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Complexity Leadership: A Theoretical Perspective

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Abstract

Complex systems are social networks composed of interactive employees interconnected through collaborative, dynamic ties such as shared goals, perspectives and needs. Complex systems are largely based on “the complex system theory”. The complex system theory focuses mainly on finding out and developing strategies and behaviours that foster continuous learning, resonating with new conditions and creativity in organizations with dynamic collaborative management mentality. Complex systems surely need leaders to manage complexity. Complexity leadership could be defined as adaptive mechanisms developed by complex organizations in new conditions required by the information age, rather than technical problems entailed by the industrial age. Complexity leadership is a joint, resultant product of the following three types of leadership: (1) administrative leadership based on strict control and a significant bureaucratic hierarchy (2) adaptive leadership fundamentally based on creative problem solving, resonating with new conditions and learning and (3) action-centered leadership that involves immediate decision-making mechanisms employed in crises and dynamic productivity. The study focuses on complexity leadership within the context of the complexity leadership theory.

Keywords: Chaos, complexity, complexity leadership, complexity leadership theory

El Liderazgo de la Complejidad: Una Perspectiva Teórica

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Abstract

Los sistemas complejos son redes sociales formadas de empleados interactivos interconectados a través de lazos dinámicos y colaborativos, tales como metas, perspectivas y necesidades compartidas. Los sistemas complejos se basan en gran medida en "la teoría del sistema complejo". La teoría del sistema complejo se centra principalmente en descubrir y desarrollar estrategias y comportamientos que fomenten el aprendizaje continuo, que resuenen con las nuevas condiciones y la creatividad en las organizaciones con mentalidad dinámica de gestión colaborativa. Los sistemas complejos necesitan ciertamente líderes para gestionar la complejidad. El liderazgo de la complejidad podría definirse como mecanismos adaptativos desarrollados por organizaciones complejas en nuevas condiciones requeridas por la era de la información, más que por los problemas técnicos de la era industrial. El liderazgo de complejidad es un producto conjunto resultante de los siguientes tres tipos de liderazgo: (1) liderazgo administrativo basado en un control estricto y una jerarquía burocrática significativa (2) liderazgo adaptativo fundamentalmente basado en la resolución creativa de problemas, resonando con nuevas condiciones y aprendizaje y 3) un liderazgo centrado en la acción que implique mecanismos inmediatos de toma de decisiones empleados en las crisis y la productividad dinámica. El estudio se centra en el liderazgo de la complejidad dentro del contexto de la teoría del liderazgo de la complejidad.

Keywords: Caos, complejidad, liderazgo de la complejidad, teoría del liderazgo de la complejidad

It has been observed that various theories and practices in administration sciences have a long established history of at least 50 years and many have lost validity because of the recently emerged ideas and theories. For instance, it is a fact that despite the information age, many of the management theories and practices can not move beyond the traditional-bureaucratic management perspective of the industrial age and thus do not offer any solutions to the contemporary issues. As a result, today's issues require new management perspectives and models (Drucker, 2012; Balci, 2014).

According to Drucker (2012), organizations of the 21st century face a complex, competitive environment called “the threshold of chaos” that is largely led by globalisation and technological revolution. In the new century which is called the “chaos era” in the literature, organizations need to adopt strategies such as establishment on knowledge, closely pursued data production based on innovation for immediate decision making, improvement and change in their traditional organizational structure into modern models by resonating with new technologies and flexible leadership styles embraced by critical decision makers if they intend to survive (Byrne & Callaghan, 2013; Fitzgerald, 2016; Adams & Stewart, 2015).

Leadership in organizations appears to be a significant mechanism that could manage hardships of the information age. Leadership models based on classical management perspectives are mostly static models based on currently invalid remedies to yesterday's issues and they are not flexible enough to offer alternative solutions to organizational problems in chaotic environment. On account of this, organizations are not likely to resonate with the new era through the leadership models available in administration sciences (Northouse, 2015). Moving beyond the traditionally accepted management perspectives is certainly another issue of leadership and it will lead to a dramatic, radical change in the classical-bureaucratic management perspective (Edmonstone, 2016).

Complexity leadership is an alternative approach for contemporary organizations to survive that function in a rather volatile, unpredictable, competitive, chaotic environment based on information technology. The study aims to set a general framework of the main dynamics of the leadership perspective. As a result of the complexity leadership framework, the research will attempt to contribute to the exploration of the current

conditions of knowledge-based organizations included in complex adaptive systems, the development of creative solutions, and the determination of organizational adaptive capacities. The need for the Complexity Leadership Theory will be better understood through the exploration of leadership qualities required by the information age and the restrictions of the available traditional leadership models. It is essential to clarify three basic leadership models that build the Complexity Leadership Theory and the roles of those models. The above mentioned models could be listed as follows: “adaptive leadership”, “action-centered leadership” and “administrative leadership” (Jackson, 2015; Waldman and Bowen, 2015; Smits and Bowden, 2015; Taneja et al., 2014).

Leadership in the Information Age

The information age is portrayed by new knowledge-based rivalry areas that are led by globalisation, technology, deregulation and democratisation (Lord & Dinh, 2014). Many organizations form an alliance to handle the new competition areas, which is called vertical and horizontal “constellations” (Burke, 2013). The alliance in practice aims to establish communication between seemingly unrelated organizations and the globe, and thus enable organizations to keep up with the “communication age” (Morrison, 2012). Through multilateral alliance, organizations in developing countries focus on organizational knowledge and services in developed countries, quitting their passive roles to serve as merely manufacturers or carry out productive activities as subcontractors and they find out new development areas with the help of the emerging information sharing (Drucker, 2012). Another concern is that organizations need to be able to internalise challenging factors such as learning new conditions, innovation and change and resonance in a fast, flexible fashion, which is essential to be achieved for organizational survival in the growing competitive environment (Balci et al., 2012; Cottam, Ranson and Vounckx, 2015). In other words, organizations in developed countries and economies embolden quick learning and thus are able to display outstanding performance required by the information age (Lichtenstein et al., 2006).

The modern times bring about new kinds of distresses for organizations and leaders (Baltaci, 2016). After the industrial era, the achievement of

organizations has depended on the capacity for learning new conditions, organizational intelligence, and the ability to utilize social assets than physical ones (Fidan and Oztürk, 2015; Castells, 2011). In an industrial economy, coordinating physical assets created by employees is a main challenge in organizations. This case has basically been an issue that optimizes the physical flow of manufacture and products in organizations (Jones, 1995; Alcácer, Cantwell and Piscitello, 2016). In the new economy reproduce from the information age, it is essential to create an atmosphere of lower production costs and knowledge accumulation. The aim here is to develop and manufacture knowledge-driven products that are unlikely to be imitated with the growing knowledge accumulation (Nonaka and Nishiguchi, 1995). The issue of intellectual knowledge accumulation is settled through transformation of knowledge of various organizations gathered over cellular networks rather than restricted information production of particular organizational members (Chesbrough, 2006). Over and above, the focal point in the knowledge accumulation of the new era is to provide immediate information production and make that knowledge resonate with organizational production capacity (Thietart and Forgues, 1995). Organizations of the information age focus on resonance with new conditions, knowledge and learning process besides productivity and control (Marion, 1999).

In order to resonate with the information age, the science of chaos suggests that chaos in organizations should gather around the organizational environment level rather than simplification and rationalisation. Ashby (2013) calls that case “diversity rule” while Boisot (2010), specifically used the term for the complexity theory and it is called “Conditional Complexity Rule”. In the simplest term, the rule is based on the view that an organization in a complex system needs to have a chaotic level equal to other organizations in the environment for sustainability in accordance with organizational goals. Conditional complexity aims at solutions to organizational issues and chaos management by the system through the optimization of organizational capacity (human sources, capital, technical and environmental potentials) to introduce innovations in goods/services manufacture. In other words, conditional complexity rule aims at the improvement of organizational creativity, learning and the ability of resonance.

As Cilliers observed (2005), traditional organizations have come up with simple solutions to the determination of chaotic conditions and the understanding of issues that lead to chaos since they do not have chaos-conscious structures. Such organizations have tried to pursue strategies, such as an attempt to conclude complex organizational environment rather than resonating with the environment. Surely, such management perspectives are incapable of managing complex organizations. Cilliers suggests that simplified and rationalised strategies will lead to static structures with restrictions defined by Simon (1965) as simplified organizational communication and coordination. However, static structures with predefined restrictions do not represent the current conditions of modern organizations but focus on relative organizational sets that interpenetrate dynamically (Cilliers, 2005). As a result of the above mentioned arguments, it could be concluded that organizational leadership in conditional complexity needs administrators and leaders who are able to imagine regardless of individuality, work with knowledge-driven dynamics and the help of new, creative ideas, and improve organizational effectiveness and resonate with complex adaptive systems as required by the information age. In substance, those which are able to extend knowledge capacity, and provide resonance and innovation appear to be complex adaptive systems.

Restrictions of the Prevailing Theories

Despite the new needs emerged with the information age, traditional and currently prevalent leadership theories have largely been built on the bureaucratic pattern defined for the “Industrial Age”, whereas the concept of leadership clarified within the framework of the bureaucratic structure has largely been built on strict control mechanisms and the conventional assumption in which auditing is rationalised (Balci, 2010). Most leadership theories are managerial practices designed for rational goals and goal attainment. According to Barnard (1938), leadership means gathering organizational rational goals and personal preferences of leaders or administrators. Selznick (1948) observes that irrational leadership preferences, social interaction in organizations and informal structuring might damage the predefined organizational goals. In this context, the researcher highlights the influence of leaders in a paradigm predominated by

leadership theories on other organizational members and groups in the context of predefined goals and hierarchical structuring (Conner, 1998). The paradigm model includes strategies such as motivating employees for organizational goal attainment and providing the inspiration for an increase in the efficiency and effectiveness of goods/services produced by employees and for internalisation of organizational goals in employees (Burpo, 2006). There are micro theories that focus on the charismatic and visionary roles of administrators from top to bottom (Castells, 2011) whereas macro theories like “Executive Leadership” rather emphasise bureaucratic structuring (Cilliers, 2005). Traditional leadership studies have been influenced by common research in social sciences on human relationships rather than focusing on studies of organizational top-bottom structures and have decided to take proper understanding and managing human factor in organizations as the main consideration (Balci, 2010).

Control mechanisms included in traditional bureaucratic structure and lacking points in the concept of formal leadership unconsciously restrict the applicability of the mainstream leadership theories in the information age (Fitzgerald, 2016). The available mainstream leadership theories are not flexible enough to gather the concept of centralised organizational power and the needs in the information age (Lichtenstein, 2006). Paradigms predominated by organizational theories attempt to avoid uncertainty by focusing on basic aspects such as organizational functioning and structure and are based on organizational stability pursuit. However, tendency towards structural issues for quest of stability in the unpredictable, and constantly growing competitive global environment of the new era may hinder organizational survival (Northouse, 2015). The new economic model introduced by the information age (information economy) might employ the main structural arguments of bureaucracy as a means of resonating with uncertainty (Morrison, 2012). Research on leadership focuses on the same issue. The problem is to offer alternatives to bureaucracy and to build theories to put these alternatives into practice. Similarly, arguments such as organizational structures, man power and technology to define uncertainty could help organizations attain their goals (Burpo, 2006).

A new leadership theory is needed to arise as traditional leadership theories generally have a slight chance to meet the assumptions of the information age, particularly of the science of chaos. The leadership theory

required by the information age needs to be built on complex grounds rather than bureaucratic ones. The theory is based on informal group process that dynamically changes and socially interactive networks. Complexity leadership premises are entrenched on the principle of simplicity in management. The theory fundamentally aims to provide administrators with basic resonance skills to manage uncertainty rather than overcontrol, suppression or hinderance during knowledge-production process (Waldman & Bowen, 2016). The early researchers and a number of follow up studies focus on the fact that the relevant dynamics are insufficient in goal attainment, rather than the potential of informal group dynamics management. A number of studies including “shared leadership” study, “distributed leadership” study, and studies with a focus on flexible working styles, have examined the potential of decentralised authority or author based leadership models. On the other hand, it has been observed that the number of studies that concern with the ability to resonate with new conditions focused on new forms of authority, distributed authorities and the dynamics of social networks in interaction with informal groups is unsatisfactory (Edmonstone, 2016).

Complexity leadership expresses an interactive process that includes creating an administrative synergy shared by a lot of complex powers in administration, promptly resonating with competitive, uncertain conditions required by the new era and flexible, effective decision making process rather than focusing on organizational member/s (Lichtenstein et al., 2006). The following few assumptions are briefly presented under the term complexity leadership (Friedrich, 2010; Lichtenstein et al., 2006; Suedfeld & Granatstein, 1995):

- Complexity leadership requires a bureaucratic superstructure that also includes organizational procedures such as goals, mission, structural organization and planning. The theory focuses on the effort to understand organizational leaders’ skills to coordinate complex dynamics, establish social, formal and informal group interactions in organizations and provide flexibility and resonance to respond to new conditions.

- Complexity leadership highlights flexible, interactive, dynamic hierarchical structuring that could resonate with new conditions, among all organizational hierarchical levels.
- Complexity leadership strengthens in complex adaptive systems. Complex adaptive systems are not a version of open systems and represent a more complex structure than those systems. The limits of these systems are generally defined through the open system theory despite different suggestions by various researchers.
- Despite various definitions, leadership in general terms is a function of resonating with new conditions and the interaction between the internal and external environment and organizations.

Principally, we need to understand why complex adaptive systems are the best ones to resonate with the new era called the information age. Thus, it is critical to the nature of complex adaptive systems to define the limits of complexity leadership.

A New Theory of Leadership: Complexity

The Complexity Leadership Theory provides a leadership framework which improves resonance capacity of organization as complex adaptive systems that are open to learning, creativity and information production. The framework ensures control mechanisms to coordinate formal organizations and produce outcomes in accordance with the vision and mission of the complex adaptive system and thus foster dynamisms required by the complex adaptive system. The theory aims to integrate new conditions caused by chaos in the bureaucratic organizational structure (Uhl-Bien and Marion, 2008).

Complex adaptive systems entail a high resonance ability to understand chaos and newly arisen problems. What is more, complex adaptive systems have flexible, interactive and a more social structure that could resonate with new conditions rather than strict, hierarchical and bureaucratically dependent structures (Marion, 2008). Flexibility in organizations means limited independence and minimum restrictions to personal behaviours and behaviours of organizational units rather than moderate dependence in the acts of organizational units, in other words, total independence of acts.

Flexibility involves a kind of auto-coordination evolved from informal but interdependent structures and activities. Auto-coordination represents a spontaneous process naturally developed in the dynamics of the system rather than impositions by organizational or formal authorities. Theorists characterize such an interactive dependence as “bottom up behaviour”. Bottom up behaviour is defined as resonating with new conditions faced in the system networks and triggering personal and organizational change when necessary. However, the term “bottom up” has been derived from informal developments considered to understand the dynamics of complex adaptive systems in the social system although it recalls research on organizational hierarchy or organizational structure (Lichtenstein et al., 2006; Uhl-Bien, 2006).

Informal setting and auto-coordination depend on the nature of coordination although they differ from coordination, a process of administration science. In complex adaptive systems, coordination arise from these two roots: (1) Informal, sudden internal restrictions caused by interdependent relationships (Innes & Booher, 1999) and (2) external restrictions imposed by informal dynamics and actions including auditing or environmental control and restrictions (Miller & Page, 2009). Internal audit or restrictions represent an internal process as a result of the spirit of shared organizational goals besides transparency and accountability caused by the nature of all agents in complex resonant systems. From an evolutionary point of view, Stacey (1996) defines auto-coordination as a type of internal response by organizational members and units to external relationships imposed by environmental obligations and relations or the ability of spontaneous resonance developed by organizational members in new conditions caused by chaos.

Administrators who have the formal authority in organizations need to deal with external restrictions and demands caused by environmental obligations and relationships necessary for survival. It surely requires organizational administrators to have auto-coordination skills. Such administrators consider all environmental and external restrictions as an opportunity for administrative activities to control production costs of organizations, focus on the main organizational activities and plan supply and allocation of necessary sources for organizational survival. Still, coordination applied by organizational authorities with a classical leadership

perspective is not sensitive to structures introduced by different factors such as resonance in the nature of complex resonant systems, creativity and interdependent learning dynamics (Holland, 2006). In this context, it is obvious that top down control (classical leadership) might hinder the effective functioning of complex adaptive systems. This case could be observed not only in top down (hierarchically structured) organizations, but also in centrally structured, strictly controlled organizations even if there is no hierarchical structure or in any of those that are managed by prevailing powers (ideology, religion and so on), regardless of sources.

In epitome, beyond offering an administrative model that could integrate organizational goals with employees, complexity leadership suggests a leadership model that is able to lead information production process effectively, especially in the information age, suggest immediate, extraordinary solutions to problems, guide the available informal process of organizations and introduce immediate resonance in chaos.

Main Characteristics of Complexity Leadership

Complexity leadership could be viewed as the outcome of generally adaptive, administrative and action-centered leadership functions that are reconsidered in chaos. Adaptive leadership is an interactive effort entailed by complex systems designed to cope with uncertainty besides learning new conditions through creative thinking and resonating with new conditions. Resonant activities required by adaptive leadership may spontaneously appear between employees or in administration. In this context, adaptive leadership might occur in informal structures of organizations independent from dynamics and organizational authority. Administrative leadership means activities to attain organizational goals caused by the formal, managerial roles of individual organizational members and groups. Administrative leadership could be defined as planning task delegation of employees, defining organizational vision, providing necessary sources and opportunities for organizational goal attainment, managing crises and conflicts and deciding all other survival strategies and policies for sound organizations (Holland, 2006). Administrative leadership focuses on regular setting and control represented by hierarchical and bureaucratic functions of organizations, whereas action-centered leadership highlights bureaucratic

structuring and the emphasis on regulation and control seen in managerial leadership and the realisation of conditions through which organizations resonate with new conditions following discussions on common ground observed in resonant leadership. Such acting has two different roles: (1) creating eligible organizational conditions to foster efficient adaptive leadership to ensure change and resonance where demanded and (2) providing creative information flux in organizations from resonant structures to administrative ones. Although action-centered leadership occurs at all organizational levels, its role might vary according to hierarchical level and position (Byrne & Callaghan, 2013).

In complexity leadership, these three leadership functions build an interwoven process which is called “entanglement” in the literature (Schneider & Somers, 2006). Entanglement might be defined as a dynamic relationship between top down formal administrative structure (bureaucracy) and informal, resonant structure of the social system. Interaction between administrative and adaptive leadership in organizations shapes complexity leadership. In this context, administrative leadership can work with adaptive leadership or contribute to the prevention of over-authoritarian, bureaucratic control mechanisms in organizations. Adaptive leadership may attempt to increase strategic needs of administrative leadership and lead organizations to high level strategies and policies. Action-centered leadership might provide different managerial alternatives to operate organizations better as well as prevention of possible conflicts between administrative and adaptive leadership to offer active, creative solutions to organizational issues (integrative role taking between administrative and adaptive leadership functions, and help for compatible functioning and so on) (Holland, 2006; Lichtenstein et al., 2006; Uhl-Bien, 2006).

In chaotic settings, formal organizations show “entangled structures” through an evolutionary process from bureaucratic structuring to complex adaptive systems. Apparently, complex adaptive systems are the basic analysis unit in chaos. All organizations definitely have bureaucratic structures at different levels (this is the observed case in post-bureaucratic structures). In this context, complex adaptive systems have to interact with the bureaucratic structure in any case. Additionally, there are some periods and conditions (stable organizational environment, enthusiasm to increase organizational profits and so on) in which internal organizational structure

and coordination (for example, hierarchical authority) decides such an interaction. On the other hand, when rivalry between organizations and an uncertain, fluctuating environment is fragile and flexible, organizations attempt to manage complexity and tend to act as part of a complex resonant system (Byrne & Callaghan, 2013).

The role of action-centered leadership in strategical terms is to lessen non-coordination between the relevant significance of top down hierarchical dynamics and complex adaptive systems and coordinate resonance between those (Schneider & Somers, 2006). As a result, a whole separation of these structures in organizations with information production in chaos is out of question.

In the light of this information, the main aspects of complexity leadership can be summarised as follows:

- Complexity Leadership Theory provides us with a comprehensive framework to explain the functions of administrative leadership, adaptive leadership and action-centered leadership. The theory aims to integrate different roles of the above mentioned leadership functions to establish interaction between complex adaptive systems and bureaucracy.
- Adaptive leadership represents an interactive, dynamic process that focuses on adaptive consequences like the ability to ensure resonance with rapidly changing new organizational conditions, introduced by organizations. Administrative leadership focuses on formal, administrative roles of individual organizational members and groups that plan and coordinate organizational activities. Action-centered leadership aims to help with activation of organizational dynamics such as optimum use of organizational opportunities by preventing controversy between administrative leadership and adaptive leadership and introduction of organizational flexibility to resonate with new conditions without difficulty and “entanglement” management. All the roles aim to manage interaction between organizational members and activities or in other words, entanglement.

Scope of Complexity Leadership

Three basic leadership types that build complexity leadership are thoroughly discussed below.

Administrative leadership. Administrative leadership means formal managerial roles (bureaucratic functions etc.) of individual organizational members and groups that plan and coordinate organizational activities. Administrative leaders have a set of roles including managerial activities such as regulation of workflow, creating organizational vision, planning sources for production, crisis management, settling non resonance between employees, defining organizational policies and strategies (Schneider & Somers, 2006; Uhl-Bien & Marion, 2008). The nature of administrative leadership changes within hierarchical structures of organizations. Administrators occupied with strategic planning also manage effective coordination, necessary sources and opportunities for production and strategic structuring that could vary depending on changing conditions. When compared to adaptive leaders, administrative leaders focus on planning and coordination of creative organizational activities, supplying sources for production and regulation of organizational structure (Uhl-Bien & Marion, 2008; Smits & Bowden, 2015).

When administrative leadership is considered as remodelling organizational authority and hierarchical structure in a top down gradually effective way, hierarchical power becomes the main managerial instrument of organizations. However, the complex adaptive leadership theory defined in that structure makes managerial leadership transparent, keeping organizational needs for creativity, resonance and learning in mind and reformulates it through adaptive leadership activities and dynamics under changeable conditions of chaos. Such an approach enables organizations to find innovative, creative solutions to fluctuating, unpredictable affairs introduced by the new era and the problems faced in over-competitive environment (Conner, 1998; Jackson, 2015).

Adaptive leadership. Adaptive leadership represents an interactive, dynamic process with resonant outcomes in a given social system. Precisely, adaptive leadership could be defined as a change collaboratively sustained by

organizational structures in informal interaction, but not directly related (Lichtenstein et al., 2006; Heifetz, Grashow & Linsky, 2009). Adaptive leadership, evolved from the necessity for managing overlapping needs, ideas and preferences of individual organizational members and groups, aims to reach resonance in individual organizational members and groups. Adaptive leadership seeks for the main reason of organizational change in informal interactions and dynamics, focusing on individual organizational members and groups, not on complex dynamics (Cilliers, 2000).

Adaptive leadership is caused by asymmetrical interactions (asymmetric interaction in complexity is a term developed by Cilliers 2001) and it is a two way interaction: One comes from preferences including informational diversity, skills and beliefs and the other from authority. If interaction is largely one way and authority based, the asymmetry here is top down. If that interaction focuses on preferences rather than being one way interaction, it might be suggested that such asymmetry is dynamic. Obviously, this kind of leadership appears as a function of organizational interaction.

Diversity in asymmetrical preferences has a direct influence on the outcomes of resonant changes. Resonant change means a process introduced by non-resonant ideas of individual organizational members and groups, information and technology and the process becomes evident by resonating with new information, creative ideas, learning and new conditions. In organizations, specifically related individuals might have contradictory views about any issue, and these contradictions could even change into immediate solution offering mechanisms, which may show that change is a sudden process. Sudden developments occur as a non-linear result of the combination of new ideas and original perceptions, pursuant to the elimination of unfavoured ideas and the acceptance of justifiable ones about a particular issue or the whole change of ideas which lead to a solution. This case means imagining beyond original assumptions. Moreover, sudden developments can be considered as a result of interaction between organizational members or between a specific group and others besides having the potential of individual realisation (Bradbury & Lichtenstein, 2000).

Adaptive leadership has a great influence on the administration of organizations that could appear as complex adaptive systems. What is significant here springs from new, creative information and potential

resonant ideas and the influence itself highlights an increase in production when new information or ideas are employed. The concept of adaptive leadership expresses a resonant dynamism and the significance of the dynamism associates with expertise and creative thinking capacity of individual organizational members and groups in interaction (Burke, 2013; Balci, 2014). However, expertise and creativity are not force majeure for resonant dynamism, but a necessity. Clearly, those with creative ideas in any science could never progress without particular scientific studies or expertise. Similarly, creativity and expertise influence resonant behaviour by nature but under certain conditions, they are influential on resonant behaviour to the extent of functionality. As a result, complex systems are structures that primarily depend on expertise and then on creativity.

Influence might be dependent from significance in order to provide resonant behaviour. Such independency is affected by hierarchical authority and organizational image of agents (individual organizational members and groups etc.) that develop creative thinking and gather organizations. Creative ideas are questioned, though produced by one at top hierarchical level, and different aspects of those ideas are discussed and significance is decided. This can be perceived as extensively participated brain storming in the organization but in practice is the process of resonant behaviour display in which ideas interact, rather than brainstorming. It should also be pointed out that a trivial idea can give way to a significant change in terms of adaptive behaviour (Ashby, 2013; Adams & Stewart, 2015).

Complexity leadership examines essential conditions in order to provide significance and influence necessary for creative change and to determine which resonant dynamics lead to creative, resonant information. Adaptive leadership, as a component of complexity leadership, is neither personal nor collective actions by interrelated agents. On the contrary, resonant leadership refers to a process as a result of interactions between individual organizational members and groups. Adaptive leadership that could decide the significance and influence of changes in organizations as social systems has to be properly integrated with complex resonant system networks. The networks are discussed below.

Network Dynamics. Network dynamics mean the context and mechanisms of adaptive leadership. As it was mentioned before, context means the

mechanisms of dynamic behavioural patterns with complex outcomes in complex adaptive systems. Trivial or great resonant ideas appear as a result of personal and group interactions in interactive, interrelated networks. The contexts which shape those ideas are complex structures including complex, convergent designs of controversial ideas between individual organizational members or groups, dependent relationships, organizational rules, direct/indirect feedback circles, demands by the rapidly changing environment and interactive networks. The mechanisms include resonant behaviours such as centering ideas, catalytic behaviours—those which ensure organizational speed or particular activities- (Schneider & Somers, 2006), employees or groups to display determined or undetermined dynamic behaviours, mechanisms to lessen tensions caused by organizational structure (Morrison, 2012), non-linear change, information flow, pattern development and complex networks associations and related actions. In complex adaptive systems, ideas appear, incorporate, diverge, corrupt, conflict and resonate with others, and change but in the end, they increase complexity. The main outcomes of the complex dynamics are resonance, creativity and learning.

Adaptive leadership might be viewed as appearance of complex contexts and mechanisms caused by network contexts and complex mechanisms in complex settings. In this context, there are two interrelated, interactive levels: (1) Interaction between shareholders that come up with information and ideas and the complex adaptive system and (2) information and ideas interacting to produce more complex information and ideas. As it is clear, this case represents a general complexity which is called “the garbage can metaphor” including information, ideas, contexts and mechanisms and agent and complex adaptive systems (Smits & Bowden, 2015). As a result, it could be suggested that adaptive leadership ensures creativity, learning and resonance on a large-scale platform, which increases its importance for all components of the system.

Break out. Break out can be defined as distance between different and controversial ideas. However, the concept, by definition, depends on two dependent mechanisms: (1) drawing new conclusions from original factors that are qualitatively different from the available components and (2) self organisation. Such an approach towards the concept introduces a new

perspective which considers natural selection theories and a unique source of change; human intelligence (Lichtenstein et al., 2006). Such a new way of thinking can be defined as an integration of components that do not interact and experience frequent controversies in conflicts caused by strategies such as organizational extension, analysis, strengthening and transformation and by chaotic and asymmetrical information. Break out is generated by complex interactive mechanisms in eligibly structured contexts and thus the aforementioned reconsideration highlights the random nature of close interaction of non-linear complex networks with unpredictable outcomes. Explaining break out, with a newly attributed meaning or comment on a recently appeared conclusion in organizations or in other words, focusing on the basic way of change in organizations in chaos is an attempt to grasp the fundamentals of original factors in the chaos literature (Uhl-Bien & Marion, 2008).

As a process, *self organisation* is an activation that is guided or manipulated towards high complexity, generally by external sources in an open system and it shapes internal organisation. The activation here is frequently exemplified in science such as physics, biology and social sciences. More specifically, this behaviour can be defined as resonance including naturally kinesthetic process which brings cases where behaviours of two or more factors are interrelated into practice. Additionally, self organisation is a dynamic movement including suggestion of different, authentic solutions to specific or general issues. Human willpower might play an important role in the self organisation definition, but it appears to be a dynamic actor in self organising behaviour, rather than a force majeure (Balci, 2014; Heifetz, Grashow & Linsky, 2009).

In the light of the above mentioned explanations, adaptive leadership can be defined as change behaviour caused by unpredictable environment, controversies and tensions, complex network dynamics, asymmetrical information, interdependence between individual organizational members and agents, interactive conditions in and out of organizations. Interactions between agents, rather than individual organizational members, and adaptive leadership that appears in complex adaptive systems can become significant and influential in dynamic process caused by chaos. Complex adaptive systems occur at all hierarchical levels of organizations. There will certainly be differences in those hierarchical levels when it comes to outcomes in

complex adaptive systems, and the effects and importance of resonant behaviour. When generally considered, resonant outcomes at top hierarchy are largely results of source gaining, strategic relationship establishment with the environment and emergency planning. Resonant outcomes at moderate organizational hierarchy associate with through planning of source allocation and emergence. Lower hierarchical levels focus on the main production and innovative planning such as creativity in production knowledge, development and resonance (Cilliers, 2000; Cilliers, 2005; Cottam, Ranson & Vounckx, 2015).

Action-centered leadership. Within the framework of complexity leadership, the role of action-centered leadership is to foster conditions to provide emergence by increasing the effectiveness of resonant leadership. Junior and mid level administrative officers often display action-centered leadership behaviour as they can directly reach necessary sources for organizational production activities and serve in positions that could firstly be influenced by changing organizational environment. However, action-centered leadership could be observed at all organizational levels. Another function of action-centered leadership is to develop managerial capacity through action-centered behaviour of efficient employees and to make administrative leadership more effective. Moreover, it is essential for a single organizational member, unit or group to resonant and action-centered roles together in order to adapt immediately with changing conditions (Kaplan, 1996; Jonstone, 2013).

The roles of action-centered leadership can be summarised as follows (Fiore & Salas, 2002; Lieberman & Pointer Mace, 2009):

- Action-centered leadership activates complex adaptive system dynamics by triggering adaptive leadership and emergence or in other words, by fostering conditions to enable actions.
- Action-centered leadership takes the role of managing role complexity between administrative and adaptive leaderships. This kind of leadership fundamentally aims (1) management of organizational conditions in which adaptive leadership takes place and (2) spread of innovative products to help adaptive leadership arise through formal management system.

One aspect of action-centered leadership is triggering complex adaptive system dynamics that foster adaptive leadership. Triggering can be defined as all activities that gather necessary conditions (context and mechanisms) to make adaptive leadership appear. Complex networks eligible for adaptive leadership are interactive, minimally dependent and organizational tension-conscious structures. Action-centered leadership aims to settle tensions caused by chaos by coordinating and motivating interactive dynamics in the network although it fosters interaction and minimal dependence for complex network survival (Jonstone, 2013; Heifetz, Grashow & Linsky, 2009).

Interaction. Network conditions are primarily triggered by interaction. Interaction is information production interconnectingly flowing over network communication. Action-centered leaders can neither define prerequisites necessary for enough communication in networks nor build sufficient dynamic connections appropriate for complex network features. The networks are self organising structures and thus, external interventions do not influence much the nature of the structures. Still, action-centered leaders might form a general structure of complex networks through working conditions that build complex networks. To illustrate the case at organizational level, action-centered leaders might provide mutual interaction of a number of variables such as working fields, architecture which is ergonomic for employees and necessarily eligible for work, self generating study groups, study groups in electronic settings, work schedule decided by administration and office rules (Uhl-Bien, Marion & McKelvey, 2007; Cilliers, 2001).

Interaction is not just restricted to organizational variables and particular persons or study groups, but it also occurs with the environment of organizations. Thus, organizations could unilaterally have different and creative ideas that can improve their own production activities through the transfer of raw materials, information and manpower for prospective production from other organizations or they can mutually exchange information, manpower or raw materials. Strategically, action-centered leadership favours the management of pressure over complex adaptive systems imposed by environmental dynamics and organizations. Such facilitation increases strategic leadership skills of solely-acting in general

and extends organizational capacity to access manpower, information and raw material in order to resonate with environmental changes and uncertain conditions although it enables the transfer of new information involving creative dynamism. Besides being a significant component of strategic planning, organizational ability to resonate with environmental changes immediately and efficiently is a prerequisite of action-centered leadership (Bradbury & Lichtenstein, 2000).

Individual agents in resonant networks may embrace behaviours and roles to increase interactive contributions. For example, agents who have an access to their own personal networks to increase the quantity of organizational production can extend accessible fields of organizations. Moreover, agents may carry organizational and environmental perspectives and opportunities to production by keeping themselves knowledgeable, competent and creative for work and associated with affairs in organizational activity area through predomination of matters. However, agents might develop new perspectives to understand the nature of powers influential on resonant dynamics through observations of political, economic, social, national, technological, international environments (Schneider & Somers, 2006; Uhl-Bien & Marion, 2008).

Interdependence. Interaction is not solely sufficient to manage complexity, and needs interdependence of agents in a particular system because dependency causes pressure on information itself, while it allows dynamic movement of information. Natural appearance of overlapping, diversely restricted networks creates the pressure power of dependency. Organizational conflicts and certain restrictions in some cases necessarily appear in the event of an agent with information and another without information or non-resonant information published by an agent with that of another. Such restrictions may cause agents to feel pressure at a certain level in the regulation of organizational production activities and the elaboration of information network (Burke, 2013; Holland, 2006).

There are various conditions and ways to trigger organizational dependency mechanisms. Providing a reasonable autonomy for informal agent behaviours is a way of fostering dependency. Autonomy enables agent to settle conflicts without interventions of official authorities although it allows the rise of conflicts. Autonomy entails the freedom of expressing

organizational ideas of agents and the development of new, creative ideas (Friedrich et al., 2010; Fitzgerald, 2016).

Solving problems at work tasks and between organizational members and intervening conflicts has historically been a significant function of leadership. The function may restrict resonant dynamics by imposing pressure on dependency. Organizational atmospheres in conflict where there are work-related and interpersonal issues become easy to manage by managerial leadership practices within complexity leadership. Action-centered leadership leads managerial leadership to settle conflicts, define conflict settlement policies and more importantly, to prevent conflicts before they occur (Marion, 2008).

Strategically, action-centered leadership attempts to provide dependency through prospective rules instead of bureaucratic structure and pressure and restrictions imposed by environmental conditions. In this case, rule formation to define interactive study groups and dependency is necessary for creating autonomous organizational environment. Flexibility, resonance, organizational speed, and innovation in production that occur as a result of smaller work groups of agents in organizations are outcomes of dependency. Dependent groups constantly communicate and possible congestions in small work groups could be solved with the help of greater groups. Additionally, an intensive information transfer between both small and greater work groups can be easily provided by dependent structures (Boisot & McKelvey, 2010; Miller & Paige, 2009).

Agents who individually foster action-centered leadership have grasped the importance of dependency at a level to increase the efficiency of production by effectively coordinating workflow and they will eventually try to reach the optimum production level and resort to restructuring the available knowledge accumulation in consideration with both their own knowledge accumulation and the one introduced by other agents and historically built by organizations (Cilliers, 2005; Lichtenstein et al., 2006).

Tension. Action-centered leadership may provide easy management of controversial, tense situations entailed by strategies, knowledge accumulation and resonance. Internal tension is generally resulted from heterogenous structures in cases where dependency and controversial restrictions appear to be the stimuli. Heterogeneity indicates differences

between agents in terms of skills, preferences, and perspectives and so on. In case of dependency, heterogenous structures can work in resonance that eliminates all differences. Such resonance is an indicator of sound interaction on which the balance of organizational dependency is built. Heterogenous structures especially at top levels may hinder organizational goal attainment whereas heterogeneity at lower levels might foster the development of extraordinary, innovative and different ideas. Action-centered leadership aims to maintain diversity by focusing on tensions between heterogenous structures and but also to lower organizational tensions. In this respect, action-centered leaders will eventually resort to solving potential problems between heterogenous structures, supporting organizational interaction that could tolerate different perspectives and organizational oppositions by focusing on heterogenous structures at all organizational levels (Taneja et al., 2013; Waldman & Bowen, 2016; Marion, 2008; Uhl-Bien, 2008).

Action-centered leadership does not only focus on internal tension. It is likely for environmental factors to cause organizational tension. Such a case is called external tension. Mid level and top administrators may perceive external tension as a kind of managerial pressure and challenging tool by evaluating through internal practices such as more even distribution of organizational sources, support for creative ideas and increasing demand for products. Action-centered leadership perceives tension as a prerequisite of emergence and a mechanism to support organizational learning and creativity. New ideas in organizations, knowledge accumulation, properly distributed sources, employees and other resources could be prerequisites of emergence. The prerequisite factors might unpredictably influence organizational network structure and resonant dynamics (Stacey, 1996; Smits & Bowden, 2015).

Individually, agents might manage the nature of action-centered leadership that triggers tension to foster productive information flow and interaction to the extent of their understanding. Agents are supposed to prefer their resonant problem solving skills to bureaucratic mechanisms. Those who determine interpersonal conflicts and controversies besides conflicts at work, overlapping tasks or differences between authentic ideas can act as a mechanism of settlement, solution and adaptation with an attempt to lessen differences and conflicts (Marion, 2008; Cilliers, 2001).

Conclusions

The fluctuating, unpredictable and unsteady atmosphere of the information age requires complex system organizations. What lies in the heart of complex systems is the chaos and complexity theory. Complex systems are social networks that consist of interactive employees interrelated by collaborative, dynamics ties such as shared goals, perspectives and needs. Complex systems are very flexible and volatile hierarchical structures connected through multiple ties similar to dynamic, interactive networks of those who build them in the social system. Complex systems are compared to “constellations that consist of humans and units” which fall towards organizations for the management of available information. Besides, it could be concluded that complex systems have basically evolved from the social system theory as they have a natural ability to display immediate resonance, learning and creative problem solving.

That kind of organizations surely needs a leadership model different from the traditional ones. The leadership model in complex systems includes new behavioural patterns and new ways of knowledge/product production required by the information age as well as bureaucratic positions and power of authority. In this context, this type of leadership represents an interactive, dynamic process including an unpredictable complex interactive system of actions and a collective, stimulating power for organizational change. Complexity leadership required by complex systems is a result of the dynamic nature of those systems. The complex system theory focuses on finding out and defining strategies and behaviours that foster continuous learning, resonating with new conditions and creativity in organizations with dynamic and collaborative managerial perspectives, especially their sub-units. Complexity leadership is a joint, resultant product of the widely-known following three types of leadership: (1) administrative leadership based on strict control and a significant bureaucratic hierarchy (2) adaptive leadership fundamentally based on creative problem solving, resonating with new conditions and learning and (3) action-centered leadership that involves immediate decision-making mechanisms employed in crises and dynamic productivity. Complexity leadership has a perspective built on numberless critical concepts. Context in complex systems is a priori, not an agent or

moderator variable, which increases dynamic climate of systems. In other words, context means agents (employees, ideas and so on), hierarchical units and interdependent, interactive structuring between organizations and the environment. Besides context, determination of strategic design that leads the system and social setting that involves the system and historicity is critical in order to decide leadership in complex systems. Historicity can be defined as the fact that an organization in a complex system cannot be separately considered from all other variables in that particular system.

The complexity leadership perspective requires a distinction between leadership and leaders. The perspective approaches to the concept of leadership from the point of view that offers immediate, interactive, dynamic and resonant outcomes in suddenly appearing conditions. The perspective is defined as “adaptive leadership” in the literature. One who authentically influences those interactive, dynamic and resonant outcomes is called “adaptive leader”. Classical leadership theories largely focus on individual acts of leaders but have not studied dynamic processes and complex systems involved in that kind of leadership which aims to resonate with chaotic conditions of the information age. Therefore, classical leadership models have been inefficient and impractical to meet the requirements of the information age. What is more, those theories have been criticised that they focus on organizational environment and intraorganizational procedures as a vicious circle, and basically disregard the nature of leadership process changing and dynamising with the information age.

Complexity leadership perspectives have been designed to overcome the deficiencies of traditional leadership concept stuck in bureaucratic positions or administrative offices. Administrative leadership, as a main component of complexity leadership, is defined as the coordination and bureaucratic structuring of organizational activities. On the other hand, when sudden conditions and informal resonant dynamics are integrated with the administrative leadership concept, they lead up to the adaptive leadership concept. Action-centered leadership is essential to develop the effectiveness of these two leadership approaches.

As a result, complexity leadership can be seen as the organizational development of resonant mechanisms for new conditions appeared in the information age, rather than technical problems of the industrial age. Resonance issues entail new learning and behavioural patterns and

challenges that need innovation. Unlike technical issues, the challenges are organizational information flow and organizational activities. Resonance challenges require organizational regulations such as considering organizational standard functioning activities bureaucratic rather than a chain of command, and determining new conditions in organizations and the environment. Improving management represents a process that includes the application of previously tested and approved solutions to familiar problems, whereas improving leadership means organizational learning about new conditions, determination of unpredictable issues, and strategies to cope with those. Apparently, complexity leaders needed by complex systems must (1) have a tendency to work project based, and with flexible decision-making process and simple interactive units, (2) analyse mass information, (3) manage organization in fluctuating economic systems and (4) have skills to manage unpredictable employee behaviours, crises and other complex settings and time.

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