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Gazendam, Henk W.M.

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The concept of equilibrium in organization theory

Henk W.M. Gazendam[1][2][3]

SOM theme A: Multi-level Interactions Within Firms

Abstract

Many organization theories consist of an interpretation frame and an idea about the ideal equilibrium state. This article explains how the equilibrium concept is used in four organization theories: the theories of Fayol, Mintzberg, Morgan, and Volberda. Equilibrium can be defined as balance, fit or requisite variety. Equilibrium is related to observables dependent on the definition of organization as work organization, formal organization or artifact organization. Equilibrium can be explicitly related to performance in the theory used, enabling cross-sectional research. The discussed theories can be mapped on a state space model in a way that clarifies the equilibrium concept, namely a mu-space (Fayol and Morgan), or a gamma-space (Mintzberg and Volberda).

[1] Prof.dr. Henk W.M. Gazendam is professor of Information Systems in the Public Sector at the Faculty of Public Administration at Twente University and associate professor of Information Strategy at the Faculty of Management and Organization at Groningen University (P.O.Box 800, NL-9700-AV Groningen, The Netherlands, tel +31-50-3637078, email h.w.m.gazendam@bdk.rug.nl).

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1. Why the equilibrium concept is needed in organization theory

Why are organization theories so difficult to formalize? The answer to this question might be that managers and consultants use organization theories as instruments for diagnosis and therapy, and that popular organization theories are formulated in a way that is suitable for this task. This means that most organization theories have not been built based on the idea that they have to offer clear rules for explaining and predicting organization behavior. Instead, they offer a framework for perceiving to what extent an organization differs from an idealized healthy state, and receipts or mechanisms to let an organization return to that healthy or vital state. In many cases. the idea of an healthy organization is related to the idea of maintaining equilibria. For instance, Fayol (1916) speaks of equilibria between personal interest and general interest, contingency theory (Lawrence and Lorsch, 1967; Drazin and Van de Ven, 1985; Venkatraman, 1989) speaks about fit between organization structure and organization environment, Maturana and Varela (1984) speak about autopoiesis, and Mintzberg (1967) speaks of stable configurations.

Researchers trying to formalize organization theories can make a mistake when trying to 'jump to the rules', skipping the interpretation frame of the organization theory, which often is the most important part of the theory from the view of the manager or consultant trying to apply organization theories in a diagnosis-and-therapy process. Sometimes, it is prematurely concluded that an organization theory does not have rules, while the theory is based on the equilibrium concept and therefore implicitly contains rules. The CAST method (Gazendam, 1992; 1993) tries to avoid these mistakes by making a number of deliberate steps from verbal organization theory to semi-formal description.

In order to be able to make better formal descriptions and computer models of organization, for instance aiming at computer-supported organization diagnosis and therapy, it is necessary to investigate the equilibrium concept in organization theory further. How is equilibrium defined? How is it related to observables? How is it related to performance? What data structure does it have? These questions will be answered for a collection of theories that have been analyzed using the CAST method, namely the theories of Fayol (1916), Mintzberg (1979), Morgan (1986) and Volberda (1992). These theories cover a broad spectrum of organization theory: classic (Fayol), modern (Mintzberg) and postmodern (Morgan). Volberda’s theory is a synthesis of several theories based on a contingency framework. It has been chosen because a working diagnosis

instrument based on this theory exists, and its equilibrium concept has an interesting structure.

2. Equilibrium in four organization theories

2.1 Equilibrium as balance between interests: Fayol

Fayol (1916/ 1956) is the inventor of the concept of organization. In his theory, Fayol relates the characteristics of personal behavior to the characteristics of the organization as a whole (Gazendam, 1993: 200-251; 1994). Fayol distinguishes several equilibria. Each of them is related to an aspect of the task of a manager or worker. Furthermore, mechanisms are distinguished to maintain the equilibria. This means that equilibrium is seen as resulting from a dynamic process. It has to be maintained and fluctuations around the equilibrium state are normal. The equilibrium state may temporarily be disturbed, but the equilibrium maintaining mechanisms will restore the equilibrium state after some time. The following equilibria can be identified (numbering of hypotheses according to Gazendam, 1993)

1. the equilibrium between authority and responsibility (Hypothesis 2.2.);
   maintaining mechanisms:
   . rewards and penalties (Hypothesis 2.3.);
   . sanctions for undisciplined behavior (Hypothesis 3.3.);
2. the equilibrium between individual interest and general interest (Hypothesis 6.1.);
   maintaining mechanisms:
   . means for reconciliation of individual interest and general interest (Hypothesis 6.3.);
   . equitable remuneration of personnel (Hypothesis7.1.);
3. the equilibrium between the organization's need for personnel and its personnel resources (Hypothesis 10.4.; Hypothesis 12.2.);
   maintaining mechanism:
   . hiring and firing of personnel; assigning tasks to people;
4. the equilibrium between learning time and productive time (Hypothesis 1.4., Hypothesis 12.1.);
   maintaining mechanism:
   . hiring and firing of personnel; assigning tasks to people.

The maintenance of equilibria is seen as the task of the managers in the organization. Fayol distinguishes the following performance criteria:

- equity;
- stability of personnel;
- initiative;

- unity of personnel.

2.2 Equilibrium as stable configuration: Mintzberg

Mintzberg's (1979) theory of organizations is a synthetic theory using elements from systems theory, decision-making theory, and contingency theory. His theory is built up in four steps that are parts in his book. Mintzberg describes his interpretation frame in the first part of his book. This interpretation frame consists of five coordinating principles, five basic organizational parts, and five (unrelated) theories in the form of systems of flow. In the second part, definitions are given of structure variables. These definitions are stated in terms of the interpretation frame. The third part of the book explains a series of hypotheses relating contingency variables, intermediary variables, and structure variables. In the fourth part of the book, a major hypothesis is added, namely the existence of five stable organizational configurations that are based on the organizational parts and coordinating principles in the interpretation framework. This means that Mintzberg defines one state for each organization, in terms of all relevant variables (contingency variables, intermediary variables, and structure variables). If this state equals one of the stable configurations, the state is, in our terms, an equilibrium state. The maintenance of equilibrium is no explicit topic in Mintzberg's theory. The rules that connect age and size with other variables, however, lead to the implicit conclusion that organizations will gradually shift away from their equilibrium point because of processes of growth and aging, and at some point of time have to jump to another favorable equilibrium point, perhaps by reorganization. Mintzberg's theory has no explicit performance criteria.

2.3 Equilibrium as variety of images: Morgan

Morgan's (1986) organization theory can be seen as a postmodern theory. Using a postmodern approach, one sees an organization as a construct of the human mind, an artifact. Because of that, organizations exist because of the images of organization people have. Stimulating imagination is important for organizations, and metaphors or images can help imagining. For this purpose, Morgan distinguishes eight metaphors for organization: machine, organism, brain, culture, political system, psychic prison, flux and transformation, and instrument of domination. Each metaphor highlights other aspects of organizational life. For further analysis, the metaphors can be grouped into three groups: the machine group, the organism group, and the mind group (Gazendam, 1993: 156). The machine group only contains the machine metaphor. The organism group focuses on the dynamic relationship of organization and environment and contains the organism metaphor and the flux and transformation metaphor. The mind group

contains two subgroups. The first mind subgroup concentrates on the relationship between the minds of persons and the organization as a social construct; it contains the brain metaphor, the culture metaphor, and the psychic prison metaphor. The second mind subgroup focuses on coordination mechanisms and power plays, and encompasses the political system metaphor and the instrument of domination metaphor.

For Morgan, using a single metaphor or image for organization, especially if this is the machine metaphor, is a state that is undesirable. Using different metaphors or images is necessary to understand the complex and paradoxical character of organizational life (Morgan, 1986: 12,13). The state of an organization can be defined in terms of the images used. A desired state is a state in which an adequate variety of images exist. When is a collection of images adequate, that is, when is an organization in an equilibrium state? There are three possibilities:

1. Images have to fit reality. In the equilibrium state, the images used correspond to the observed organizational reality, for instance in terms of the behavior of people (within and outside the organization) cooperating in transactions or work processes, or in terms of symbol structures that express the existence of the organization like contracts, transactions, norms, financial reports and legal documents.
2. Images have to follow fashions. The fashion mechanism has a useful side-effect because it leads to a necessary periodic renewal of the organization (see Gazendam, 1993: 268, for empirical evidence). The equilibrium state corresponds to an adequate rate of renewal of the images used in an organization.
3. Images have to fit in the cultural climate of a society. Images can be seen as an expression of the somewhat fashionable forms of communicative behavior within and between organizations. People in organizations, therefore, create and follow patterns of communicative behavior (part of them expressed as images of organization) in order to remain communicating. In the equilibrium state, the images used in an organization correspond to the norms of communicative behavior in that part of society that is relevant to the organization.

The equilibrium state of an organization is maintained by people within the organization, especially people with leadership capabilities, imagining new organizational forms that are more adequate. Morgan's theory has no explicit performance criteria.

2.4 Equilibrium as match between turbulence and flexibility: Volberda

Volberda's (1992) theory is, like Mintzberg's theory, a synthetic theory based on a contingency framework. Its basic idea is that the flexibility of an organization has to match the turbulence of its environment. Based on this theory, a computer-based flexibility diagnosis system called FARSYS has been developed (Gazendam, Rutges, and Volberda, 1993). The flexibility of an organization is defined as the combination of the changeability of an organizational characteristic and the capabilities of management to change that characteristic. The capability of management to change a characteristic is measured in terms of the variety of the repertoire of available change measures. Three groups of organization characteristics are distinguished: structure, technology and culture. To measure the flexibility in these fields, concepts stemming from various theories are used. The turbulence of the environment is measured in terms of characteristics of materials, products, customers, suppliers, competitors, distribution channels, labor market, financial market, know-how, and government. Turbulence characteristics include complexity, dynamics and predictability. The measurements of flexibility and turbulence result in a 10 by 15 matrix where 10 aspects of turbulence are confronted with 15 aspects of flexibility. For each of these points an optimal score exists. This means that there are 150 equilibrium points to maintain; the ensemble of these equilibrium points forms a grand equilibrium.

Equilibrium has to be maintained by the management function in the organization. Change is based mainly on reorganization. This means a change of the behavior repertoire expressed in strategies, tasks, work procedures, functions, positions, organization units, and so on. It also means changing the underlying technology, structure and culture, wherever changeable, in a more adequate direction. Volberda's theory has no explicit performance criteria.

3. Aspects of the equilibrium concept

3.1 The Definition of Equilibrium

The equilibrium concept in the four theories that have been analyzed ranges from balance through fit to requisite variety, and from static to dynamic. In Fayol's theory, equilibrium is a balance between forces (interests), fluxes (of personnel), and phases (learning time and productive time). The equilibrium is dynamic, it results from forces, fluxes and phases that have to be managed continuously in order to preserve the equilibrium. In Mintzberg's theory, the equilibrium is defined as fit between contingency variables, intermediary variables, and structure variables. The equilibrium

is relatively static; management only has to reorganize occasionally to reach a new equilibrium point. In Morgan's theory, equilibrium is defined as a requisite variety of images. The equilibrium is relatively dynamic; management has to find new images more or less continuously to attain an acceptable rate of learning and renewal in a changing world. The rate of change in the environment has to be matched by the rate of invention of new concepts and images. In Volberda's theory, equilibrium is seen as (1) fit between turbulence and flexibility, and (2) a repertoire of available change measures of requisite variety. Because of this, the equilibrium concept is as well relatively static (at the fit level) as relatively dynamic (at the requisite variety level).

We can conclude that there are (at least) three concepts of equilibrium in organization theory: equilibrium as *balance* between forces, fluxes and phases, equilibrium as *fit* and equilibrium as *requisite variety*. 'Balance' and 'requisite variety' are relatively dynamic equilibrium concepts. These concepts are connected to reasoning about processes that, working together and balancing the effects of each other, maintain a dynamic equilibrium state. This means that, occasionally, an event can lead to a temporary deviation from the equilibrium state, which subsequently will be restored by the processes in the organization. 'Fit' is relatively static and only concerns the organization or system level.

3.2 How is equilibrium related to observables?

The concept of organization is a complex concept because it can be defined in three ways, each of which refers to observable reality in a specific way. An organization can be defined as:

1. a collection of actors (people or machines) and the events they produce in a stable pattern of cooperative relations (work organization);
2. an institution, that is a construct of the human mind expressed in symbol structures (legal and financial documents, norms) that reflect an agreement between people about behavior patterns (defined, for instance, in terms of work procedures, norms and contracts) to apply in a work organization (formal organization);
3. an idea, that is a construct of the human mind that, as metaphor or image, guides cooperative behavior of people (artifact organization).

The distinction between work organization and formal organization that is made here has been proposed by Schmidt (1991). According to Schmidt, formal organization is a -not always congruent- layer on top of the work organization safeguarding the interests of the owner and regulatory bodies (Schmidt, 1991: 103). In this context, formal organization is not to be seen as opposed to informal organization, but as a layer adding symbol structures to patterns of cooperation. The distinction of an organization based on one of these three definitions also implies the distinction of the part of the world that is not belonging to a specific organization (the environment). Dependent on the theory used, the environment is

not in the picture (common in classic theories), handled as a unstructured object (common in modern theories), or handled as a collection or network of other organizations (common in postmodern theories).

If we go back now to our four theories in order to connect them to these organization definitions, we run into problems because Mintzberg and Volberda claim to be based on systems theory, which is an abstract theory. Systems theory has gained a prominent place in organization theory since the 1960s. Systems theory as such only offers an abstract model; whether and how this model is related to observables is strongly dependent on the author taking systems theory as a starting point. Checkland's (1981) soft systems theory, for instance, uses systems theory in a manner compatible with the artifact definition of organization. Mintzberg as well as Volberda seek most observables in the sphere of formal organization, and some in the work organization.

Fayol's theory is a work organization theory. Although reasoning about the organization as a whole takes place, all observables are at the level of the work and communication of individual actors. Secondary sources like documents are never mentioned. Morgan's theory is a typical artifact organization theory. What counts are the images of organization people have.

3.3 How is equilibrium related to performance?

The fact that an organization is in an equilibrium state is often implicitly related to the performance and viability of an organization. If an organization performs badly, it will be deserted by its participants and will not survive. Without performance criteria that follow directly from an organization theory, only the organizational survival can be predicted based on the fact that an organization is in equilibrium. This requires longitudinal research. Whenever a theory offers explicit performance criteria, cross-sectional research can be done. The relation between equilibrium and performance has been discussed in contingency theory as the relation between fit and performance. Contingency theory distinguishes a simple fit model, or criterion-free model, from an extended fit model, or criterion-specific model (Venkatraman, 1989; Schrama, 1991: 28). In the simple fit model, it is assumed that there is one type of organization structure that fits in an environment. Because of that, the organization structure that is predominant in a certain environment is seen as the best one for that environment. In the extended fit model, it is assumed that fit between organization and environment leads to a better performance (Schrama, 1991: 28). Fayol uses four criteria for measuring performance: equity, stability of personnel, initiative, and unity of personnel. In three of the theories that have been discussed (Mintzberg, Morgan, and Volberda), there is no explicit performance criterion. In order to be able to

investigate these theories empirically, it is recommended to develop an extended fit model (Donaldson, 1995: 3). This means that these theories have to be supplemented with explicit assumptions about dimensions of organizational performance.

3.4 Which data structure does the equilibrium concept have?

The data structure of the equilibrium concept can be studied based on a state space model of organization. In order to elaborate the state space concept, we go back to the history of statistical mechanics in the nineteenth century (Cohen and Thirring, 1973; Gazendam, 1973). The aim of statistical mechanics, especially of its founding father Boltzmann, was to explain the macro, thermodynamic, behavior of a physical system in terms of the behavior of its components, namely molecules. In order to be able to do that, Boltzmann developed two ways of describing the system at a microscopic level, namely the mu-space model and the gamma-space model. In the *mu-space* model (Ter Haar, 1966: 41), the state of each component of the system is described separately in a mu-space (also called phase space of the molecule). If there are s independent variables for describing the component, the condition of a component can be expressed in terms of the values of those s variables and the values of their time derivatives. The mu-space of a component is the space determined by the s variables and the s time derivatives of those variables. The collection of mu-spaces of all components of the system is used for deriving the state variables of the system as a whole. One could say that the way of reasoning is bottom-up, from component to system. There is, however, a problem with using the mu-space model. Interactions between components have to be neglected or simplified in order to avoid an overcomplex model. Describing the behavior of a component interacting with all other components would require that you include a model of the system as a whole in each mu-space description. In terms of modeling organizations: if you want to incorporate interactions between actors in organizations in a mu-space type model of organization, you need a model of the organization as a whole inside the model of each actor.

The use of the mu-space model by Boltzmann led to a number of paradoxes, especially the Loschmidt paradox. In order to overcome this paradox, Boltzmann invented a new way of describing a system, namely in terms of a gamma-space. In the *gamma-space* approach (Ter Haar, 1966: 152), it is assumed that the system as a whole can be described by n variables and their time derivatives. In statistical mechanics, each variable expresses the dependency of the system as a whole on one of the state variables of a component. The behavior of a system is derived from reasoning about collections of systems (called ensembles), in which each system has the same relevant state variables but can be in a different state. The

way of reasoning is more or less top-down, namely from the characteristics of a collection of systems to the characteristics of a single system. The difficulty of handling the complexity of interactions between components is avoided by looking at the results of those interactions in a collection of similar systems. The main difficulty of this gamma-space approach is the plausibility of the so-called ergodic hypothesis. This hypothesis states that variables expressing the time development of a system can be predicted based on data expressing the distribution of properties over a large collection (an ensemble) of similar systems at a certain point of time. In other words, an ensemble average is equalized to a time average. In terms of gamma-space models of organizations: you will always have the difficulty of generalizing results of surveys of organizations at a certain point of time to conclusions about the time development of a specific organization.

For the theories of Fayol, Mintzberg and Volberda it is possible to make a state space model that depicts the structure of the equilibrium concept used.

Fayol's theory uses four equilibria for describing the state of each person in an organization. This leads to a mu-space description using eight variables for each organizational actor. Equilibrium of the organization as a whole can be described as a collection of 4*N equilibrium points (N being the number of actors in the organization), four points for each actor. Characteristics of the organization as a whole are derived from the collection of the mu-spaces of actors using several aggregation mechanisms (Gazendam, 1993: 217).

In Mintzberg's theory, an organization is described as a whole using 38 (see Gazendam, 1993: 165-167) relevant variables. This corresponds to a gamma-space approach. The state of an organization can be represented as a point in the gamma-space. In the gamma-space of an organization, five equilibrium points exist corresponding to the five stable configurations. The rules connecting design parameters, contingency factors, and intermediary variables stated by Mintzberg can be seen as stating statistical correlations between variables that hold for large numbers of organizations. This feature also resembles Boltzmann's use of the gamma-space, where he uses an ensemble of points (each point depicting a system) in his statistical reasoning.

Morgan's concept of equilibrium uses a collection of mental maps of persons. The contents of these mental maps are metaphors or images. These structures can be described as graphs. A further mathematical handling of these maps, may include counting the graphs that resemble certain prototypes. This handling might, however, be seen as inadequate for this type of theory that uses mainly qualitative reasoning. Furthermore, there are three possible mappings of the collection of

mental maps that can determine whether a collection of mental maps is adequate, that is, in the desired equilibrium state. Because of the complications resulting from the qualitative nature of the theory and the possible mappings for determining the equilibrium state, using a state space model of organization would lead to information loss. A mu-space model, in which the mu-space variables describe the present variety and the requisite variety of metaphors for each actor would be the best approximation.

In Volberda's theory, the organization is described in terms of a set of combinations of an environmental variable and a flexibility variable. If we define equilibrium is in terms of the distance between the environmentally required flexibility and the actual flexibility, there is only one equilibrium point per variable combination; the distance is zero when in equilibrium. This means that, at first glance, there are n*m (in this case, 10*15= 150) equilibrium points, where n is the number of environmental variables, and m is the number of internal flexibility variables. This would correspond to a state space model consisting of 150 mu-subspaces. The variables in these subspaces, however, are not independent. This means that the mapping of the matrix model on the mu-space model leads to information loss. In fact, there are only 25 variables, and we can also reason in terms of a 25-dimensional gamma-space. Because of the way we have defined equilibrium, there is only one equilibrium point. This mapping to a gamma-space is better than the mu-space mapping. However, the problem with the mapping of the matrix model on the gamma-space model is that the distinction between environmental variables and internal flexibility variable vanishes, so this mapping also leads to some information loss.

From a statistical point of view, the mu-space model may have the advantage that it has the possibility to reason about characteristics of the collection of mu-subspaces. Each subspace can be seen as an instantiation of a more general concept of equilibrium, fit, or stable state. When reasoning about in-depth studies of a relatively small number of organizations, this may have advantages. The other way round, the gamma-space model is more suitable for reasoning about organizations when having a large number of organizations but a relatively small number of variables.

4. Conclusion and research agenda

4.1 Conclusion

Managers and consultants use organization theories as instruments for diagnosis and therapy. Popular organization theories like the discussed theories of Fayol,

Mintzberg, Morgan and Volberda are formulated in a way that is suitable for this task. The concept of equilibrium in its various forms (balance, stable configuration, adequate image variety, match or fit between organization and environment) plays a major role in these diagnosis-oriented theories. When formalizing organization theories or constructing computational models of organization, it is important to be aware of the concept of equilibrium to be able to handle it adequately. Otherwise, one might make the mistake of jumping to the rules (if they exist) or concluding that no rules exist. In handling the equilibrium concept, it is important to find out how it is defined, how it is related to observable reality, how it is related to performance, and which data structure it has. Equilibrium can be defined as *balance*, as *fit*, or as *requisite variety*. The definitions of organization as *work organization, formal organization* or *artifact organization* each imply a specific relation of theory to observables. The association of a performance criterion with the equilibrium concept enables empirical cross-sectional research. Furthermore, it may be important to discover which structure the equilibrium concept has in the theory at hand: a *mu-space model* or a *gamma-space model*. The mu-space model leads to complexity as soon as interaction between actors is included in the model; the gamma space model has problems in explaining and predicting the time development of organizations.

4.2 Current research agenda: current projects related to the development of organization theory

The MAIS (Multi-Actor systems and Information Strategy) research group at the University of Groningen (NL) aims at developing new organization theory based on (1) computational models that relate to empirical data in a well-defined way, and (2) invention of organizational forms based on new information technology. If new organization theory, expressed in concepts and models, wants to be useful in management practice where the diagnosis-therapy type of task is dominant, it has to has to be clear about the equilibrium concept it uses. In order to relate organization theory to management practice in a useful way, the MAIS research projects define their research set-up in terms of the equilibrium concept (to be pragmatic) and in term of multi-actor theory (to contribute to theory).

The three definitions of organization, and the different structures of the equilibrium concept, give rise to different accents in theoretical and empirical research. As an example, let us look at three MAIS research projects.

The *work organization* and the *mu-space structure* is used in multi-actor simulation models of organization. These simulation models in SOAR and Smalltalk aim at developing new organization theory, to be compared with

observations of people in situations of cooperation or conflict (Van den Broek and Gazendam).

The *formal organization* gives rise to theory building in the sphere of organizational semiotics and institutional economics. These theories are formulated in a computational way using a combination of simulation models with semi-formal descriptions of knowledge, belief and intentions (Klos). The simulation models have to be validated against empirical data stemming from observations of negotiation processes and from legal, financial, and other documents. Which equilibrium structure will be used is not yet clear.

The *artifact organization* and a *matrix-space structure* is used in a research project aiming at evaluating the success of information strategies in multi-actor organizations. This project is heavily dependent on the invention of a definition of the concepts 'multi-actor organization' and 'information strategy' that is adequate with respect to present-day's organizational networks and information technology use (Homburg and Gazendam, 1995; Gazendam and Homburg, 1996). The empirical component of the research, however, is based on a in-depth study of the information strategy of several organizations in a way that relates mainly to the formal organization, and only partially to the artifact organization.

4.3 Future research agenda: Equilibrium in multi-actor theory

The MAIS group wants to contribute to multi-actor theory (Gazendam and Jorna, 1993). We consider this theory as an abstract theory of a similar nature as systems theory, emerging from the concepts, problems, and behavior patterns found in multi-actor simulation models of organization. Multi-actor theory, like systems theory, claims to have validity at several levels of observation: the work organization, the formal organization, and the artifact organization. Multi-actor theory can be seen as a competitor of systems theory, stressing other concepts and principles, and thus paying attention to other phenomena. A table of differences is given below.

System concepts and multi-actor concepts compared

Systems Theory	*Multi-Actor Theory*
Command	dialogue
Control	autonomy
Stability	independence
Variety of control measures	variety of actor skills, knowledge and culture
Motivation	legitimacy
Efficiency	interest / cooperation benefit
Effectiveness	interest / cooperation effect
Flexibility	variety of agents, regimes, and opinions
Learning by adjustment	learning by evolution/ selection
Legitimization of governance and management	legitimization of actor autonomy

If multi-actor theory wants to be used in management practice, it has to be clear about its use of the equilibrium concept. This would be the first point that this paper puts on the future research agenda: how is equilibrium is handled in the multi-actor theory? Possible equilibria to consider are, for instance:

- Equilibrium 1 between cooperation and competition based on cooperation benefits and cooperation costs;
- Equilibrium 2 between specialization and general abilities;
- Equilibrium 3 between consensus/ cultural conventions and pluriformity of opinions;
- Equilibrium 4 between individual interest and manager/ organization interest;
- Equilibrium 5 between predetermined coordination and emergent coordination;
- Equilibrium 6 between rational domination and pluralist legitimization.

A second question to put on the future research agenda is how the three definitions of organization distinguished in this paper relate to the time bands distinguished by Newell (1990), and to the multi-actor framework of Carley and Newell (1994).

A third point that needs investigation is an adequate formal description of the concept of equilibrium in organization theories. This might lead to a larger body of organizational knowledge accessible for logic and computation.

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