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Managing Strategic Tensions in the Development of Organizational Ecosystems

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Abstract: The paper explores the key strategic tensions in the development of organizational ecosystems as well as the applied responses. It presents a conceptual overview of the key tension areas faced by the coordinators of complex inter-organizational systems and the results of empirical case studies conducted in knowledge-intensive industrial clusters in Lithuania (in the fields of high-technologies, information and communications technology, medical innovations and wellness products, cinema and game industries, machinery production and tourism). The research presented in the paper identifies eight strategic tensions faced by the leaders responsible for the development of organizational ecosystems: (1) focused interventionism vs. self-organization; (2) hierarchy-based structures vs. network-based (eco)systems; (3) under-connectedness vs. over-connectedness; (4) central rules vs. emerging metanorms; (5) short-term vs. long-term orientation; (6) focus on elements vs. relationships in the system; (7) big wins vs. small wins; and (8) exploitation vs. exploration. Case studies and expert interviews with the coordinators of different industrial clusters revealed the diversity of adopted approaches. The more mature the social and industrial context of the industrial cluster is, the less pronounced are the strategic tensions, and there is less need for focused interventions. In cases where such interventions are needed, the leaders of ecosystems adopt one of the following approaches: (1) take a position on one of the extremes by seeking to leverage the situation; (2) adopt a trade-off approach by seeking a point of balance; (3) capitalize on both extremes at the same time. The adopted approach may vary from one strategic tension to another within the same organizational ecosystem.

Keywords: strategic tensions; organizational ecosystems; industrial clusters; complex adaptive systems; development of organizational ecosystem; innovation ecosystem; knowledge ecosystem

1. Introduction

Ecosystem research in the social sciences has seen exponential growth due to the radically increased role of networks, multi-stakeholder environments, open innovation and corporate social responsibility. The performance of organizations more than ever depends on their capacity to maintain effective network relations, exchange valuable knowledge assets and build synergies in various collaborative (as well as competitive) environments. The proliferation of research on organizational ecosystems was indirectly influenced by the research on natural ecosystems with its focus on linkages, interactions and energy flows across diverse living and non-living species [1]. The state of equilibrium in an ecosystem emerges in the way of self-organization based on the relations of many diverse yet complementary actors.

Extant research covers diverse conceptual variations of organizational ecosystems, such as business ecosystems [2,3], innovation ecosystems [4–6] or knowledge ecosystems [7–10]. There is an ongoing debate among researchers regarding rather fuzzy conceptual boundaries of the ecosystem construct [11,12], the extent to which the social ecosystems can be developed through purposeful interventions and the potential limits of such interventions in complex self-organizing environments of autonomous actors with internal structures

and hierarchies [13]. Other researchers are concerned with the issues of complementarity and tensions while integrating the diverse ecosystems, such as the business- and knowledge ecosystem [14,15]. The achievement of synergies across diverse yet complementary ecosystems is an important precondition for sustainable development.

The most recent social research in the area of ecosystems has touched on a variety of aspects, such as educational and learning ecosystems [16], ecosystem services in various environmental contexts [17], creative and cultural ecosystems and their services [18], sustainable development of innovation ecosystems in high-tech contexts [19], transformation of urban innovation ecosystems [20], smart cities as organizational ecosystems [21], value co-creation in smart industrial ecosystems [22], healthy workplace ecosystems in the COVID-19 context [23], regional innovation ecosystem policies [24], trade-off vs. synergy analysis in ecosystem services [25], and many others.

To bring more clarity in this complex field, organizational ecosystems can be approached both as internal and external ecosystems [26]. The internal ecosystem implies the dynamic relationships of *intra*-organizational actors. The external ecosystems encompass the complex dynamic network of *inter*-organizational relations that enable organizational learning and collective capacity building [27]. However, the boundaries of internal and external ecosystems are not always clearly distinguishable [28,29]. The organization's internal ecosystem (i.e., quality of its agents and their relations) has to be sufficiently effective at absorbing valuable resources from the external ecosystem in order to strengthen and upgrade its capabilities on a continuous basis. Contemporary organizations (and their networks) are in a dire need to develop organizational ecosystems as platforms for asset orchestration across the organizational boundaries [28,30]. The organizational ecosystems are closely related to the Japanese concept of *ba*, meaning an intersubjective space where knowledge is being shared and created [31,32]. The presence of such spaces allows to increase, upgrade and create knowledge and capabilities on individual and collective levels. The organizational ecosystems contribute to the integration of diverse kinds of assets across different organizations and areas of specialization within the company [30].

In this paper, we adopt the view of the external organizational ecosystem by focusing on the development of inter-organizational ecosystems. The perspective of "strategy tensions" helps structure the debates on strategy and strategic development [33]. These tensions occur when strategists are faced with complex choices between the opposites that are hard to reconcile. The examples of general strategy tensions are *revolutionary* vs. *evolutionary* approaches to strategic change; *outside-in* (market) vs. *inside-out* (resources) perspectives in business-level strategy; *portfolio* vs. *integrated* organization in corporate-level strategy; or *competition* vs. *cooperation* in network-level strategy [33]. Such tensions can also be difficult strategic choices concerning the *strategy formation* (deliberateness vs. emergence), *strategic innovation* (exploitation vs. exploration) or *missioning and visioning* (profitability vs. responsibility). This list of tensions is non-exhaustive.

The extant research mainly focuses on the strategy tensions faced by firms and organizations, not their networks or ecosystems, which represents an important *research gap* addressed in this paper. The research problem can be expressed in the following *research question*: What are the strategic tensions that surround the development of complex organizational ecosystems? In other words, this paper is about the tough strategic choices that have to be made at the network level (i.e., not by the managers of firms, but by network coordinators) to facilitate the effective emergence of collaborative structures inside the economic regions, industries or industrial clusters of diverse firms and organizations. The role of the network coordinator is that of a facilitator, characterized by a horizontal, non-interventionist approach and indirect managerial influence, which is in line with the emergent nature of organizational ecosystems. In most cases, the facilitators are professional managers of multi-stakeholder environments who encourage the interactions of diverse agents, understand their dynamic relationships, help shape the boundaries and reach agreements on the 'simple rules' that are important for the functioning of complex organizational systems.

One can also argue to what extent the tensions, which are inherent in strategic decision making, can be effectively "managed". According to the authors of the concept, "many of the disagreements within the field of strategic management are rooted in the different assumptions made about coping with different strategy tensions" [33,34]. The general agreement is that no ultimate or universal solutions to strategic tensions are possible. Thus, strategic tensions can never be fully resolved. On the other hand, they must be continuously leveraged by taking into consideration the evolving strategic conditions. Research suggests that tensions can be managed by approaching them as: (1) *dilemmas* that require choosing one of the opposites with little space for compromises, (2) *trade-offs* where certain balance between the extremes is to be found without sacrificing one for the other and (3) *paradoxes* where both sides of the tension are intertwined, they coexist and lead to synergies. The latter approach calls for the highest level of creativity and intelligence from the decision makers.

This paper largely focuses on the strategic tensions that stem from the complex adaptive nature of organizational ecosystems and the inherently hierarchical, control-focused nature of the established organizational environments. To be effective, the coordinators of inter-organizational ecosystems have to consider the dynamics on both ends and adopt appropriate managerial approaches.

The original contribution of this paper to the field of knowledge is twofold: (1) it identifies and substantiates eight types of strategic tensions faced by the developers of (external) organizational ecosystems; (2) presents the findings from empirical studies in diverse industrial settings that improve our understanding of the importance of different tensions and adopted managerial solutions.

In the first part of the paper, we present and discuss the key strategic tensions that underlie the emergence and development of complex organizational ecosystems. We draw on the extant research on the complex adaptive systems (CAS) and network dynamics.

In the second part of the paper, we present research methods regarding the analysis of organizational ecosystems. Here, the focus is on industrial clusters as a specific type of organizational ecosystems.

Finally, we present the results of empirical research where we reveal the context of the tensions experienced by the analyzed organizational ecosystems. The Discussion accordingly reveals the main aspects to be considered while dealing with the identified strategic tensions.

2. Literature Review

Strategic Tensions behind the Emergence of Organizational Ecosystems

Organizational ecosystems are composed of many actors and/or organizations, which participate in exchanges and enter into relationships, following a wide range of intentions [35]. Organizational ecosystems by their very nature are *complex adaptive systems (CAS)*, which can be understood as networks of both cooperating and competing actors wherein a new order emerges from diverse interactions rather than from centralized control [36,37]. Since it fluctuates from the edge of order to the edge of chaos [38], the development of organizational ecosystems passes through various non-equilibrium states, which are stabilized by various attractors, such as simple rules, values and behavioral norms. The processes and emerging phenomena taking place in these complex adaptive systems, are of self-organizing origin, i.e., rising at the lower level of the system in the absence of centralized control [34,39,40].

One should state that the best reflection of complex adaptive systems are biological ecosystems, consisting of groups of heterogeneous individual agents, which interact closely through the flows of various components of the ecosystem, and are characterized by their level of regularity (fluctuation between complete order and complete disorder), non-linear behavior and the ability to self-organize [41]. Accordingly, the emergence of such ecosystems is a natural and dynamic process, and these ecosystems fit a particular context and are able to adapt to it.

The development of such multi-actor systems must take into consideration the key concepts and principles of complexity management. However, more often than not, the prevailing approaches to management and administration rely on the logic of 'complicated' rather than 'complex' systems. Such an approach underlies the attempts to construct idealized organizational models by putting emphasis on systems' elements instead of their relationships, while ignoring the emergent nature of complex social systems with their multiple feedback loops, processes of learning and self-organization. The hierarchical structures and cultures that still prevail in private corporations, as well as in public sector institutions, are more suitable for solving the problems that lend themselves to standardization (e.g., ensuring safety requirements or quality control) but are ineffective when faced with complex undertakings (e.g., reforming and developing higher education, healthcare, solving public security problems or developing the innovation ecosystem). All of this requires a completely different approach based on different organizational–institutional and mental structures.

The development of organizational ecosystems is subject to various pressures and contradictions. Most of the tensions are about the difficult *strategic choices* that leaders/coordinators of ecosystems are faced with, or *inherent challenges and pressures* they must overcome. Table 1 summarizes the key challenges in ecosystem development faced by the network coordinators and the corresponding strategic tensions.

Table 1. Nature of strategic tensions in the development of organizational ecosystems.

Challenge in Ecosystem Development	Strategic Tension
How strong should the direct managerial intervention be?	Focused interventionism vs. self-organization
How to accommodate the organizational hierarchies in the development of network structures?	Hierarchy-based structures vs. network-based (eco)systems
What should the nature and intensity of inter-actor relations be?	Under-connectedness vs. over-connectedness
How to reconcile the "top-down" and "bottom-up" approaches in system development?	Central rules vs. emerging metanorms
How to balance the different time horizons of stakeholders involved?	Short-term vs. long-term orientation
Should the quality of actors or their relationships come first?	Focus on elements vs. relationships in the system.
How to think and act "big" without missing the "small" things that matter?	Big wins vs. small wins
How to reconcile stability and dynamism in the ecosystem?	Control vs. learning; exploitation vs. exploration

In the paragraphs below, we discuss the strategic tensions of developing the organizational ecosystems as complex adaptive systems (CAS). It is important to stress at the outset of our discussion that, on the one hand, the development of organizational ecosystems is a collective undertaking of many diverse yet related actors. On the other hand, the success of such development depends a lot on the effective coordination efforts. Extant research shows that despite the spontaneous and emergent nature of CAS, the role of network coordinators (or facilitators) should not be understated. The tensions described below reflect the key strategic pressures and challenges faced by the coordinating actors on the network level.

Focused interventionism vs. self-organization. This is one of the key strategic tensions faced by network coordinators, as they have to decide how direct their managerial intervention should be. The complex adaptive systems are usually characterized by self-organization and emergence, which means that they tend to emerge spontaneously, without direct influence "from above", and retain their essential identity even during non-linear

transformations. Each CAS is shaped by "order parameters", which exert a disproportionate influence on other elements of the system (e.g., profit is considered the key order parameter in business organizations and ecosystems). Self-organization often leads to the formation of minority clusters, otherwise known as "local majorities". Mobilization of critical mass is one of the most important management challenges for finding a new equilibrium in a complex system (e.g., to change the prevailing attitudes in the system). Self-organization usually occurs through self-reinforcing positive feedback loops, such as the "snowball" effect. Feedback loops also ensure the co-evolution of the system and its actors (i.e., changes in the actors lead to changes in the system, and the changing system in turn changes the actors). The management of feedback loops and the creation of a critical mass become an essential management competence when setting the de facto standards or developing the urban spaces and industrial clusters (e.g., concentrating a critical mass of productive resources in specific areas, and creating a feedback loop where "success breeds success"). As a result, the ecosystem leaders often face a strategic choice whether to adopt a more proactive interventionist approach (in priority areas), or to be a more passive observer and facilitator of the self-organization processes. For example, in previous research [42], at least three strategic approaches were identified that could be adopted in the context of the discussed tension: active coordination, coordinated self-organization and self-organization.

Hierarchy-based structures vs. network-based (eco)systems. Extant research [43] distinguishes between two types of management systems: a traditional hierarchical system and a loosely coupled system. One of the fundamental tensions arises from the fact that in highly complex, networked environments, a significant number of institutions and organizations retain strong structural and cultural elements of hierarchy. The hierarchical nature of decision-making and accountability means that decisions imposed "from above" tend to have limited recognition among the actors of the system and do not achieve the desired effects as they get distorted during the implementation. Examples of successful institutional reforms show that the mobilization of stakeholders is critical to the success of such reforms. The creation of a cooperative environment by promoting continuous interaction of actors is necessary for the sustainability of systemic reforms [44]. However, many organizations, both in private and public sectors, are designed to prioritize managerial control over building the long-term relationships of trust with employees and external stakeholders. The general trend of "professionalization of management" and the hiring of expensive "management talent" to solve the perceived organizational problems deprive the employees and community members of a sense of ownership and participation [43]. From a CAS perspective, overreliance on hierarchical arrangements is considered a signature of poor organizational design. A key condition of complex adaptive systems is ignored; the quality of relationships often has a greater impact on the ultimate performance of the system than the quality of its individual actors [45]. Therefore, it is more important to build trust, identity and a shared sense of meaning than rely on economic incentives and transactional relationships. However, in the "professional" practice of institutions and organizations, priority is often given to formalized and quantitative management mechanisms, as decision-makers seek to justify their role with quickly visible and tangible levers. As a result, the network coordinators face pressure to accommodate the organizational hierarchies and rule-based systems in their attempt to develop flat organizational networks.

Under-connectedness vs. over-connectedness. The leaders of organizational ecosystems face another critical challenge: deciding on the desired nature and intensity of inter-actor relationships. Individuals have many different dynamic relationships, but most interact with members closest to them (i.e., short-range relations prevail). Both insufficient numbers of connections and too-dense connections can hinder the system's adaptation to internal and external changes. There is no straightforward answer as to what the ideal balance between the two extremes is. On the one hand, a lack of connections prevents effective coordination of inter-actor relations, on the other hand, an excessive number of connections can lead to systemic rigidity and an increased number of conflicts [46]. High interdependence of members and insufficient quality of their relationships lead to potential

conflicts. Thus, too many actors and too many connections can have the same destabilizing effect on a system as having too few actors and connections [47]. One of the ways to address this tension and achieve delicate balance for system developers is to create subsystems of dense relationships ("pockets of collaboration") that spread throughout the entire system.

Central rules vs. emerging metanorms. The leaders of emergent ecosystems are faced with a continuous pressure to reconcile the "top-down" and "bottom-up" processes without falling into either of the extremes. On the one hand, excessive centralization of management decisions distorts feedback in the system and hinders its learning and adaptation to the changing environment. On the other hand, excessive decentralization leads to the depletion of collective resources (e.g., the phenomenon of the "tragedy of the commons" [48]). CAS research shows that group metanorms often have a greater influence on system behavior than centrally approved rules. Moreover, the developers of organizational ecosystems need to consider that metanorms have a distorting effect on centrally approved rules and decisions. Nevertheless, the actors of the ecosystem must still rely on the centrally adopted rules that would be universally applicable and facilitate their coordination and transactions. As one of the potential solutions to this strategic tension, CAS research stresses the importance of universally accepted "simple rules" (e.g., clear values and key principles), which enable the coordinated decisions and sensemaking of diverse actors in complex environments and situations.

Short-term vs. long-term orientation. One of the main tensions facing both private and public sector decision makers is balancing between different time horizons. The development of any organizational ecosystem is in continuous tension between the inherent managerial short-termism and long-term system dynamics. There is a constant time pressure on management to produce fast and tangible results as well as to achieve the long-term growth objectives. However, the prevailing structures often favor the narrow short-term solutions to the complex problems of development. In business, the structures of corporate governance (i.e., owners, shareholders, creditors) have a significant influence on short- or long-term orientation of managers in their decision making. Managers are often incentivized to meet the measurable performance indicators in the short run rather than focus on the strategic long-term growth of the organization, especially if it means sacrificing the short-term results. Such short-term orientation is particularly characteristic of systems whose corporate governance emphasizes shareholder value. In public administration, the priorities of policymakers are influenced by the election cycle, which determines the perceived necessity of quick and tangible results. As a result, the policy implementers often favor quick fixes over more comprehensive and long-term measures whose effects are not immediately visible and clearly recognized. The development of complex systems requires a long-term orientation because the emphasis on short-term effects can have negative consequences in the long term. At the same time, long-term development can be at stake if critical short-term needs are not addressed. Greater stakeholder involvement can alleviate the tensions between the short-term vs. long-term orientation. Decisions made in closed "circles of professionals" and handed down to the opposing majority have little chance of taking hold in the system over the long term. No organizational ecosystem is sustainable if it does not gain legitimacy and support from its key stakeholders. However, their time horizons may vary quite dramatically, which is something that the coordinators of organizational ecosystems have to take into consideration when dealing with this tension.

Focus on elements vs. relationships in the system. The developers of organizational ecosystems must deal with yet one more challenge of deciding whether to focus primarily on introducing the right elements (e.g., attracting the best actors) or building quality relationships. More often than not, traditional management thinking is still largely based on the reductionist approach: perceiving the system as a sum of individual elements and downplaying the role of their dynamic interactions. Managers seek to identify and strengthen the key success factors of their firms, while eliminating the bottlenecks and productivity barriers. Such an approach assumes that professional management is capable of conducting a detailed analysis of the organization's activities and ensuring their control.

The time pressure mentioned above means that it is much more convenient for decision makers to focus on the elements rather than their interrelationships. The same is true of time costs. It takes much less time and effort to identify the critical "impact points", but a much more complex task is to understand all of their systemic relationships. As a result, many organizations identify the wrong reasons for their success or failure. Even if they manage to identify the correct "point of leverage", activating it without understanding of the wider context and systemic connections leads to unintended consequences. A linear approach to cause-and-effect relationships (derived from scientific management and military strategy) often leads to failure in solving complex environmental problems. This is due not only to the aforementioned framework conditions (e.g., pressure to deliver quick tangible results in the market), but also the reductionist linear mentality embedded in management education and often simplistic instruments that managers are equipped with. One of the pioneers of systemic thinking, Jay Forrester of the Massachusetts Institute of Technology, assumes that the situation may begin to change when leadership positions are occupied by people with education in areas such as information systems management, where the dimension of complexity has long been understood and recognized [49]. The growing importance and conceptual influence of information and communications technology and sustainable development on modern management can contribute to the consolidation of the paradigm of complexity in a field with a long tradition of linear thinking. Nevertheless, for now, the leaders of ecosystems face a continuous challenge of improving the environment of interactions while at the same time seeking to improve the quality of cooperating entities.

Big wins vs. small wins. One more relevant strategic tension concerns the accommodation of visionary "big picture" thinking with small positive interventions. CAS researchers usually note the importance of modest interventions [46,50] or "small wins" [51] while seeking systemic improvements. However, the managerial practice and thought is often dominated by the "big bang solutions", as relatively few leaders recognize that large systemic changes can be brought about by adopting a strategy of small wins. Managers and policy makers often ignore the "cascading" properties of complex systems. For example, Snyder [52] discusses the application of complexity theory in the case of education reform, and notes that it is not necessary to start comprehensive reforms in all links of the system, if you can single out and influence several essential levers in the management of the system. As already mentioned, managers recognize the existence and importance of such "points of influence". However, as systems researchers point out, as soon as the analysis is done and the impact points are identified, managers tend to adopt linear thinking and push the right impact point in the wrong direction [53]. It is not easy to rely on intuition when developing complex systems, as their solutions are often counterintuitive. Focusing on one area of impact cannot solve the problems of a complex system because directing a system towards a desired output requires the distribution of impacts across different aspects of the system, actors and levels [52]. Therefore, systemic changes occur when many stakeholders are empowered to make small changes in the desired direction. As a result, the leaders of ecosystems are faced with the tension of making many right choices on a smaller scale, while also mobilizing the different stakeholders through clear and attractive "big ideas".

Exploitation vs. exploration. Last but not least, the leaders of organizational ecosystems are dealing with the general challenge of reconciling stability and dynamism in the ecosystem. The duality of stability and change is inherent in organizational theory and practice. It is reflected by such strategic tensions as exploitation vs. exploration, and control vs. learning [54]. The effectively functioning ecosystems contain actors that are sufficiently diverse and cover both the exploitation and exploration sides of the spectrum. The exploitation side is concerned with the stability of operations, minimization of costs and risks, discipline and compliance with the deadlines, i.e., all factors that ensure effective and efficient performance of current activities. The exploration side is concerned with discovering the new areas of growth and value creation. Both sides are related to different professional cultures, mentalities and key success factors. As a result, it is quite difficult

to achieve their reconciliation, not to mention synergies. The exploitation vs. exploration tension can be observed both at the level of ecosystems as well as organizations.

Aspects of the exploitation vs. exploration dichotomy have been touched upon by various researchers, presenting different yet related concepts, such as the ambidextrous organization [55,56] or the innovator's dilemma and innovator's solution [57]. Some researchers (e.g., [58,59]) treat these tensions as a dilemma (i.e., an "either–or" decision) and support the idea of clear separation or "unbundling" the actors of both sides into independent organizations or organizational units. Other researchers [60] treat this tension rather as a paradox, where both the Performance Engine (i.e., the unit performing daily operations) and the Innovation Team (i.e., the unit creating new sources of future growth) have to be aligned with each other to achieve sustainable growth. From the perspective of an ecosystem manager, the ways of addressing the exploitation vs. exploration tension depend on the nature and objectives of the ecosystem. In certain instances, the ecosystem and its actors may be more focused on exploiting the existing markets and resources (e.g., business clusters as economic agglomerations). In other instances, the ecosystem can be more focused on a combination of knowledge for innovative outputs (e.g., innovation clusters). However, the first type of ecosystem is more vulnerable to technological and market disruptions. To achieve a resilient ecosystem, its leaders have to become the coordinators of collective learning [43], foster a collaborative environment by engaging diverse stakeholder groups, build collective capabilities of "smart swarms" [61] through "positive coupling" [62] and strengthen their commitment to shared goals [63]. Researchers of complex adaptive systems stress the importance of "empowering ordinary actors to do extraordinary things" and are skeptical of polarizing the innovative vs. non-innovation parts of the system.

3. Methods

In order to achieve the research aim, i.e., to reveal the manifestations of strategic tensions and the adopted managerial approaches, the context of Lithuanian clusters was chosen. A "cluster" is primarily "a concentration of geographically interconnected companies, specialized suppliers, service providers, firms in related industries and associated institutions (trade/industry associations, universities, educational institutions, etc.) that both cooperate and compete" [64]. Clusters consist of firms and organizations from diverse industries that are related through the value chain. Their dynamic relations contribute to the increased individual and collective competitiveness of the participating actors. Thus, industrial clusters evolved into an important policy tool for economic development [65]. The general context of this study is still characterized by limited generalized trust, a legacy of hierarchical management structures, insufficient traditions of industrial cooperation and self-organization [66].

Such a research context represents an excellent background for the *research question*: How are the strategic tensions manifested and managed in the context of cooperation and self-organization challenges?

We conducted empirical research on nine industrial clusters in Lithuania. The clusters were chosen from a list of all active industrial clusters in Lithuania; this list was provided by an official cluster facilitator. These clusters are: Cinema cluster, Game industrial cluster, Tourism cluster, Machinery cluster, ICT cluster, Wellness cluster, Medical innovation cluster, Photo electronics cluster and Laser cluster. In order to ensure confidentiality, clusters are identified only by their area of activity, without mentioning their exact name.

These clusters had to meet the following criteria: (1) size (at least 10–15 participants, thus the cluster is able to develop a network of participants); (2) duration (no less than 3 years of activity); (3) the cluster includes both cooperating and competing members; (4) the cluster should be actively performing its activities and should be based on genuine bottom-up initiatives. The clusters involve complementary firms and organizations from diverse industrial backgrounds. Clusters are self-governing structures that define independently and collaboratively the rules and conditions for its members.

In general, all chosen clusters were bottom-up-based networks of both cooperating and competing actors, where various knowledge processes, such as generating, sharing and storing knowledge, and applying it into decision-making processes and professional job-related activities [67], were in place to create innovative products. Thus, the clusters could be seen as both knowledge and innovation ecosystems.

Each of these clusters represented a unique reality [68] because the clusters differed from each other not only in their activity but also in their emergence and further enablement of the formation. Thus, a multiple-case strategy was adopted [69], and interviews with industry cluster coordinators, i.e., the individuals who see the cluster as a whole, were conducted. The cluster coordinator in the context of complex adaptive systems should not be seen as a central controller but as a facilitator of the dynamically evolving network relations. In most cases, the coordinators were part of a cluster from the earliest stages, and thus they could present an evolutionary perspective that was important to the study. Nine interviews were performed, and every interview lasted approximately 60 min.

The research included various aspects of cluster development, starting with the first triggers of emergence and proceeding to more mature stages of development. This paper presents the part of the research that is dedicated to the area of strategic tensions in analyzed clusters. The questions, which reflect separate tensions, are as follows:

- **Focused interventionism vs. self-organization.** How is the process of communication and cooperation ensured in the cluster? Are there any signs of passiveness among cluster members? How is it solved? The answers to these questions reveal to what extent the cluster processes depend on the cluster firms, and how much the cluster coordinator feels the need to interfere in order to find effective solutions.
- **Hierarchy-based structures vs. network-based (eco)systems.** How are the organizational hierarchies accommodated within the flat horizontal network structure? What management structures tend to prevail in clusters?
- **Under-connectedness vs. over-connectedness.** What does the admission of new members to the cluster look like? What are the admission criteria? Taking into account the admission criteria, it is important to realize, for example, whether a member that is new to the market and unfamiliar to the cluster members can be accepted. Are the members of your cluster more likely to act individually? If so, how is this solved? Are there competing companies in the cluster (more specifically, competing without cooperation)? If so, how is the problem of competition solved?
- **Central rules vs. emerging metanorms.** Do the enterprises support each other and follow common standards of values and behavior? Do cluster enterprises feel responsible for other members, i.e., watch, give advices and support them when they are not successful? Do cluster enterprises feel like a community with a common destiny, where the actions of one person/enterprise affect the whole cluster? What values are dominant in the cluster?
- **Short-term vs. long-term orientation.** What are the overall approach and individual approaches towards cluster goals and their achievement? Does short-term or long-term orientation prevail, or are they reconciled?
- **Focus on elements vs. relationships in the system.** In order to develop the cluster, what is the approach to particular characteristics of new members or the potential development of relationships?
- **Big wins vs. small wins.** What is an approach in the cluster regarding small achievements vs. big achievements?
- **Exploitation vs. exploration.** How is the learning process ensured in the cluster? Do enterprises lack creativity and innovation? Have cluster enterprises become more innovative since acting in the cluster? To what extent is creativity and innovation controlled?

During the process of the interviews, the questions were not always exactly the same, as the questionnaire was formulated beforehand, and the questions could change depending on the previous answers. As mentioned before, the research in total covered

various aspects, including entering international networks, cooperation with external actors, situation of qualified workforce, etc.; thus, overall, it revealed a broad view of the strategic tensions and how they are managed.

Received data were analyzed on the basis of inductive thematic analysis [70]. The research findings presented below are based on the insights of network coordinators who were in the best position to present the systemic view on cluster dynamics. However, at the current stage of research, we were unable to involve the network members themselves, which is a limitation of the study.

4. Results

Focused interventionism vs. self-organization. Empirical research results revealed that, in some cases, the intervention from cluster coordinators is inevitable because there are still various aspects that hinder bottom-up initiatives and spontaneous interactions in the clusters. One of them is *competition*—this was especially vivid in the conversations with the coordinators of ICT and Cinema clusters. For example, the coordinator of the ICT cluster stated that competition exists both in his cluster and the clusters he knows: "it is not yet possible to distinguish that <...> there is one rule inside the cluster, and other rules outside of it". In the absence of such division, cluster members may even become rivals.

Undoubtedly, the clusters themselves are needed in order to develop a healthy attitude towards competition, as well as the capacity for competition because everyone can find their niche: "there will be enough space for everyone under the sun" (Laser cluster).

Thus, it is very important for cluster enterprises to define common goals and activities, such as joint scientific research, and to achieve them (Medical innovation cluster). Another goal could be the creation of a new joint product, where each enterprise occupies a certain niche on the basis of its core competencies (e.g., Game industry cluster, ICT cluster, Wellness cluster).

Another issue that happens in the analyzed clusters is *conflictual situations*. Although some cluster coordinators are trying to intervene in these conflicts, others tend to adopt the attitude that "conflicting parties should sit down and talk among themselves" (Photo electronics cluster). In addition, in order to reduce the phenomenon "first we do, we will agree later" (from an interview with the coordinator of the Cinema cluster) it is necessary to clearly define the vision, mission and goals before starting the activities.

Individualism is also mentioned as one of the challenges for cluster development (e.g., Cinema cluster and Game industry cluster). It can be assumed that the manifestation of individualism especially in creative industries could be related to creative specialists who "have their own opinion", and the abundance of such personalities makes communication difficult: "the more people, the more different opinions, the more personalities, the more difficult it is to manage everything" (Cinema cluster). It was stated that in such cases, the number of members in a particular project should be limited to a maximum ten participants (Laser cluster).

Passiveness is also seen as a challenge to self-organization. However, cluster coordinators employ different approaches in those situations: a strict approach, when the member is getting expelled from the cluster (e.g., Games industry cluster; Tourism cluster), or a more tolerant approach, when it is believed that activity cannot be permanent and there are episodes with bigger or less activity (e.g., Wellness cluster, Medical innovation cluster, Laser cluster, Photo electronics cluster, Machinery cluster).

Hierarchy-based structures vs. network-based (eco)systems. Empirical research revealed the significance of the role of the cluster coordinator. The performed functions vary from administrative ones (e.g., searching for new opportunities for cluster formation, generating financial solutions and preparing administrative documents, project proposals and reports), to teambuilding, psychological support and behavioral changes, such as management of negative emotions, mediation in conflictual situations, inspiration of optimism and enthusiasm. The coordinator of the Medical innovation cluster stated that "60 percent cluster activity depends on coordinator's enthusiasm, organization, meetings, and defining

goals". One of the interviewees stated that the cluster coordinator's "management skills, competence" at the beginning of cluster activity (first three years) is "a critical factor" for the mobilization of cluster members and their activity—in the case of choosing the wrong cluster coordinator, there is high probability that cluster will collapse despite his/her sound ideas and future objectives.

However, some of the analyzed clusters emerged in a more self-organized way. The success of a self-organizational strategic approach depends heavily on the legitimized prehistory of the cluster; if the initial cooperation ties have emerged naturally through social relationships, there is a high probability that the same relationships will continue after the cluster is legitimized. Even in the case of the legitimization, some clusters keep a very flexible structure. For example, the coordinator of the Photo electronics cluster emphasized that various formalities occur only "when they are asked for it", and there are no such officially organized general meetings: there are constant interactions between cluster members initiated by themselves ("in a smaller circle of five or six members, we meet maybe once a week, and three or four members meet twice a week"; "there is constant communication between laboratories, people who work in laboratories and companies"). Even in the case of conflicts, the cluster coordinator still follows the idea that these conflicts have to be resolved by the cluster members themselves. A similar situation has been observed in the case of the Laser cluster: "the so-called supervisory committees didn't get naturalized because cluster enterprises themselves can agree on joint activities: "they [supervisory committees] were shown officially because of the structure but in reality they had nothing to do".

Under-connectedness vs. over-connectedness. Empirical research results revealed that the number of members in a particular cluster vary depending on the industry context. It is especially noted in the case of high-technology industries, where the emergence of new enterprises is quite rare, especially in the domestic context: "Ten, fifteen, twenty companies—this is not an industry" (Laser cluster). In general, such a situation arises from the uniqueness of the developed products, because the number of the users of such products will be limited, the final result is quite uncertain, and it requires highly skilled employees with the competence to create technology-based start-ups (this does not quite apply to a more volatile environment of the ICT start-ups).

However, some industrial sectors seem quite fast-developing, such as the tourism sector: before the legitimation of the cluster, there were as many as 40 enterprises cooperating in the district. Lithuania is also characterized by the rapid development of the health and information technology sector.

Some cluster coordinators even stated that their clusters had reached their membership limit: "We do not see promising members, which we could accept". Thus, new members are carefully selected. Targeted admission of members to the cluster was emphasized almost in every interview, with the emphasis on complying with the area of the activity and competences of the cluster; creating high-quality products that, for example, meet certain standards; having a good reputation; having a clear goal of joining the cluster, in other words, clearly understanding its functions; supplementing with its own resources and products—"knowledge, people, contacts, created products, services", even financial resources for particular projects. However, although cluster coordinators expect those new members to be active, reality is sometimes different because some members expect more proactiveness from the cluster coordinator and naturally remain passive. Thus, in such a case, under-connectedness is more often the case in the analyzed clusters than over-connectedness.

Central rules vs. emerging metanorms. Although during the interviews, respondents emphasized the values of communication, cooperation, openness, trust and support, the manifestations of these values in some cases are implemented using top-down principles (as a central rule), while in some other cases, they emerge naturally as metanorms. Various centralized rules can be noticed in the developing clusters, like a necessity of annual reports, annual presentations of the managers of cluster enterprises. However, both high-

tech clusters and the Medical innovation cluster do not have any formal documentation of activities and other bureaucratic procedures, and everything is left as natural as possible. The coordinator of the Medical innovation cluster stated that "We naturally get together, we meet. Such protocols we don't write, we don't do, I don't perform those formalities".

However, the attendance of the meetings is quite often seen as a central formalized rule (for example, Tourism cluster, Machinery cluster, ICT cluster, Game industry cluster). It means that cluster members are requested to meet every week, to prepare annual reports, etc., with the expectation to create a habit of regular communication and responsibility. Cluster coordinators also emphasize such meetings as a source for new ideas (ICT cluster), mutual support (Tourism cluster), development of trust (Cinema cluster) and overcoming passiveness (Machinery cluster).

However, sometimes the enterprises are not pleased about regular meetings because their representatives may not always be present in such meetings. In some cases, communication decreases sharply after the finalization of particular projects because such meetings are no longer compulsory.

In contrast, some clusters are developing bottom-up initiatives, emerging as metanorms, including informal meetings, when the enterprises meet naturally in bigger or smaller groups meet once a week or even often In some cases, an enterprise organizes a meeting of all cluster members if it wishes to announce certain news, for example, to introduce its new service, and the enterprise then "initiates the meeting, and then we all come as best as we can" (Wellness cluster). Some clusters, such as Tourism or Wellness, have a practice of enterprise visits, when the representatives of cluster members meet each other at a particular enterprise and learn about this enterprise. Some clusters even organize huge meetings of approximately 800 participants, including the cluster members, their employees, their family members and their business partners, as was the case with the Bebrusai gathering hosted by the Laser cluster. The Medical innovation cluster also has such summer-holiday meetings and conferences, where everyone participates.

Short-term vs. long-term orientation. Empirical research revealed that short-term orientation towards cluster success is a reason behind passiveness, because being in a cluster does not bring quick benefits: a common cause of continued passiveness is unmeasured expectations towards the cluster, the expectation of benefits without making one's own effort and the unclear meaning of the cluster to some of its members. The topic of expectations appears in many interviews (e.g., Cinema cluster, Tourism cluster, Machinery cluster, Medical innovation cluster). It is not uncommon for the new members of the cluster to have false beliefs that everything will work out by itself without special effort: "theoretically everyone imagines that <...> everything is done very easily" (Cinema cluster) and that "if we became cluster members, everything is clear—someone else will send us tourists, someone else will help us earn money" (Tourism cluster). There are enterprises that hope that paying the membership fee is enough and the benefits will come by themselves: "they pay the membership fee and do nothing but expect feedback" (Game industry cluster). Obviously, such expectations later lead to dissatisfaction: "Where are my sales? Why aren't my sales growing here?" (Machinery cluster). Here, we have to emphasize once again that clusters differ from industry associations because the cluster members have to be more proactive and strategic in creating partnerships along the value chains as well as investing effort into their sustainability.

Thus, cluster coordinators advise defining realistic expectations for the cluster: it is important to understand that "a cluster cannot move mountains" in the face of limited external and/or for internal financing, or its absence (Machinery cluster).

Focus on elements vs. relationships in the system. Empirical research revealed that the analyzed clusters strictly avoid having participants only as positions on a list: "to take on another company in order to become an international cluster, because of the list—I don't see the point" (Machinery cluster). On the contrary, empirical research revealed that there is a high interest in the participants with particular defined qualities (competence, knowledge, development of high-quality products, providing a benefit to the cluster, in some cases,

also monetary contributions because of the development of the projects). The selection of new participants in these cases is quite strict, including compulsory recommendations (e.g., Tourism and Game industry clusters): "we rarely accept members who propose themselves" (from an interview with Game industry cluster coordinator), and "the recommending company undertakes at least 95 percent of responsibility" (from an interview with the Tourism cluster coordinator). However, further development of the ecosystem reveals various challenges related to the interactions and relationships among the ecosystem's participants, especially competition, individualism and passiveness.

Some clusters seem much more flexible regarding the acceptance of new members: the coordinator of the Wellness cluster stated that if it becomes clear that the candidate corresponds to the activities area, product quality, reputation, benefits for the cluster and other criteria, that organization can become a member of a cluster. In the case of the Wellness cluster, it is possible to even fill out a questionnaire on its website for joining the cluster (though admission is not automatic). Clusters implement projects and perform various publicity actions, whereby candidate members learn about a particular cluster from the media and may apply to join the network. Also, interest in joining a cluster arises from common activities, such as participation in the same business exhibitions, where "there are both cluster companies and non-cluster companies, and people then begin to wonder what this cluster is, what it is doing here" (Medical innovation cluster). The general observation is that most cluster coordinators emphasized the simultaneous need to attract quality members (focus on elements) and to create a strong culture of healthy personal and business relationships with the cluster (focus on relationships). The latter, however, takes greater effort and longer time to build and to maintain.

Big wins vs. small wins. Empirical research revealed various examples of employing the mindset of 'thinking big–acting small'. It is most vivid in the case of the Cinema cluster, whose roots are related to the crisis in the cinema industry, bankruptcy of the anchor company and the inability to develop international projects in the absence of industrial law. Proactive actors decided to take advantage of the opportunity to move to a building of a bankrupt cinema studio in order to be closer to each other. As a result, many individual actors started to communicate more and to start initiating big projects, including a project for industrial law and preparing a proposal to attract EU funding. Those visions gradually came to fruition by developing relationships, spreading the vision and sense of the events, and creating space for experimentation and innovation. There are other examples of clusters that also adopted the approach of thinking big–acting small for reaching the bigger customers: "that's why we joined together, so that we could reach those larger customers" (Game industry cluster); "We communicate with huge corporations that have recently merged, thus getting bigger and reducing the number of suppliers" (Machinery cluster). Some clusters were created to unite their capabilities and resources to create innovative products: "We saw how useful it is to help each other, organize events together, learn from others and to improve, to be the first to receive the latest materials and goods" (Medical innovation cluster). In cases where the very idea of a cluster was new to companies, no drastic steps were taken before the shared understanding was built through 'small steps'. For example, in the case of the Machinery cluster or ICT cluster, there were consultants and moderators who had a clear methodology of cluster development, held conversations with potential participants in order to explain to them the idea of the cluster and built upon it when the agreement was reached.

Exploitation vs. exploration. Based on the study results, all analyzed clusters were more focused on exploration in order to create new innovative products.

In addition, cluster enterprises promote the introduction of new study programs in education and science institutions in order to produce the specialists that are currently lacking, and to increase the attractiveness of particular professions as well as the activities performed by cluster enterprises in the society (e.g., Tourism cluster, Cinema cluster, Game industry cluster). One should state that learning appears to be one of the most attractive reasons for being a cluster member. The coordinator of the Cinema cluster stated that

approximately "two hundred different trainings" were organized. Some clusters, such as the Gaming cluster or the Medical innovation cluster, have created their own training system—infrastructure and training programs both for new and current members of the cluster. Separate training sessions for both groups of members are also organized. These training sessions focus not only on the development of specialized professional skills, but also on "soft skills" (e.g., leadership, personal growth, communication psychology). The employees of cluster enterprises also attend scientific conferences to present scientific achievements.

In general, all cluster coordinators agreed that cluster members become more creative and innovative while participating in the cluster activities. These products emerged because of active participation in joint project activities.

On the other hand, the analyzed industrial clusters were quite highly dependent on external funding, which naturally requires more coordination and control (exploitation). Implementation of such projects allowed increasing the innovativeness, but also imposed various rules to follow.

5. Discussion

Research results contribute to scientific literature, analyzing strategic approaches regarding the development of complex organizational ecosystems. For example, in a previous study [42], we identified three strategic approaches to ecosystem development: active coordination, coordinated self-organization and self-organization. Strategic approach of self-organization means that the cluster coordinator acts remotely while the participants of the ecosystem act based on the bottom-up principle without any extra support measures and formalities. In contrast, active coordination is characterized by an active involvement of the cluster coordinator in order to maintain the processes. Finally, coordinated self-organization represents the middle case between these two approaches [42].

The research on strategic tensions revealed that active coordination (Cinema cluster, Game industry cluster, Tourism cluster) is related to focused interventionism, hierarchy-based structures, under-connectedness, central rules, short-term orientation, focus on elements, expectation of big wins and exploitation, while the strategic approach of self-organization (Laser cluster, Photo electronics cluster, Medical innovation cluster) was more related to long-term orientation, small wins, exploration, emerging metanorms, network based (eco)systems and even over-connectedness because of intense interactions an relationships. The Machinery cluster and the Wellness cluster, while employing the approach of coordinated self-organization, represent a more balanced approach to addressing the strategic tensions.

Some strategic tensions are amplified by the suboptimal contextual conditions, such as the dominance of low or medium technological level industries, insufficient cross-sectoral cooperation, small cluster networks (approximately 13 enterprises), insufficient (human and financial) capabilities to manage clusters, insufficient trust among enterprises and commitment [66]. These challenges may create under-connectedness and short-term orientation. There is also a challenge to find a solution to attract new members, which both possess particular qualities and orientation to openness and relationships, if there is a scarcity of industrial actors in the particular industry.

Empirical research revealed various means for strengthening the ecosystemic properties of emergent clusters, such as: clear definition of mission, vision and aims at the outset of activities; frequent regular communication in order to create the habit for communication; developing the ability to distinguish boundaries between cooperation and competition; differentiating the activities and creating new innovative products; defining realistic expectations aligned with the needs of participating firms; and highlighting benefits of participation in a cluster.

In general, cluster coordinators have clear ideas about self-organization and various principles on how it can be promoted. Cluster coordinators expect more involvement and initiatives from the cluster members. As stated in one of the interviews, cluster coordina-

tors should follow "not the principle of management, but the principle of communication" (Machinery cluster), since the main pre-condition of self-organization is stimulating interactions [71]. However, interactions depend on the personal attitudes towards dynamism and self-organization, such as trust in the cluster and its members, an ability to contribute and help each other; openness; team-work; and long-term orientation.

Adopting the strategic approach of significant involvement of the cluster coordinator may be the most effective strategic decision to create the stability of the system as its members train themselves to move towards a higher level of self-organization. In the case of limited traditions of cooperation, such an approach may be the only valid solution at a particular time. The Game industry cluster coordinator stated that "because there is no other choice. Who will do that?" The coordinator of the Cinema cluster insisted that "you have to reach, you can't stop".

The latter attitude also reflects the overall attitude toward the cluster from the perspective of cluster coordinators. When the cluster coordinator believes in natural processes of the cluster and is not afraid of losing the cluster, if the cluster idea fails for some reason, as the coordinator of the Cluster of medical innovations stated: "We started to work naturally, we are doing all the matters naturally, and we will die naturally". However, some cluster coordinators believe that they have to do everything in order to keep the cluster active, especially if externally funded projects take place. In such situations, the struggle in providing equilibrium of exploration and exploitation in organizational ecosystems is evident [40].

One should state that the clusters, which had a prehistory of cooperation, especially in the form of doing joint activities as colleagues, experienced less strategic dilemmas and had a more flexible approach towards central coordination and continuous involvement of cluster members (for example, Wellness cluster, Laser cluster, Medical innovation cluster).

6. Conclusions

This paper analyzes the following eight strategic tensions, which occur in organizational ecosystems: interventionism vs. self-organization; hierarchy-based structures vs. network-based (eco)systems; under-connectedness vs. over-connectedness; central rules vs. emerging metanorms; short-term vs. long-term orientation; focus on elements vs. relationships in the system; big wins vs. small wins; and exploitation vs. exploration.

Empirical research, which analyzed the cases of nine industrial clusters as complex organizational ecosystems, revealed the challenges of finding the balance between a hierarchical interventionist approach and a more dynamical approach based on self-organization. It revealed that in many cases, focused interventionism, hierarchy-based structures, under-connectedness and central rules are in place when the ecosystem's participants act individually and remotely and do not develop interactions and relationships. However, the example of more self-organization-based clusters reveals various ways to increase dynamism and self-organization by overcoming individualism, competition, short-termism and passiveness. It is mostly related to providing a clear vision and aims, creating the space for dialogue and experimentation, nurturing the traditions of frequent regular meetings, developing joint projects, creating opportunities to present the cluster and its achievements.

In general, the research results reveal the approach of cluster coordinators, how they develop clusters as complex adaptive systems. When the cluster members are mature in their understanding about cooperation and self-organization, many processes are emergent and strategic tensions are less pronounced. When the cluster members engage in more passive or competitive activities, cluster coordinators have to take a more proactive leveraging role by adopting a position based on one of the extremes. In in some cases, coordinators adapt trade-off approach by trying to find a balance between focused intervention and self-organization, or an optimal density of connections within the network. The leaders of emerging organizational ecosystems may also stress both extremes of the tension at the same time, e.g., in the case of *big wins* vs. *small wins* where both 'big' visionary ideas and sound 'small' fundamentals can be achieved at the same time.

To get a more complete picture of strategic tensions in ecosystem development, one should involve not only the coordinators, but also the interacting members themselves. Further research should be performed by including diverse actors within the network and their perspectives on the issue.

In addition, similar empirical research can be repeated in the future by considering the further development of clusters as organizational ecosystems. The managerial solutions implemented at a particular stage of development may be suitable for achieving the current goals; however, if the cluster coordinator is still active in the decision making, but cluster members do not become more mature in cooperation and collective decision making, there is a danger to future development of clusters as an organizational ecosystem.

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