

FORESIGHT, GOVERNANCE AND COMPLEXITY OF SYSTEMS: ON THE WAY TOWARDS PRAGMATIC GOVERNANCE PARADIGM

Jari Kaivo-oja

*Finland Futures Research Centre, Turku School of Economics, University of Turku, Tampere, Finland,
e-mail: jari.kaivo-oja@utu.fi*

Jari Stenvall

*School of Management, University of Tampere, Finland
e-mail: jari.stenvall@uta.fi*

crossref <http://dx.doi.org/10.5755/j01.eis.0.7.4236>

The analytical connection between foresight and governance is a vital scientific issue in management sciences. The landscape of management includes elements of foresight and governance. As we know foresight is focused on futures and governance is focused on current and intentional decision-making processes. There has not been too much theoretical discussion about these two key concepts of management sciences. The grand aim of the article is to define key elements of new pragmatic governance paradigm. The article focuses on theoretical discussion of these two concepts: foresight and governance. Foresight process includes in an ideal case three elements: diagnosis, prognosis and prescription (DPP framework) which were invented in the FOR-LEARN project of the European Union. The structures of governance are linked to these elements of foresight. By good governance managers and leaders want to create effective and just structures of society. Authors note that good governance requires deep understanding of complexity.

There are systems with low level of complexity (simple systems) and systems with very high level of complexity (chaotic systems), and complicated systems and complex systems. Systems can be either in form of order or disorder. Action of governance aims to create order, but it does not always be successful in this aim. The degree of complexity varies and foresight analyses needed in different decision-making situations depend on the degree of complexity of systems. For example, in chaotic systemic conditions, we do not need much foresight processes, but actions. Following David Snowden (2002) and Snowden & Kurtz (2003) there are four decision models: (1) For simple systems and Known systems: Sense - categorise – respond; (2) For complicated systems and for systems which are Knowable: Sense-analyse-respond; (3) For complex systems and for systems which are Unknowable, complex: Probe-sensesrespond; (4) For chaotic systems and Unknowable, chaotic: Act-sense-respond. These four decision models can be key elements of pragmatic governance.

In the article authors present a DPP methodology map for complexity management. Summary section of the article includes key elements of pragmatic governance paradigm.

Keywords: *Complexity theory, foresight research, governance, leadership, system theory.*

Introduction

In 1998 David S. Byrne published his book “*Complexity Theory and Social Sciences*” (Byrne 1998). This book and many other contributions in this field indicate that there are growing interests to apply complexity theory to social and administrative sciences. Complexity is a new buzz word in both science and contemporary society. The ideas of complexity theory represent can have enormous implications for the way we understand and engage with the world. Complexity theory can also make huge impacts to social and administrative research and help us to understand crucial social issues of our day.

This article is including discussion about three concepts of modern management sciences: governance, complexity and foresight. Our aim is to clarify the relations of these key concepts and outline some key issues in modern governance paradigm. The grand aim of the article is to define key elements of new pragmatic governance paradigm. In European Union and elsewhere in the world governance challenges are increasing. Foresighting the future is decidedly more difficult

than explaining the past. Change results from a mixture of general and specific factors. It is easier to foresight general social and technical trends than it is to forecast specific political and technical events.

Many trends seem to increase complexity of human interactions and communications. The Knowledge Era is characterized by new competitive landscape driven by globalization, technology, deregulation and democratization (Halal & Taylor 1999). Between markets and hierarchies all kind of networks are emerging. Both horizontal and vertical integration structures are emerging when companies ally with others (Williamson 1996). In general, companies in post-industrial countries focus on information and services, but companies in developing countries focus on sub-contracting and production (Drucker 1999).

Despite the needs of the Knowledge Era, much of governance and leadership theories remain largely grounded in a bureaucratic top-down framework more appropriate for the Industrial Age. Governance structures which worked well

before in Industrial Age, are not working so well anymore. Leadership scholars and experts of governance face many challenges. We need more realistic and pragmatic approach to leadership (Gronn 2002).

We summarize current discussion: “Much of leadership thinking has failed to recognize that leadership is not merely the influential act of an individual but rather is embedded in a complex interplay of numerous interacting forces (Uhl-Bien 2007, 302).

In science there are at this time a number of approaches to characterizing complexity. Neil Johnson (2007) describes complexity science as the study of the phenomena which emerge from a broad collection of interacting objects. Systems theory and cybernetics are key theories of complexity science.

In the 1960s and 1970s, models of self-organizing systems, based on self-organization, started to appear to scientific debates. Self-organization occurs without a single, formal leader (Drazin & Sandelands 1992). Many organizations are self-organized and have adopted distributed leadership (Gronn 2002), which increases relevancy of the approaches of complexity theory. Complex systems exhibit diversity in personal backgrounds, world views and experiences of system members. Such diversity enhances the system’s capacity to manage complex challenges and adapt (Axelrod & Cohen 2000, Stacey 2003).

The study of complex adaptive systems was given impetus by the new mathematics of complexity. Examples of complex adaptive systems include the weather system, the Internet, businesses, the immune system and the human body. Their properties are that they are made of many agents, each of which has its own internal structure. They are simultaneously influencing and being influenced by their context. They are context-sensitive and context-creating. There are both linear and non-linear systems. Linear systems, whose effect is proportionate to the cause or input, can be analysed by a sum of their component parts. Their system dynamics are relatively simple and change is gradual and incremental. In non-linear systems, the effect or response is disproportionate to the cause or input. In non-linear systems a small change can have a large effect. The whole is not equal to the sum of the parts and the system dynamics generate very complicated behaviour, even deterministic chaos, in some cases. The models of self-organizing systems imply that change can be precipitous and revolutionary. Sense-making processes are partly shared, partly unique (see Holbeche 2006, 104-105).

Our basic framework of complexity analysis is based on David Snowden’s ideas of systems (Snowden 2002, 2003). Complexity science suggests a new paradigm of leadership and management. The new paradigm frame leadership, not to be bureaucratic and top-to down model, but more interactive, flexible, dynamic and complex model with adaptive outcomes. Organizations need more adaptive outcomes like *innovation, learning and adaptability*. For the organizations of knowledge society complexity is a key issue. Second chapter includes key concepts and their definitions. Third chapter includes discussion about analytical links between foresight and governance. Chapter 4 is providing broader analysis of the DPP methodology map and complexity challenge. Final chapter 5 is summarizing key findings of theoretical and conceptual discussion. Summary section of the article includes key elements of pragmatic governance paradigm.

Key concepts: foresight, governance, complexity and leadership

In this chapter we shall focus on key concepts of administrative and management sciences: foresight, governance, complexity and leadership. These concepts are relevant for all organizations in knowledge societies.

Foresight

The simplest definition of the concept of foresight is: foresight is the systematic consideration of, and action on, the future. According to For-Learn project of the European Union foresight is a systematic, participatory, future-intelligence-gathering and medium-to-long-term vision-building process aimed at present-day decisions and mobilising joint actions (For Learn 2013). Thus, as APEC Centre of technology (2013) foresight defines foresight, foresight is a dynamic process that continues to look ahead to anticipate the next changes. Foresight does not focus on day-to-day “operational” concerns, although it can provide important insights into how operations can be reformed to manage effectively in a rapidly changing world. Foresight processes are not based on extrapolation of existing patterns; it explicitly recognizes that the future is uncertain and that seriously disruptive events can and will happen. Most importantly, the goal of foresight is not just to prepare well for the future, but also to take every opportunity to shape and create the future. According to For-Learn model (For Learn 2013), foresight includes typically diagnosis, prognosis and prescriptions. We can call this entity of functions of foresight a DPP functions foresight paradigm.

Foresight activities typically include: (1) inputs, (2) analysis, (3) interpretation, (4) prospection and (5) outputs (Voros 2003). Foresight activities make explicit reference to the future, they include action related dimension and they incorporate a participative or collective dimension (Downey & Haydebreck 2004, 8).

Often foresight activities are connected to *sensemaking*, which is the process by which people give meaning to historical and current experiences. Sensemaking typically includes actions like (1) identification of issues, (2) making retrospections, (3) produce narratives, (4) promote dialogues, (5) give feedback, (6) present historical and future storylines, (7) extract cues from various contexts and (8) present plausible notes (Weick 1993, Currie & Brown, 2003, Thurlow & Mills 2009).

Sense making and situational awareness are viewed as working concepts that enable us to investigate and improve the interaction between people and broader decision environment. Within this perspective, it is recognized that humans play a significant role in adapting and responding to unexpected or unknown situations, as well as recognized situations. Foresight processes and tools used in foresight processes help people in their sense making processes.

For modern organizations, foresight provides relevant information and knowledge for the leadership of organizations, especially for leadership that structures and enables conditions such that complex adaptive systems are able to optimally address *creative problem solving, adaptability and learning*. Foresight provides also information and knowledge for leadership as a generative dynamic than underlies *emergent change activities* (see Uhl-Bien, Marnen & McKelvey 2007, 299). In general foresight is something which is needed in modern knowledge societies (see e.g. Slaughter 1995).

Governance

The word governance derives from the Greek verb κυβερνάω [kubernáo] which means *to steer* and was used for the first time in a metaphorical sense by Plato (see Schofield 2005). There are various definitions of governance.

There are several possibilities to define the concept of governance. The World Bank defines governance as: the manner in which power is exercised in the management of a country's economic and social resources for development (World Bank 2001). The Worldwide Governance Indicators project of the World Bank defines governance as: The traditions and institutions by which authority in a country is exercised. (The International Bank for Reconstruction & World Bank (2006).

Nowadays, managing complex governance systems is seen one of key challenges of governance. Complex systems are today subject to system pressures, system shocks, chance events, path-dependency and self-organisation. One key idea to manage complexity is *the idea of dual thinking and dual action strategies*, which can satisfy the desires of controlling processes and the need to adjust to changes simultaneously. (Teisman, van Buuren & Gerrits 2009). Complex systems do not follow conventional path-dependency rules. Typically, governance means systems that emphasize networks, self-organizing units, and collaboration between actors. The model involves negotiations between people from different agencies committed to working together over more than a short term and aims at keeping any single agency from acting alone (Sullivan and Skelcher 2002; Dickinson & Glasby 2010, 815). So-called inputs come into the system not only from hierarchy administration but from other directions as well (via networks, etc.). To summarize, the concept of governance includes multi-actor systems and network based collaboration (Klijn 2008; Virtanen & Stenvall 2010, 55–56.). In the context of governance the self-organizing networks are autonomous and they shape their own environment. (see Rhodes 1996; 1997) The different interest groups involved in the solving of the problems of the public governance are citizens (as individuals), local public organizations, NGO's, media, public institutions and the politicians.

The concept of governance can, indeed, be used to describe all such ways of managing interest group relations that organizations use in implementing their duties. It has also become an analytical framework or approach to politics which is based on networks. There is a strong link between complexity and governance too. *Pluralistic state* several diverse processes affect the decision-making processes in the society. As Osborne (2010, 9) puts it: "Governance is a product of and a response to the increasingly complex, plural and fragmented nature of public policy implementation".

Complexity

One of key trends of science is complexity theory. The concept of complexity, originally developed in the natural sciences and biology, has however influenced other social sciences, like organizational theory and management. As Klijn (2008) has noticed, in the context of organizations complexity seems to be an important concept for understanding modern government and governance processes. Hence complexity is not easy to define. Advocates of complexity theory see it as a

means of simplifying seemingly complex systems. As Johnson (2007, 4-5) has noticed, complexity science can be seen as the study of the phenomena, which emerge from a collection of interacting processes. From this perspective organizational reality is seen as emergent, dynamic and nonlinear. Of course, some phenomena can still be linear with simple systems and management/governance rules.

One key concept of complexity theory is emergence. A key issue is that the capacities of a complex system are greater than the sum of its constituent parts. A system can have emergent qualities that are not analytically tractable from the attributes of internal components (Baas & Emmeche 1997). Emergence is function of synergism, whereby system-wide characteristics do not result from superposition, but instead from interaction among components (Lansing & Kremer 1993). Nowadays an economy has emergent qualities such as volatility and such behaviour that are commonly attributed to irrationality or imperfect markets. This kind of behaviour can be intrinsic to rational and local interactions and their non-linear consequences (Andreoni & Miller 1995).

There are different kinds of theoretical perspectives in the complexity sciences. Firstly, it is possible to analyze complexity from the chaos theory's approach. The second possibility is the adaptive perspective, which means that organizations' should have to adapt their actions according to the emergence process. For this reason, adaptation and resilience of the public sector has been discussed by many researchers (f.e. Bouvard 2008). Third approach is to understand complexity as a social process. Complexity is social processes, and human interaction creates complexity (Stacey 2001, 2010; Macmillan 2009; Marion 2008; Stenvall & Laitinen 2012).

Many scientific definitions tend to postulate or assume that complexity expresses a condition of numerous elements in a system and numerous forms of relationships among the systemic elements. What one sees as complex and what one sees as simple is relative and changes with time. Complexity is not a context-free concept. Complexity of an object or system is a relative property. There are two basic approaches to complexity: organized complexity and disorganized complexity. The original source of disorganized complexity is the large number of parts in the system of interest, and the lack of correlation between elements in the system.

Organized complexity, in Weaver's (1948) view, resides in nothing else than the non-random, or correlated, interaction between the parts. These correlated relationships create a differentiated structure that can, as a system, interact with other systems. The coordinated system manifests properties not carried or dictated by individual parts.

In complexity theory, there three fields of complexity analysis. *Algorithmic complexity*, in the form mathematical complexity and information theories, contends that complexity of a system lies in the difficulty faced in describing relevant system characteristics. Secondly, *deterministic complexity* deals with chaos theory and catastrophe theory, which posit that the interaction of two or three variables can create largely stable systems prone to sudden discontinuities. Thirdly, *aggregate complexity* concerns how individual elements work in concert to create systems with complex behaviour. These three approaches are complementary to each other. All three kinds of complexity are concerned with how the nature of a

system may be characterized with reference to its constituent parts in a non-reductionist manner. (Manson 2001, 405-406).

Leadership

Leadership has often been described as “a process of social influence in which one person can enlist the aid and support of others in the accomplishment of a common task” (Chemers 1997).

Many in-depth definitions of leadership have also emerged. Leadership is typically seen ability of organizing a group of people to achieve a common goal or vision. There is not a way to lead people and other factors like knowledge. The leader may or may not have any formal authority. Studies of leadership have produced theories involving traits, situational interaction, function, behavior, power, vision, values, charisma, and intelligence, among key factors of leadership. A leader is somebody whom people follow: somebody who guides or directs others. (see e.g. Mumford 1986, Zaccaro 2001, Kaiser, Hogan & Craig 2008).

Today there are three main types of leadership: (1) leadership grounded in traditional, bureaucratic notions of hierarchy, alignment and control, (2) leadership that structures and enables conditions for learning, innovating and adaptation and (3) leadership as a generative dynamic that underlies emergent change management activities Uhl-Bien, Marnen & McKelvey 2007, 299). The list of leadership styles is almost endless.

We emphasizes the importance of authentic leadership (Syväjärvi et al 2013). There has been a great amount of research on authentic leadership in recent years (e.g., Algera & Lips-Wiersma 2012; Ladkin & Taylor 2010). Authenticity can be defined as owning one’s personal experiences (e.g., thought, knowledge, intuition, belief, needs, etc.) captured by the injunction to know oneself (Gardner et al. 2005). Authentic leaders are true to themselves, as authenticity typically involves components such as awareness, unbiased processing, action, and relations. Thus, an authentic leader works with self-awareness, recognizes acceptance and rejection, acts in accordance with his/her true self and in relation to others (Syväjärvi ect 2013.).

Links between foresight and governance

How foresight is linked to governance? We can present a following Table 1 to describe links between foresight, governance, leadership and complexity analysis. We can use key concepts described above to define critical links. This table can help us in proper interpretation of complexity theory, especially with regard to human systems (organization and leadership).

One key aspect of Table 1 is that governance and foresight need a special attention as complementary actions. Second key aspect is that planners and decision-makers must think carefully the actual nature of systems they are managing. They must really think whether a system is simple and well-known systems, complicated systems and knowable, complex systems and unknowable or whether they are chaotic unknowable systems. In different systems the decision rules vary.

DPP methodology map and complexity challenge

For good governance all organizations need some forward-looking activities. They need to develop foresight tools and mechanisms. Typical needs of governance are to understand, are some future events (1) feasible, (2) desirable, (3) probable, (4) important, (5) risky, and (6) with expected positive or negative impacts. Diagnosis and prognosis phases are producing information and knowledge about these issues. Strategic interests and risk taking attitudes have impacts on what kind of events and choices are prioritized. In Table 2 we have presented DPP methodology map. The Table 2 integrates foresight functions to systems theory.

A key issue in Table 2 is that it integrates DPP foresight functions to David Snowden’s (2002, Snowden & Kurtz 2003) systems theory framework. In the context of simple systems, we can find best practices of governance. In the context of complicated systems, we can find good practices of governance. When we try to manage complex systems, only emergent governance structures are working. In the context of chaotic systems, only novel governance systems are suitable. Four governance rules are the following one.

Table 1. Foresight and links to governance, leadership and complexity management

Foresight functions	Diagnosis	Prognosis	Prescription
Governance functions	Analyse what is happening in systems Production of new information and knowledge	Identification of learning needs, innovation needs and potential and adaptation needs	Analyse needs of action Construct desirable and feasible action programs
Leadership functions	Understanding changes	Explaining changes	Leading changes
Complexity analysis	Categorize systems (simple system, complicated system, complex system or chaotic system?)	Select suitable prognosis methods and tools (diagnosis tools, prognosis tools and prescription tools)	(1) For simple systems and Known systems: Sense - categorise – respond; (2) For complicated systems and for systems which are Knowable: Sense-analyse-respond; (3) For complex systems and for systems which are Unknowable, complex: Probe-senserespond; (4) For chaotic systems and unknowable, chaotic: Act-sense-respond. These four decision models can be key elements of pragmatic governance.

Table 2. DPP methodology map, governance and alternative systems

	Simple systems	Complicated systems	Complex systems	Chaotic systems
Diagnosis	Benchmark, Find Best Practice	Econometric or statistical analyses	Perform cross impact analysis or trend impact analysis	Chaos analysis Analysis based on a catastrophe theory
Prognosis	Limit analyses to trend analyses	Develop a statistical models with explaining variables (drivers) for key driven variables	Make morphological analyses, perform scenario analysis leading to alternatives	Explain and understand a way out of chaos
Prescription	Follow the Best Practice or follow Benchmarked Champions	Create a model for predictions and follow best prediction models	Make a choice concerning alternatives based on scenario analysis	Act

A Rule: If a system is a simple system, in which the relationship between cause and effect is obvious to all, the approach is to: Sense - Categorise - Respond and we can apply best practice.

B Rule: If a system is complicated, in which the relationship between cause and effect requires analysis or some other form of investigation and/or the application of expert knowledge, the approach is: to Sense - Analyze - Respond and we can apply good practice.

C Rule: If a system is complex, in which the relationship between cause and effect can only be perceived in retrospect, but not in advance, the approach is: to Probe - Sense - Respond and we can sense emergent practice.

D Rule: If a system is chaotic, in which there is no relationship between cause and effect at systems level, the approach is: to Act - Sense - Respond and we can discover novel practice.

The fifth domain of Snowden's framework is Disorder zone, which is the state of not knowing what type of causality exists, in which state people will revert to their own comfort zone in making a decision. No general rule can be presented in this case.

This framework is helps decision-makers to plan process platforms of foresight in such way that they are "system-aware".

Summary

The analytical connection between complexity, foresight and governance is a vital scientific issue in management sciences. The landscape of management includes elements of foresight and governance. Foresight is focused on futures and governance is focused on current and intentional decision-making processes. There has not been too much theoretical discussion about these three key concepts of management sciences (see Cantino 2013). The grand aim of the article is to define key elements of new pragmatic governance paradigm. The critical links between these to two key concepts require more scientific attention.

The article focuses on theoretical discussion of these two concepts: foresight and governance. Foresight process includes in an ideal case three elements: diagnosis, prognosis and prescription (DPP framework) which were invented in the FOR-LEARN project of the European Union. The structures of governance are linked to these elements of foresight.

By good governance managers and leaders want to create effective organizations, just structures and forward-looking processes of society.

We have noted that good governance requires deep understanding of complexity. There are systems with low level of complexity (simple systems) and systems with very high level of complexity (chaotic systems), and complicated systems and complex systems. Systems can be either in form of order or disorder. Action of governance aims to create order, but it does not always be successful in this aim. The degree of complexity varies and foresight analyses needed in different decision-making situations depend on the degree of complexity of systems. Awareness of complexity is needed for creating right kind of foresight and decision-making processes. For example, in chaotic systemic conditions, we do not need much foresight processes, but actions.

In the article we have presented a DPP methodology map for complexity management. The article includes key elements of pragmatic governance paradigm. In the future we need to (1) understand better the different kinds of complexity theory, (2) develop provision of data and research methods amenable to complexity research, (3) provide proper interpretations of complexity theory in relation to governance and leadership theories and (4) deliver exploration of the epistemological and ontological corollaries of complexity.

If we can address these issues, we can develop pragmatic governance paradigm further and study economic, technical, social, environmental systems and political systems with fresh approaches suitable to the Knowledge Era organizations.

References

- Algera, P. M., & Lips-Wiersma, M. (2012) Radical authentic leadership: Co-creating the conditions under which all members of the organization can be authentic. *The Leadership Quarterly*, 23(1), 118–131. <http://dx.doi.org/10.1016/j.leaqua.2011.11.010>
- Andreoni, J. & Miller, J.H. (1995) Auctions with artificial adaptive agents. *Games and Economic Behaviour* 10, 39–64. <http://dx.doi.org/10.1006/game.1995.1024>
- Axelroad, R. & Cohen, MD. (2000) *Harnessing Complexity: Organizational Implications of a Scientific Frontier*. New York: Basic Books.
- Baas, N. A. & Emmeche, C. (1997) *On Emergence and Explanation*. Santa Fe, NM: Santa Fe Institute.

- Bovaird, T. (2007) Beyond engagement and participation – user and community co-production of public services. *Public Administration Review* 67, pp. 846–860. <http://dx.doi.org/10.1111/j.1540-6210.2007.00773.x>
- Byrne, D. (1998) *Complexity Theory and Social Sciences*. London: Routledge.
- Cantino, M (2013) *Organizational Myopia. Problems of Rationality and Foresight in Organizations*. Cambridge: Cambridge University Press. <http://dx.doi.org/10.1017/CBO9781139208819>
- Currie, G., & Brown, A. (2003) A narratological approach to understanding processes of organizing in a UK hospital. *Human Relations* 56, 563–586. <http://dx.doi.org/10.1177/0018726703056005003>
- Drazin, R. & Sandelands, L. (1992) Autogenesis: a perspective on the process of organizing. *Organization Science* 3(2), 230–249. <http://dx.doi.org/10.1287/orsc.3.2.230>
- Dickinson, H. & Glasby, J (2010) Why partnership working doesn't work? *Public Management Review*, 12; 6, 811–828. <http://dx.doi.org/10.1080/14719037.2010.488861>
- Drucker, P. (1999) *The Management Challenges of 21st Century*. New York: Harper-Collins.
- For-Learn (2013) Support to mutual learning between foresight managers, practitioners, users and stakeholders of policy-making organisations in Europe. Web: <http://forlearn.jrc.ec.europa.eu/index.htm>
- Gardner, W. L., Avolio, B. J., Luthans, F., May, D. R., & Walumbwa, F. (2005) “Can you see the real me?” A self-based model of authentic leader and follower development. *The Leadership Quarterly*, 16, 343–372. <http://dx.doi.org/10.1016/j.leafqua.2005.03.003>
- Gronn, P. (2002) Distribute leadership as a unit of analysis. *The Leadership Quarterly* 13, 423-451. [http://dx.doi.org/10.1016/S1048-9843\(02\)00120-0](http://dx.doi.org/10.1016/S1048-9843(02)00120-0)
- Halal, W.E. & Taylor, K.B. (Eds.) (1999) *Twenty-first Century Economics: Perspectives of Socioeconomics for a Changing World*. New York: MacMillan.
- Holbeche, L. (2006) *Understanding Change. Theory, Implementation and Sciences*. Oxford: Butterworth-Heinemann.
- Johnson, N.F. (2007) *Two's Company, Three is Complexity: A Simple Guide to the Science of all Sciences*. Oxford: Oneworld.
- Kaiser, R. B., Hogan, R., & Craig, S. B. (2008) Leadership and the fate of organizations. *American Psychologist*, 63(2), 96. <http://dx.doi.org/10.1037/0003-066X.63.2.96>
- Klijin, E-H (2008) Governance and governance networks in Europe. An assessment of ten years of research on theme. *Public Management Review*. Vol. 10 Issue 4. s. 505–525.
- Ladkin, D., & Taylor, S. S. (2010) Enacting the ‘true self’: Towards a theory of embodied authentic leadership. *The Leadership Quarterly*, 21, 64–74. <http://dx.doi.org/10.1016/j.leafqua.2009.10.005>
- Lansing, J.S. & Kremer, J.N. (1993) Emergent properties of Balinese water temple networks: coadaptation on a rugged fitness landscape. *American Anthropologist* 95(1), 75–114. <http://dx.doi.org/10.1525/aa.1993.95.1.02a00050>
- Marion, R. (2008) Complexity Theory for organizations and Organizational Leadership, in Uhl-Bien, M. – Marion, R. (ed.) *Complexity Leadership*. North Caroline: Information Age Publishing.
- Manson, S. M. (2001) Simplifying complexity: a review of complexity theory. *Geoforum* 32, 405-414. [http://dx.doi.org/10.1016/S0016-7185\(00\)00035-X](http://dx.doi.org/10.1016/S0016-7185(00)00035-X)
- McMillan, E. (2004) *Complexity, Organizations and Change – An Essential Introduction*. London: Routledge. <http://dx.doi.org/10.4324/9780203507124>
- Mumford, M. D. (1986) Leadership in the organizational context: Conceptual approach and its application. *Journal of Applied Social Psychology* 16(6), 508–531. <http://dx.doi.org/10.1111/j.1559-1816.1986.tb01156.x>
- Osborn, S (2010) Introduction. The (New) Public Governance; a suitable case for treatment? In Osborne, S (Ed). *The New Public Governance?* London and New York: Routledge, p. 1–16.
- Rhodes, R. (1997) *Understand Governance: Policy Networks, Governance, Reflexivity and Accountability*. Buckingham: Open University press.
- Schofield, M. (2005) Plato and practical politics. In C. Rowe and M. Schofield (eds.), *The Cambridge Companion to Greek and Roman Political Thought*, Cambridge: Cambridge University Press, 293–302.
- Snowden, D.J. (2002) Complex acts of knowing: paradox and descriptive self-awareness. *Journal of Knowledge Management* 6 (2): 100–111. <http://dx.doi.org/10.1108/13673270210424639>
- Snowden, D. J. & Kurtz, C. F. (2003) The new dynamics of strategy: Sense-making in a complex and complicated world. *IBM Systems Journal* 42 (3), 462–483. <http://dx.doi.org/10.1147/sj.423.0462>
- Stacey, R. (2003) *Strategic Management and Organizational Dynamics – The Challenge of Organizational Complexity*. 4th Edition. Essex, UK: Pearson.
- Stacey, R. (2007) *Complex Responsive Processes in Organizations – Learning and Knowledge Creation*, Routledge, Abingdon, Oxon.
- Stacey, R. (2010) *Complexity and Organizational Reality. Uncertainty and the Need to Rethink Management After the Collapse of Investment Capitalism*, Routledge, Abingdon, Oxon.
- Stenvall, J. & Laitinen, I. (2012). *Higher Education Engagement and Innovation Dynamics - Comparative Study of Regional Innovative Networks of the City of Helsinki and the City of Chigago*. The paper presented in the Pascal conference in Brest.
- Sullivan, H. & Skelcher, C (2002). *Working across Boundaries: Collaboration in Public Services*. Basingstoke; Palgrave Macmillan.
- Syväjärvi, A., Uusiautti, S., Perttula, J., Stenvall, J. & Määttä, K. (2013) *The Reification of Caring Leadership in Knowledge Organizations*. Manuscript.

- Zaccaro, S. J. (2001) *The Nature of Executive Leadership: A Conceptual and Empirical Analysis of Success*. Washington, DC: American Psychological Association. <http://dx.doi.org/10.1037/10398-000>
- Teisman, G., van Buuren, A. & Gerrits, L. M. (2009) *Managing Complex Governance Systems*. London: Routledge.
- The International Bank for Reconstruction & World Bank (2006) *A Decade of Measuring the Quality of Governance*. Washington, D.C.
- Thurlow, A., & Mills, J. (2009) Change, talk and sensemaking. *Journal of Organizational Change Management* 22(5), 459–579. <http://dx.doi.org/10.1108/09534810910983442>
- Uhl-Bien, M., Marnen, R. & McKelvey, B. (2007) Complexity leadership theory: shifting leadership from the industrial age to the knowledge era. *The Leadership Quarterly* 18, 298–318. <http://dx.doi.org/10.1016/j.leaqua.2007.04.002>
- Virtanen, P. & Stenvall, J. (2010) *Julkisen johtaminen (Public Management)*. Tietosanoma. Tallinn.
- Voros, J. (2003) A generic foresight process framework. *Foresight* 5(3), 10–21. <http://dx.doi.org/10.1108/14636680310698379>
- Weaver, W. (1948) Science and complexity. *American Scientist* 36 (4), 536–44.
- Weick, K. (1993) The collapse of sensemaking in organizations: The Mann Gulch disaster. *Administrative Science Quarterly* 3, 628–652. <http://dx.doi.org/10.2307/2393339>
- Williamson, O. (1996) *The Mechanism of Governance*. Oxford: Oxford University Press.
- World Bank (2001) *Managing Development - The Governance Dimension*, 1991, Washington D. C., p. 1.

The article has been reviewed.

Received in April, 2013; accepted in September, 2013.