often retained from the previous and repealed legislature, whilst courts base their evolving interpretation on prior cases and interpretations. It is beyond doubt that it is far easier to identify complex nature concerning heterogeneity and agents in common law through the judiciary's hierarchical structure and practice of *stare decisis* that “*fundamentally link courts with courts and opinions with opinions in ways that produce complicated and complex (as defined herein) institutional and instrumental connections*”.²³ However, as seen above, it is also beyond doubt that the most rigid, declaredly linear field of continental law produces the same essential features of heterogeneity and the interconnectedness of agents in the complex system of Hungarian energy law.

Furthermore and contrary to the declared intention of continental law, the *relationships between the above investigated particles are non-linear*. The agent interaction does not produce something like a one-way, linear, predictable behaviour in a kind of continuous proportionate relationship. First, in the above examples of energy law relationships, contractual connections of gas traders or licensing procedures of the parallel authorities (HEA, environmental authority, building authority as leading authorities, accompanied by the lower level special authorities) are neither providing proportionate relationships and patterns nor are constant in time. During our practice, we have seen totally different outcomes of the very same gas trade contractual relationships: one fulfilled, one litigated. We have seen totally different outcomes of the very same licensing situation (a wind park receiving production license, whilst an identical one rejected), and also a totally different outcome of the very same litigation (standing granted in one litigation case against an industrial network code, whilst not granted in another case, against the very same network code). The complexity arises in nonlinear relationships, especially when we connect the above levels of reality: contracting, licensing and litigation – like life does.

5. EVOLVABILITY: THE DOUBLE-EDGED SWORD

These nonlinear relationships are further made more sophisticated by the often changing legislature, having the highest relevance in continental law countries. Just continuing the example of electricity licensing, only the licensing rules have been amended more than

²² Kúria [Supreme Court] case no. Pfv. V.21.296/2017.

²³ Ruhl, ‘Managing Systemic Risk in Legal Systems’.

100 (!) times during the last 25 years. Considering the electricity act, being the top of the regulatory pyramid governing licensing (and thus, expectedly, being the most stable piece of legislation governing electricity-related legal relationships), we see that the present one²⁴ is the third being in force since 2001 (the 1994 energy act²⁵ repealed in 2003 by the 2001 electricity act²⁶ that was also repealed in 2007).

However, this is just the surface. Non-linear dynamics, where increases in a certain incentive or factor can lead to varying effects, due to contextual changes, with new effects occurring when certain time thresholds are crossed.²⁷ While tides are considered to be complex yet predictable in the same time, weather systems are complex and often unpredictable, as the fascinating work of *Edward Lorenz* demonstrated.²⁸ There are voices saying that legal systems exhibit properties that make them behave more like weather and less like tides,²⁹ and, in light of the above examples, they are likely right, when considering Hungarian energy law as well. This leads to another essential feature of complex systems that is *emergence and evolvability*. These are very relevant, as with these we enter the most controversial, most disputed aspects of the legal system, hence the most vulnerable parts as well, as related to certain types of risks. Neither legal systems, nor public administrations are static phenomena. Even a robust complex adaptive system is not something immune to emergence, thus emergence is not a judgment nor a quality issue. Emergence is commonly defined as “a process that leads to the appearance of structure not directly described by the defining constraints and instantaneous forces that control a system”³⁰ or in more technical terms, as “complicated global patterns emerging from local or individual interaction rules between parts of a system”.³¹ In fact, emergence is a crucial phenomenon for law and legal systems as well, also including continental law systems and thus our example of Hungarian energy law.

The emergence of jurisprudence, that is, the essence of common law is thoroughly investigated by scholars. There it is well-established that reductionist approaches fail to understand the jurisprudence in emergence.³² What is really interesting in these findings is that while mapping masses of judicial opinions and broad and narrow concepts in common law jurisprudence, the combinations exhibit patterns of connections that are not

²⁴ Act LXXXVI of 2007 on Electricity.

²⁵ Act XLVIII of 1994 on Electricity.

²⁶ Act CX of 2001 on Electricity.

²⁷ E Mitleton-Kelly, *Ten principles of complexity and enabling infrastructures. Complex systems and evolutionary perspectives of organisations: the application of complexity theory to organisations* (Amsterdam: Elsevier, 2003); G R Teisman, ‘Models for research into decision-making processes: on phases, streams and decision-making rounds’, *Public Administration* 78 (2000), 937–956.

²⁸ E Lorenz, ‘The nature and theory of the general circulation of atmosphere’, *World Meteorological Organization* no 218 (1967).

²⁹ Ruhl and Katz, ‘Measuring, Monitoring, and Managing Legal Complexity’.

³⁰ J P Crutchfield, ‘Is Anything Ever New? Considering Emergence’, in *Complexity: Metaphors, Models, and Reality*, ed. by G A Cowan, D Pines and D Meltzer. Berkeley, California, University of California, 1994.

³¹ P-M Binder, ‘Frustration in Complexity’, *Science* 320, 5874 (2008).

³² Bommarito, *Exploring Relationships*; Ruhl, ‘Managing Systemic Risk in Legal Systems’.

inherently obvious and neither explicitly built into or otherwise obvious from the hierarchy itself.³³ Indeed, it is easier to identify such phenomena concerning case law and judicial opinions. Many have observed that the common law is a “*complex adaptive system in which an array of agents, institutions, and social contexts together act to produce its substantive jurisprudence*”.³⁴ The gradual development of jurisprudence, the ‘stare decisis’ and the evolution of legal doctrines accordingly in common law systems are apparent and easy to follow, having limited relevance in continental legal systems and in our special example of Hungarian energy law.

What can be said then about the emergence of continental law systems and public administration? Being complex systems like common law or the ecosystem, the above should be true for these as well, though the expectedly more robust complex legal systems, the continental law systems are less transparent in their emergent behaviour. As in the ecology dynamic equilibrium models are widely accepted with a premise that alteration in ecologic systems is inherent even though such alteration is bounded within predictable confines,³⁵ this is indeed true in our legal example of the rigid Hungarian public administrative (energy) law as well. Emergence is inherent, Hungarian energy law evolves: the laws and bylaws are amended and repealed, the “nodes”: the licensees and even the agents change as well. Just to the latter, public authorities are dissolved, created or re-defined.

It is far less evident that emergence and evolvability in the legal system both in legislation and legal execution (public administration) may represent useful flexibility as adaption (reflection) indeed, but also risk, thus evolvability is a double-handed sword. Concerning the latter, that is risk, it is clear that emergence may also be associated with country risk (that is, a country changing its legal norms too often producing less stability) and public administration operation (that is, the quality of public administration). Such observation may also be relevant as it seems scholars do consider emergence only as a positive characteristic of complex legal systems.³⁶ Consider the following case. The HEA was re-designed in 2013 so thoroughly that it became even a legislator concerning price setting, besides its public administrative tasks. This emergence happened due to the Hungarian Government’s so-called ‘*rezsicsökkentés*’ (overhead reduction) campaign, expecting to keep end-consumer energy prices at a low level, not only regulating the potential profit of certain market players (the distribution system operators) but also their justified costs as well. In order to avoid successful judicial reviews of the public administrative resolutions of HEA with the artificial and arbitrary price reduction, Parliament even passed a law changing the Constitution. This amendment prescribed that HEA should carry out its price settings not in the form of individual public administrative resolutions, against which judicial review

³³ Bommarito, *Exploring Relationships*.

³⁴ Katz et al., ‘Reproduction of Hierarchy?’, 97.

³⁵ R F Noss, ‘Some Principles of Conservation Biology, as They Apply to Environmental Law’, *Chicago-Kent Law Review* 69, no. 4 (1994), 893.

³⁶ For example Ruhl, ‘Managing Systemic Risk in Legal Systems’.

is open, but through decrees, that is, bylaws instead with *erga omnes* binding force, against which no judicial control is available.

In our view, the above is a very important and powerful example to understand *the potential, but linearly unpredictable twofold consequences of emergence and evolvability*. In our above example, that is, the changing role of HEA as a public administrative body in Hungarian energy law, even becoming a legislator (thus making law) is clearly a self-explanatory case study of legal emergence, both being in connection with the increase of country risk and the decrease of quality expectations towards (that is, trust in) public administration. A public administrative body becoming a lawmaker for price setting unprecedentedly indeed a phenomenon affecting investment and regulatory stability and thus country risk (and trust) in the energy sector in general. At the same time, quality expectations and trust in public administration are also being affected by narrowing available legal remedies against decisions of the public administration. This is not just a theory. We have seen dozens of big energy investors increasing the used country risk factor in their future investment decisions due to the arbitral and unpredictable change of the price setting back in 2013, whilst decreasing their reliance on public administration in the same time, by clearly avoiding further possible contact with public administrative bodies.

As our example warns, emergence in the legal system is something that may be causing risk in the market, either increasing country risk or reducing quality of public administration – sometimes both. It is also clear that emergence is rather an issue in connection with complex *behaviour* rather than complex *systems*. This emergent legal system behaviour however, while being a product of the legal system's structural interconnectedness as seen above previously, cannot be predicted in its complexity from a reductionist study of the interconnected components. This anti-reductionist and non-linear nature is something lawyers definitely tend to deny without cause.

6. THE RYF DILEMMA AND SYSTEMIC RISKS

We can summarise the consequence of the changing role of HEA in the following way. This emergence (evolvability) in the legal system intended to add (and definitely managed to do so) to the robustness of the legal system with strengthening the legal position of official price setting and defending 'rezsicsökkentés' from judicial review, also increased the fragility of it as well: increasing country risk, decreasing trust in quality of public administration in the same time. This turns all the above to a more normative (and *de lege ferenda*) viewpoint, that is, to the 'robust yet fragile' (RYF) dilemma. The RYF dilemma is generally about the phenomenon that a legal system is both robust and fragile in the same time, and any effort to reduce fragility by reducing organisation would also reduce robustness, but increasing organisation to increase robustness also increases fragility. According to Alderson and Doyle, the core criterion for the RYF dilemma model is "*large and/or diverse number of*

components, the complexity of their interconnections and interactions, and the complexity of the behaviors that result,”³⁷ that is, the very essence we identified.

The RYF dilemma and the emergence of *systemic risk* are closely related. Alderson and Doyle argue that the ordinary cause of systemic risk is the complexity in highly organised systems that arises primarily from design strategies intended to create robustness.³⁸ Thus, understanding the complex system nature of our very rigid continental law example, namely the Hungarian energy sector regulation and the involved public administration implementing should necessarily draw our attention to this RYF dilemma in understanding *systemic risks*. The emergent properties and the relatively autonomous character of the agents cause systems to have unpredictable and complex dynamics. Seemingly stable equilibriums can be suddenly disrupted by unexpected events³⁹ activating and making visible imminent systemic risks. Hence, complexity connects emergence, RYF and systemic risks in the following way:

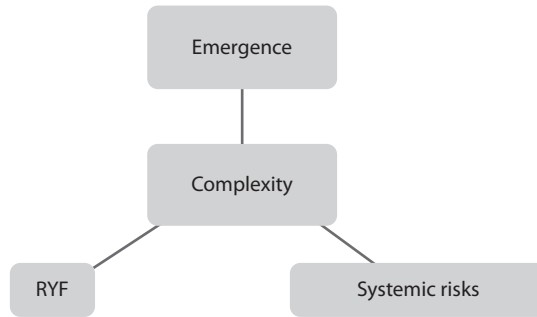


Figure 3 • Complexity-centred phenomena (Source: Compiled by the authors.)

What is a systemic risk? Whilst legal scholars have written about systemic risk occurring in financial systems as early as in the 1980s,⁴⁰ identifying systemic risk within the legal system is a quite recent field of investigation.⁴¹ Law as normativity is a system among the multitude of social systems and subsystems and its aim is, expectedly and allegedly, to regulate constraints and failures the other social systems face; as being such, it is a fail-safe strategy for other social systems. However, risks cannot only be caused *in other complex social systems* by the law, like it happened with the changing rule of the HEA causing the increasing country risk and decreasing trust in public administration quality. A certain

³⁷ D L Alderson and J C Doyle, 'Contrasting Views of Complexity and Their Implications For Network-Centric Infrastructures', *IEEE Transactions on Systems, Man, and Cybernetics – Part A: Systems and Humans* 40, no 4 (2010), 840.

³⁸ Ibid.

³⁹ Klijn and Snellen, 'Complexity Theory and Public Administration', 4.

⁴⁰ M Gruson, 'The Global Securities Market: Introductory Remarks', *Columbus Law Review* (1987), 303.

⁴¹ Ruhl, 'Managing Systemic Risk in Legal Systems'.

degree of systemic risk is without doubt inherent *within* the legal system itself, as in case of any other complex adaptive systems. Obviously not all system failures are the result of systemic risk and not all risk is systemic. According to Helbing, systemic risk is the risk of having not just statistically independent failures, but “*interdependent, so-called ‘cascading’ failures in a network of N interconnected system components. That is, systemic risks result from connections between risks (‘networked risks’)*”.⁴² According to Helbing, it is exactly the potential for cascading that is so dangerous in case systemic risk is high. Ruhl asks the fundamental question: how is it that a robust complex adaptive system such as law, with all its fail-safe mechanisms guarding against failure, nonetheless fails?⁴³ The RYF dilemma and the emergence of systemic risk are closely related, therefore, whilst investigating the common law system of the United States, Ruhl comes to the fundamental question that if we cannot effectively manage systemic risk within the legal system, how can we expect the legal system to manage systemic risk elsewhere?⁴⁴

One more thing to clarify here. Ruhl identifies qualities of robustness as modularity, scalability and evolvability⁴⁵ over reliability and efficiency. Since this verdict is based on common law experiences, this might not be an automatically correct standpoint concerning continental public administrative law, like Hungarian energy regulation. Since reliability (stability) is the very essence of continental law systems and also something reflected in country risk, expectations towards regulation (reliability, hierarchy, non-negotiability, vertical expectations) thus may easily be confronted with quality expectations towards public administration (flexibility, reflexivity, democratisation, horizontal expectations). *This confrontation or collision is a problem especially when we take the position that normativity comprises both: public administration (with its quality issues) and regulation (with its country risks concerning stability requirements)*. Adding to these that normativity, the product of complex legal systems contains an inherent fragility in a form of systemic risk, we have to deal with this three-component risk matrix when addressing the robust yet fragile dilemma of complexity.

7. IDENTIFYING SYSTEMIC RISK THROUGH COMPLEX CONSTRAINTS

Where and how can we identify the systemic risks, that is, the frontline of the RYF and the most dangerous consequence of emergence in law being a complex system? Though different types of constraints and risks may arise on the level of components, the most important ones are complex constraints. The reason is simple: constraints that occur on the component level can be realised much easier. A constraint is complex on the system as

⁴² D Helbing, ‘Globally networked risks and how to respond’, *Nature* 497 (2013).

⁴³ Ruhl, ‘Managing Systemic Risk in Legal Systems’, 583.

⁴⁴ *Ibid.* 563.

⁴⁵ *Ibid.* 594.

a whole that is not a consequence of those on the components.⁴⁶ It means that it is much harder to realise them than constraints occurring on the component level, as they do not exist on the component level. Those procedural norms creating an environment for the operation, for example licensing rules in Hungarian energy law could be relevant to such complex constraints for example. Different constraints may combine in their effect and interact with each other, creating emergent situations that might not have arisen in the absence of this combination, that is, would not occur at component level.

Let us take another case study, the issue of licensing wind power plants in Hungary. Following Hungary's accession to the European Union (2004), the green energy goals of the EU became binding targets for Hungary, as well. In order to comply with these, the Hungarian energy law regulation intended to solve the issue of promoting power plant investments producing electricity from renewable energy sources (RES) by introducing a so-called mandatory off-take system, accompanied by a feed-in tariff. In this off-take system, the wholesale electricity trader, then later the transmission system operator was obliged to off-take the electricity produced from RES. The expected return of investments with the profit as well was inbuilt in the tariffs of electricity produced that were officially set by law, whilst eligibility to participate in the mandatory off-take system was checked and criteria (for example, the amount of electricity to be sold, time of eligibility for the off-take) were set by HEA in public administrative resolutions. Risks or apparent constraints were not present on the component level, the logic was clear and straight-forward, and tasks were well-balanced between the legislator, the affected market players (producer, off-taker) and the public administration (HEA). However, in 2006, given that the guaranteed return (mandatory off-take and feed-in tariffs) made RES investments a very attractive business, countless applications for licenses were submitted to the HEA, in sum exceeding 1,000 MW new wind capacity in total, more than three times higher than what the electricity system could manage. The problem was simple. Given the volatility of wind energy (the wind is not always blowing, not always from the same direction and so on), each megawatt electricity produced from wind requires a certain level of electricity production from different sources as a 'back up', in case the production of the wind park stops (storage possibilities were almost null at that time). This 'back up' is provided through so-called system-level services, provided by old 'conventional', mainly gas-fuelled power plants in the system. That time, the maximum amount of wind energy that could be handled by system-level services was around 300 MW, whilst the total requested new wind capacity in the submitted license requests was the said 1,000 MW. A cascade of failures occurred. As Alderson and Doyle argues, when system organisation becomes more complex, even slight perturbations could have cascading and ultimately catastrophic consequences through the tightly interconnected system.⁴⁷ Here in our case the complexity increased by the introduction of the green energy subsidy, that is, with the mandatory off-take and feed-in

⁴⁶ Alderson and Doyle, 'Contrasting Views of Complexity', 841.

⁴⁷ Ibid. 843.

tariffs. This new element brought in the perturbation event to the complex system – new wind energy production licence applications of a total 1,000 MW that the electricity system was physically unable to handle – and even the originally well-functioning particles failed in an unforeseen way. Again, as Alderson and Doyle explain the theory: the emergence of complexity can often be seen as a spiral of new challenges and opportunities that organisms and/or technologies exploit, but “*which also lead to new fragilities, often from novel perturbations. When successful, fragilities are met with increasing complexity and robustness, which, in turn, creates not only new opportunities but also new fragilities, and so on*”.⁴⁸ What happened in the wind power plant licensing issue then is worth considering to understand the RYF dilemma and the cascade of failures. Given that the Hungarian electricity system was physically incapable to handle 1,000 MW wind power plant capacity, HEA arbitrarily decided which license application to accept and which to reject, though legally (concerning criteria set by law) all had to be accepted. HEA thus manifestly violated the law – though for a very good reason. HEA issued a so-called ‘prospectus’ with the arbitrarily set criteria – the problem with this doubtful paper was that as ‘prospectus’ it did not appear in the law concerning legislation, thus it could not have binding force at all. In terms of normativity, it was simply not law, but the HEA considered it necessary in order to *defend the robustness of law*. The investors whose license applications were rejected turned to the courts in a form of public administrative litigation. Thus, the perturbation manifesting in the HEA’s dilemma was passed to a different branch of power: the judiciary. The court, measuring the interest of formal legality (stability) and the interest of the electricity system as a whole (though not manifested in law), decided in favour of the latter. The consequence was that dozens of investors left the country. The legislator also reacted in its slow way: the electricity act was amended saying that licensing of wind power parks should be subject to special rules in the future. However, the special law regulating such was enacted only one and a half year later, causing an unconstitutional omission. So far, the cascade of legal failures included the failure of the existing regulation, then the failure of the public administration (HEA), the failure of the courts, the failure of the legislation. Complex constraints lead to a cascade of failures: the imminent systemic risk became express.

8. HANDLING SYSTEMIC RISKS

In our view, mitigating systemic risk is the field where complex system theories can add a lot to the improvement of the public sector. Understanding normativity failures and errors to handle RYF complexity spiral in law as a complex system, like in the above wind park licensing case study, should indeed be a central issue for *de lege ferenda* thinking.

⁴⁸ Ibid.

Some scholars suggest fail-safe strategies, improving the quality of the system components, redundancy of components, building in sensors and feedback.⁴⁹ Improving the quality of the system components in order to strengthen robustness of the legal system is closely connected to the issue of quality in public administration, concerning the executive branch of power and to the issue of country risk, through stability and reliability of legislation, whilst also being a rational response to the issue of systemic risk within the executive branch of law. Such quality improvement may address institutions, procedures, people, technology (digitalisation) and so on. The *quality excellence models* used nowadays originally elaborated for the private (business) sector are capable as a tool to grab the issue for the public administration. There are two widely accepted models, by law in Western Europe: the Speyer Quality Award and the European Excellence Model.⁵⁰ The first is a 1998 document and mainly used by German-speaking countries, whilst the latter is a successor of the Business Excellence Model from 1999. National quality awards in Western European public service organisations under both models do operate with the following criteria: leadership, policy and strategy, people, resources, processes and finally, different categories of ‘objective’ and ‘subjective’ results, with obvious differences in weightings from country to country.⁵¹ These are mainly indirectly forced by law from a client perspective, as these should be applied (and often self-assessed, especially in case of the European Excellence Model) by public administrative organs, not necessarily (though in some cases still) forming part of classical public administrative codes. It is also worth noting that the Common Assessment Framework (‘CAF’) based on complex realisation of challenges in public administration was elaborated in 2000⁵² and had started to compete with the previous European Excellence Model, due to its more flexible and more public administration tailored nature.⁵³ *The ISO 9000 series* are also good-old standards (often refreshed) for quality assurance purposes. It is apparent that the main focus of the ISO-system is the contracting-out of public services, whilst ISO 9004 standards are the most suitable for TQM developments and ISO 9000-9003 for organisations without their own (normative, legal) rules of operation.⁵⁴ Instead of ISO standards, the EU came to prefer the public administration tailored quality assurance system mentioned (in a form of a recommendation), namely CAF. Finally, it should also be observed that the quality in public administration is often considered in a broader sense by the European Union, for example, in the toolbox (a non-legal document) on quality in public administration, also

⁴⁹ Ibid. 841–842; Ruhl, ‘Managing Systemic Risk in Legal Systems’, 579.

⁵⁰ EFQM, ‘Driving organisational change and performance improvement’, s. a. www.efqm.org (accessed 26 November 2020).

⁵¹ E Löffler, ‘Quality Awards as a Public Sector Benchmarking Concept in OECD Countries. Some Guidelines for Quality Award Organisers’, *Public Administration and Development* 21, no 1 (2001), 27–40.

⁵² S Geldof, P Staes, A Stoffels and N Thijs, *Five years of CAF 2006: From Adolescence to Maturity – What next?* (Maastricht: European Institute of Public Administration, 2011).

⁵³ G Bouckaert and C Pollit, *Public Management Reform* (New York: Oxford University Press, 2011).

⁵⁴ S Russel, ‘ISO 9000:2000 and the EFQM Excellence Model: competition or co-operation?’ *Total Quality Management and Business Excellence* 11, no 4–6 (2010).

counting on governance, policy making, embedding anticorruption practices, the quality of judicial systems and managing public funds.⁵⁵ Concepts go so far that legislative and judicial branches of power are also affected by the promotion of quasi-legislative and quasi-judicial tools and instruments are encouraged. Quasi-legislative processes are deliberative democracy, e-democracy, public conversations, participatory budgeting, citizen juries, study circles, collaborative policy making, and other forms of deliberation and dialogue among groups of stakeholders or citizens. Quasi-judicial processes include alternative dispute resolution such as mediation, facilitation, early neutral assessment, and arbitration.

Redundancy of components is also a reasonable tool. Contrary to typical two-stage public administration, two-stage judicial review and separation of competence and power within the public administration, for example amongst different authorities, such redundancy is worth considering in order to mitigate risks. In western countries, deliberative democracy, e-democracy, public conversations, participatory budgeting, citizen juries, study circles, collaborative policy making, and alternative dispute resolutions are promoted⁵⁶ that may also result in redundancy of regulatory and public administrative components, however, also reducing the control of power, that is, the very essence of normativity. These considerations are closely connected to the “New Public Management” (“NPM”) that exactly aims at decentralisation, privatisation, competition and so on.⁵⁷

The NPM and the privatisation, democratisation and outsourcing tendencies of public administration and public management are also considered real-world exemplars of complex systems by certain authors, having thus effect on systemic risks. For example, the argument is advanced by Meek, De Ladurantey and Newell that administrative networks, shared governance, and co-production of public services developed in the conjunctive state are real-world exemplars of the emergent properties of complex adaptive systems (CAS). According to them, as the production of social capital and public trust of government decline in response to the increasing inability of hierarchical, topdown, command-and-control institutions to solve complex societal problems, the fundamental nature of associations and relations among citizens, policy makers, civic leaders, and government is changing in metropolitan areas as government slowly shifts toward governance.⁵⁸

In our view, however, we should also be able to find certain other possible tools without, this side-effect of losing the very essence of normativity, and fitting better to the regulatory

⁵⁵ European Union, *Quality in Public Administration – A Toolbox for Practitioners*, 2015, file:///C:/Users/M%C3%A1t%C3%A9/Downloads/eu_publicadmin_toolbox_full_en.pdf (accessed 26 November 2020).

⁵⁶ L Blomgren Bingham, T Nabatchi and R O’Leary, ‘The New Governance: Practices and Processes for Stakeholder and Citizen Participation in the Work of Government’, *Public Administration Review* 65, no 5 (2005), 547–558.

⁵⁷ G Gruening, *Origin and theoretical basis of the New Public Management (NPM). Draft for the IPMN conference in Salem/Oregon*, 1998.

⁵⁸ J W Meek, J De Ladurantey and W H Newell, ‘Complex systems, governance and policy administration consequences’, *Emergence: Complexity and Organization* 9, no 1–2 (2007), 24.

tendencies of the Hungarian energy sector⁵⁹ and thus similar complex systems of normativity elsewhere, too. In regulated markets, one-stop-shop public administration prescribed by legislation can be such an effective tool in energy law (for example, in licensing) not only because it reduces the number of nodes but also because it would concentrate all relevant aspects in one hand, enabling the recognition of correlations and coupling effects. Building sensor protocols into the system in order to provide relevant information about system failure potentials as well as strengthening feedback may also likely improve quality in public administration, trust in legislation and mitigating systemic risk. It may also be a useful tool to compare the frequency of how norms utilised by the public administration body and the place of these norms in the legal hierarchy: the derivations from the ideal power-law distribution of the utilisation of norms might be relevant indicators concerning regulatory systemic risks too.

9. CONCLUSION

As it can be seen from the examples of Hungarian energy (public administrative) law, heterogeneity (wholesale gas pricing), complexity above complicatedness (electricity production licensing) and system interconnectedness (on component level: Novenergia case, on level of legal branches: MAVIR case) show complex adaptive system features. Thus, even though there are significant differences compared to common law where such approaches are well-received, there are valid grounds to consider continental law and the public administration administering it as a complex system. Based on these findings, there are also valid grounds to investigate Hungarian energy (public administrative) law dynamics through such complex system phenomena like evolvability and the RYF dilemma (HEO changing role, the ‘rezsicsökkentés’ case) as well as complex constraints and systemic risks (the wind park licensing case). These are the aspects where complex system approaches may add a lot to the understanding of normativity and the operation of public administration, as well as to the identifying of systemic risk within the law. This should be applicable to other jurisdictions as well, especially in other countries with similar regulatory and public administration structures, both in CEE/SEE and beyond. Hence it is a promising new field for further interdisciplinary studies concerning public administration. In our belief, this should be a new direction of scientific and practical investigation in all regulated industries like energy, pharma, health care and financial institutions and in all jurisdictions with similar regulatory logic.

⁵⁹ A Herczeg and Gy Vastag, ‘New directions in the Hungarian energy market: Transformation of the national public utility’, *Pro Publico Bono – Magyar Közigazgatás* 7, no 2 (2019), 110–121.

REFERENCES

1. Alderson, D L and J C Doyle, 'Contrasting Views of Complexity and Their Implications For Network-Centric Infrastructures'. *IEEE Transactions on Systems, Man, and Cybernetics – Part A: Systems and Humans* 40, no 4 (2010). DOI: [10.1109/TSMCA.2010.2048027](https://doi.org/10.1109/TSMCA.2010.2048027)
2. Anabtawi, I and S L Schwarcz, 'Regulating Systemic Risk: Towards an Analytical Framework'. *Notre Dame Law Review* 86, no 4 (2011).
3. Ashburner, L, E Ferlie, L Fitzgerald and A Pettigrew, *The New Public Management in Action*. New York: Oxford University Press, 1996.
4. Bálint N, Herczeg A, Tóth M and Gebhardt G, 'A közösségi közműszolgáltatás megszervezésének egyes szabályozási kérdéseiről'. *Pro Publico Bono – Magyar Közigazgatás* 3, no 1 (2015), 4–18.
5. Barzelay, M, *The New Public Management*. New York: University of California Press, 2001. DOI: [10.1525/9780520925274](https://doi.org/10.1525/9780520925274)
6. Binder, P-M, 'Frustration in Complexity'. *Science* 320, 5874 (2008), 322–323. DOI: <http://doi.org/10.1126/science.1156940>
7. Bommarito, M J, *Exploring Relationships between Legal Concepts in the United States Supreme Court*. Unpublished manuscript, 2009. DOI: [10.2139/ssrn.1814169](https://doi.org/10.2139/ssrn.1814169)
8. Bouckaert, B, 'Measuring Quality', in *Quality Improvement in European Public Services. Concepts, Cases and Commentary*, ed. by C Pollitt and G Bouckart. London: Sage Publications, 1995.
9. Bouckaert, G and C Pollit, *Public Management Reform*. New York: Oxford University Press, 2011.
10. Buchanan, J M, 'The Constitution of Economic Policy'. *The American Economic Review* 77, no 3 (1987).
11. Clauset, A, C R Shalizi and M E J Newman, 'Power-law distributions in empirical data'. *Siam Review* 51 (2009). DOI: [10.1137/070710111](https://doi.org/10.1137/070710111)
12. Carpenter, D P and G A Krause, 'Reputation and Public Administration'. *Public Administration Review* 72, no 1 (2012). DOI: [10.1111/j.1540-6210.2011.02506.x](https://doi.org/10.1111/j.1540-6210.2011.02506.x)
13. Crutchfield, J P, 'Is Anything Ever New? Considering Emergence', in *Complexity: Metaphors, Models, and Reality*, ed. by G A Cowan, D Pines and D Meltzer. Berkeley, California: University of California, 1994.
14. EFQM, 'Driving organisational change and performance improvement', s. a. www.efqm.org (accessed 26 November 2020).
15. European Union, *Quality in Public Administration – A Toolbox for Practitioners*, 2015. <https://ec.europa.eu/digital-single-market/en/news/quality-public-administration-toolbox-practitioners> (accessed 26 November 2020).
16. Farber, D A, 'Probabilities Behaving Badly: Complexity Theory and Environmental Uncertainty'. *U.C. Davis Law Review* 37, no 1 (2003), 145–173.
17. Geldof, S, P Staes, A Stoffels and N Thijs, *Five years of CAF 2006: From Adolescence to Maturity – What next?* Maastricht: European Institute of Public Administration, 2011.

18. Gruening, G, *Origin and theoretical basis of the New Public Management (NPM)*. Draft for the IPMN conference in Salem/Oregon, 1998.
19. Gruson, M, 'The Global Securities Market: Introductory Remarks'. *Columbus Law Review* (1987). DOI: [10.2307/1372560](https://doi.org/10.2307/1372560)
20. Halachmi, A, 'Measure of Excellence', in *Quality, Innovation and Measurement in the Public Sector*, ed. by H Hill, H Klages and E Löffler. Frankfurt am Main: Peter Lang Verlag, 1995.
21. Harrison, T, 'Communication and Interdependence in Democratic Organizations', in *Communication Yearbook*, ed. by S Deetz. Thousand Oaks, CA: Sage, 1994.
22. Helbing, D, 'Globally networked risks and how to respond'. *Nature* 497 (2013), 51–59. DOI: <http://doi.org/10.1038/nature12047>
23. Herczeg A and Gy Vastag, 'New directions in the Hungarian energy market: Transformation of the national public utility', *Pro Publico Bono – Magyar Közigazgatás* 7, no 2 (2019), 110–121. DOI: <http://doi.org/10.32575/ppb.2019.2.7>
24. Jones, G T, 'Dynamical Jurisprudence: Law as a Complex System'. *Georgia State University Law Review* 24, no 4 (2012). <http://readingroom.law.gsu.edu/gsulr/vol24/iss4> (accessed 26 November 2020).
25. Katz, D, J R Gubler, J Zelner, M J Bommarito, E Provins and E Ingall, 'Reproduction of Hierarchy? A Social Network Analysis of the American Law Professoriate'. *Journal of Legal Education* 61, no 1 (2011), 76–103.
26. Katsuhito, I, *The Foundation for a Unified Theory of Fiduciary Relationships: 'One May Not Contract with Oneself'*, August 5, 2016. DOI: <https://doi.org/10.2139/ssrn.2424098>
27. Kauffman, S A, *At Home in the Universe: The Search for Laws of Self-organization and Complexity*. New York: Oxford University Press, 1995.
28. Kekes, J, *Az egalitarizmus illúziói*. Gödöllő: Attraktor, 2004.
29. Klijn, E H and I Snellen, 'Complexity Theory and Public Administration: A Critical Appraisal', in *Managing Complex Governance Systems*, ed. by G R Teisman, M W van Buuren and L M Gerrits. Routledge, 2009.
30. Lee, Y-j and V M Wilkins, 'More Similarities or More Differences? Comparing Public and Nonprofit Managers' Job Motivations'. *Public Administration Review* 71, no 1 (2011), 45–56. DOI: [10.1111/j.1540-6210.2010.02305.x](https://doi.org/10.1111/j.1540-6210.2010.02305.x)
31. Blomgren Bingham, L, T Nabatchi and R O'Leary, 'The New Governance: Practices and Processes for Stakeholder and Citizen Participation in the Work of Government'. *Public Administration Review* 65, no 5 (2005), 547–558. DOI: [10.1111/j.1540-6210.2005.00482.x](https://doi.org/10.1111/j.1540-6210.2005.00482.x)
32. Löffler, E, 'Quality Awards as a Public Sector Benchmarking Concept in OECD Countries. Some Guidelines for Quality Award Organisers'. *Public Administration and Development* 21, no 1 (2001), 27–40. DOI: [10.1002/pad.167](https://doi.org/10.1002/pad.167)
33. Löffler, E, *Defining Quality in Public Administration*. Riga: NISPACE Conference, 2013. <http://unpan1.un.org/intradoc/groups/public/documents/nispacee/unpan005013.pdf> (accessed 26 November 2020).

34. Lorenz, E, 'The nature and theory of the general circulation of atmosphere'. *World Meteorological Organization* no 218 (1967).
35. Lorenz, K, *On Aggression*. New York: Harcourt, Brace & World, 1966.
36. MacCarthaigh, M, *Public Service Values*. CPMR Discussion Paper 39. Institute of Public Administration, www.ipa.ie, 2008.
37. McEvily, C P, 'Vested Interests: The Federal Felon Body-Armor Ban and the Continuing Vitality of *Scarborough v. United States*'. *Georgetown Law Journal* 100, no 4 (2012), 1341, 1398.
38. Meek, J W, J De Ladurantey and W H Newell, 'Complex systems, governance and policy administration consequences'. *Emergence: Complexity and Organization* 9, no 1–2 (2007), 22–32.
39. Miller, J H and S E Page, *Complex Adaptive Systems: An Introduction to Computational Models of Social Life*. Princeton University Press, 2007.
40. Mitchell, M, *Complexity: A Guided Tour*. New York: Oxford University Press, 2009.
41. Mitleton-Kelly, E, *Ten principles of complexity and enabling infrastructures. Complex systems and evolutionary perspectives of organisations: the application of complexity theory to organisations*. Amsterdam: Elsevier, 2003.
42. Noss, R F, 'Some Principles of Conservation Biology, as They Apply to Environmental Law'. *Chicago-Kent Law Review* 69, no 4 (1994), 893–909.
43. Rago, W V, 'Adapting Total Quality Management to Government: Another Point of View'. *Public Administration Review* 54, no 1 (1994). DOI: [10.2307/976499](https://doi.org/10.2307/976499)
44. Ross, A, *On Law and Justice*. Los Angeles: University of California Press, 1958.
45. Ruhl, J B and J Salzman, 'Mozart and the Red Queen: The Problem of Regulatory Accretion in the Administrative State'. *Georgetown Law Journal* 91, (2003), 758–850.
46. Ruhl, J B, 'Law's Complexity – A Primer'. *Georgia State University Law Review Symposium Issue, Forthcoming FSU College of Law, Public Law Research Paper* no 313 (2008). <https://ssrn.com/abstract=1153514> (accessed 26 November 2020).
47. Ruhl, J B, 'Managing Systemic Risk in Legal Systems'. *Indiana Law Journal* 89, no 2 (2014). www.repository.law.indiana.edu/ilj/vol89/iss2/2 (accessed 26 November 2020).
48. Ruhl, J B and D M Katz, 'Measuring, Monitoring, and Managing Legal Complexity'. *Iowa Law Review* 101, no 1 (2015), 191–244; *Vanderbilt Public Law Research Paper* no 15–1. <https://ssrn.com/abstract=2566535> (accessed 26 November 2020).
49. Ruhl, J B, D M Katz, and M J Bommarito, 'Harnessing legal complexity'. *Science* 355, no 6332 (2017), 1377–1378. DOI: [10.1126/science.aag3013](https://doi.org/10.1126/science.aag3013)
50. Russel, S, 'ISO 9000:2000 and the EFQM Excellence Model: Competition or co-operation?' *Total Quality Management and Business Excellence* 11, no 4–6 (2010), 657–665. DOI: [10.1080/09544120050008039](https://doi.org/10.1080/09544120050008039)
51. Sawyer, R K, *Social Emergence: Societies as Complex Systems*. New York: Cambridge University Press, 2005. DOI: [10.1017/CBO9780511734892](https://doi.org/10.1017/CBO9780511734892)
52. Schumpeter, J A, *Capitalism, Socialism and Democracy*. London: Routledge, 1994.
53. Sohn, J L, 'The Case for Prudential Standing'. *University of Memphis Law Review* 39 (2009).

54. Szmodis J, 'A jog multidiszciplináris megközelítéséről'. *Magyar Tudomány* 172, no 1 (2011), 7–17.
55. Teisman, G R, 'Models for research into decision-making processes: on phases, streams and decision-making rounds'. *Public Administration* 78 (2000), 937–956. DOI: [10.1111/1467-9299.00238](https://doi.org/10.1111/1467-9299.00238)
56. Vermeule, A, 'Second Opinions'. *Harvard Public Law Working Paper* no. 10–38 (2010). DOI: [10.2139/ssrn.1646414](https://doi.org/10.2139/ssrn.1646414)
57. Watkins, N W and M P Freeman, 'Natural Complexity'. *Science* 5874, no 320 (2008), 323–324. DOI: <http://doi.org/10.1126/science.1151611>
58. Wesel, U, *Juristische Weltkunde. Eine Einführung in das Recht*. Frankfurt am Main: Suhrkamp, 1984.
59. Yu, P K, 'Intellectual Property and the Information Ecosystem'. *Michigan State Law Review* no. 1 (2005). <https://ssrn.com/abstract=578575> (accessed 26 November 2020).
60. Zeithaml, V A, A Parasuraman and L L Berry, *Delivering Quality Service. Balancing Customer*. 1990.

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