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3.3 Autonomous Cooperation – A Way to Vitalize Organizations? [5]

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3.3.1 Complexity and dynamics of social systems – the problem of unlocking

In the age of information technology the rising amount and the permanent alteration of information will cause a rise of complexity and dynamics (Hülsmann and Berry 2004). The fast development and spreading of the internet and new communication services are well known examples of these technological changes, which imply new possibilities of interaction for organizations and customers (Pflüger 2002).

In terms of the complexity of a system, not the quantity of elements is decisive but the existence of multiple interrelations between the elements of the system as well as between the system and its environment (Dörner 2001; Malik 2000). According to Dörner (2001), a complex system can be understood as „the existence of many interdependent characteristics in a section of reality [...]“. When this definition is transferred to an example in the field of information technology, the amount of available information based on the innovations in those technologies represent the rising amount of elements in this section of reality.

The term dynamics describes the accelerated variation of the system`s status over time. Here, the internet can be quoted as a technological example: dynamics mean the permanent alteration of available information on the internet. In this case, the elements (pieces of information) themselves

[5] A former version of this paper was presented at the 22nd EGOS Colloquium “Unlocking Organizations“ in 2005.

change and thus the relations between them and other systems (e.g. companies) alter.

This development in turn leads to a higher complexity of the firm's environment. As a result, firms have to cope with this complex information to maintain their capacity of reacting to timely to changing demands. In order to handle complexity and dynamics, there is a need for a flexible adaptation of the system, which is realized through processes belonging to system theory: system openings and system closures.

Processes of system openings (Luhmann 1973) enable the system to communicate with the environment through mutual inter-relations. Thereby the system it sustains the existential exchange process of resources (Staehle 1999; Böse and Schiepek 1989). During these system openings, the system absorbs a part of the environmental complexity (e.g. information) to incorporate necessary resources. In order to avoid the risk of an information overload, system openings have to go along with system closures. This means that the system does not absorb the entire complexity of the environment but only the portion that, in terms of the ability of solving specific problems, corresponds to the system's identity (Luhmann 1994) and ability to handle it. System closure therefore ensures that the system does not absorb more information than needed or than manageable by the system's capacity.

The challenging task of the management, keeping the best possible balance between those system processes, implies a dilemmatic decision-making situation. Since the degree of necessary information to solve specific problems rises along with the increased complexity and dynamics of the environment, the decision maker has to absorb more complexity (information) through system openings, while still possessing the same ability of handling this piece of information. At the same time, the management faces the difficult selection of information in terms of quality and quantity and has to take into account the dynamics of information and the risk of an information overload caused by system closure (e.g. Hülsmann 2005; Gebert and Boerner 1995; Gharajedaghi 1982).

A possible outcome of this dilemmatic situation is a limited ability of decision-making (Hülsmann and Berry 2004). In this state of being caught in its own complexity the organization is called a locked organization. The environmental complexity outgrows the organization's capability of handling it and the immanent lack of information of a decision called the problem of bounded rationality (Simon 1972: a manager cannot have the complete information about his problem of decision) renders the situation suboptimal.

Since the system will then be unable to continue its exchange of vital resources with the environment, the event of locking will have negative effects on the continuity of the organization. The latter will lose its flexibility and will not be able to respond to the requested resources of the environment in time, quality, quantity, or place (e.g. products of the company which are needed by the environment but cannot be provided). In the worst case, a locked system may result in the risk of a collapse of the organization. The notion of a "locked organization" describes a dysfunctional and suboptimal situation with a limited choice of possible decisions (Schreyögg, Sydow and Koch 2003). The adjective "dysfunctional" in this context describes the limited ability of a rational decision-making. The immanent lack of information for a rational decision (the problem of bounded rationality (Simon, 1972: a manager cannot have the complete information about his problem of decision) is connotated with the adjective "suboptimal". This leads to the question of how durable flexibility can be generated and integrated in the organizational structure. For the research of the generation of flexibility the concept of autonomous cooperation is of interest whereas the idea of competence-management may offer a tool to integrate flexibility into the organizational structure.

The aim of this paper is to analyze to which extent autonomous cooperation can provide a tool to unlock organizations. For this purpose, the approach of the competence-based perspective is used to apply the concept of autonomous cooperation to business science and to identify its contributions to a flexibilization of the organization.

In the following, the concept of autonomous cooperation will be analyzed from a competence-based perspective. Section 2 describes autonomous cooperation in its history of development (2.1), its core statements (2.2) and its understanding in business science (2.3) to establish common background knowledge as well as an analytical basis. Section 3 analyzes the role of flexibility from a competence-based perspective to point out its relevancy in this context. For this purpose, the approach of the competence-based perspective is presented in a short introduction of its main statements and the role of flexibility from a competence-based perspective is analyzed. In section 4 the attributes of the concept of autonomous cooperation are combined with their contributions to a flexibilization of the company structure to discuss possible effects of autonomous cooperation on flexibility. A conclusion of the results of the paper can be found in section 5.

3.3.2 The concept of autonomous cooperation

Origins of autonomous cooperation

The concept of autonomous cooperation belongs to the field of complexity science. It deals with the problem of complex and dynamic systems in natural science and analyzes how these systems generate system adaptiveness, robustness, and emergent order. The basic idea derives from the science of self-organization, whose intention is to study, explain, and identify general principles on how complex systems autonomously create ordered structures. This concept was originated in the 70s by separate scientists of different disciplines, e.g. von Foerster (1960) (cybernetics), Prigogine and Glansdorff (1971) (chemistry), Haken (1973) (physics), Maturana and Varela (1980) (biology). After recognizing a common background of the notions complexity and order at the end of the 70s, a basis for a comprehensive interdisciplinary theory was established. Until now this young science is still at a stage of forming and developing. Initial results of different approaches of self-organization have already diffused into other fields of science. The approach of autopoiesis of Maturana and Varela (1980), for instance, appears in different scientific fields, such as sociology with reference to Luhmann's systems theory (Luhmann 1994), as well as in psychology in the area of family therapy (e.g. Hoffmann 1984).

Classification of autonomous cooperation

Before the main statements of the concept of autonomous cooperation are presented, a short classification of the concept and a distinction from similar terms will follow. A clearly defined usage of the notions 'self-management', 'self-organization' and 'autonomous cooperation' has not been established yet. The specifications of the terms could be categorized in the following way.

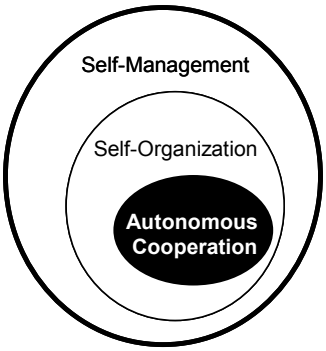

Fig. 3.1 Classification of the terms 'self-management', 'self-organization' and 'autonomous cooperation'

The term self-management comprises the most widespread concept of the mentioned terms. It describes the ability of a system to organize itself autonomously. This means the system determines its own objectives, autonomously chooses its strategies and organizational structure and also raises the necessary resources itself (Manz and Sims 1980). Therefore, a self-managed system is able to design and to vary its own management system. Self-organization as a part of management describes the way of autonomously creating an emergent order. It focuses on the autonomous formation of structures and processes (Bea and Göbel 1999; Probst 1987). Finally, the term autonomous cooperation as the narrowest perspective of the mentioned terms describes processes of decentralized decision-making in heterarchical structures. It presumes interacting elements in non-deterministic systems which possess the capability and possibility to render decisions independently (Hülsmann and Windt 2005).

Main statements of autonomous cooperation

Autonomous cooperation aims at achieving an increased robustness and a positive emergence of the total system resulting from distributed and flexible coping with dynamics and complexity (Hülsmann and Windt 2005). As self-organization and autonomous cooperation have the same scientifical roots, they share the main attributes such as autonomy, interaction, emergences, and non-determinism (Von Foerster 1960; Prigogine and Glansdorff 1971; Haken 1973; Maturana and Varela 1980). Among other attributes the named ones were chosen for an analysis in the following as they feature the characteristic of reflecting the process of self-organization.

Autonomy

A system or an individual is autonomous if its decisions, relations, and interactions are not dependent on external instances and therefore are operationally closed (Probst 1987). However, a complete independence of other systems cannot be assumed (Varela 1979; Malik 2000), as each system only represents a part of a wide-ranging total system which it is to a certain extent dependent on and influenced by. Therefore, we have to speak of a relative autonomy of the individual or the system in relation to certain criteria (Varela 1979; Probst 1987). In the organization these criteria are defined by the given scope of action and decision-making of the autonomous subject. For this reason autonomy manifests itself in the organization as a result of the processes of decentralization and delegation. (Kappler 1992).

Interaction and emergences

The core statement of the concept of self-organization is that open, dynamic and complex systems (natural or social systems) develop a self-organized order within a system (von Foerster 1960; Prigogine and Glansdorff 1971; Maturana and Varela 1980), which is the result of various interactions of the individual system elements (Haken 1987). From this process of interaction new qualitative characteristics of a system arise, namely emergences (Haken 1993). These emergences are not related to individual system components but result from the synergistic effects of the interacting elements. It is not yet clarified how these synergetic effects arise from the interacting elements and how they may be analyzed and explained. According to Haken (1987), the system reaches a new increased level of quality through the emergences as they enable the system to better cope with environmental demands.

Non-determinism

Another feature that can be found in all self-organizing systems is non-determinism. In autonomous, cooperating systems general rules of decision-making are predetermined (Hülsmann and Windt 2005) and the desired final state of the system may be predicted but not the way of how to achieve this. Since the system elements are able to autonomously take decisions, the system behaviour is casually not predetermined and thus not predictable (Haken 1983; Prigogine 1996).

3.3.3 Flexibility out of a competence-based-view

From a system theoretical point of view, flexibility can be seen as a driver for unlocking organizations. Flexibility describes the ability of a system to open its boundaries for required resources (e.g. information) and thereupon to change the system structures according to the demands of its relevant environment if needed. Through processes of system openings the border to the system's environment becomes increasingly indistinct. Therefore, it is all the more important to compensate the degree of flexibility through processes of stabilization (system closure) to maintain the system's identity in the permanent processes of adaptation. Consequently, organizational flexibility is needed to cope with internal and external dynamics and complexity and to avoid the risk of locked organizations.

According to the strategic management, achieving sustainable competitive advantage should be the aim of an organization. The literature of the strategic management argues that there are two essential sources of competitive advantages – one from the market position (market-based view) and one from competencies (competence-based view).

The concept of the competence-based view started with articles and books by Prahalad and Hamel beginning in the late 1980s (Hamel and Prahalad 1989; Prahalad and Hamel 1990; Hamel and Heene 1994; Sanchez et al. 1996). The main statement of the theory of the competence-based view is that companies focus on their competencies to achieve competitive advantages. According to Sanchez et al. (Sanchez and Heene 1996; Sanchez 2004) competences can be understood as „[…] the ability to sustain the coordinated deployment of assets in ways that help a firm achieve its goals." In the theory of the competence-based view a firm is seen as a learning organization that builds and deploys assets, capabilities, and skills to achieve strategic goals (Hamel and Heene 1994).

Flexibility plays an important role in the competence-based management. Representing particular forms of activeness and processes within the organization, competence-building and competence-leveraging go hand in hand with a certain degree of alteration and consequently require organizational flexibility. In strategic management literature, for instance, the work of Sanchez covered the topic of flexibility, which underlines its importance. Sanchez (2004) defined five "modes" of competences, each of which stands for a different kind of flexibility that all respond to changing environmental conditions.

On the one hand, organizations have to develop flexibility to ensure their survival in the long run by adapting to changing environmental de-

mands. But on the other hand, a basic flexibility should be present within the organization's predisposition to enable a continuous competence building and leveraging. Consequently, a dualistic role of organizational flexibility can be identified (Hülsmann and Wycisk 2005), which leads to two basic challenges for management: the basic requirement of flexibility has to be assured while flexibility and stability also have to be balanced (Hülsmann and Wycisk 2005).

3.3.4 The contribution of autonomous cooperation to a flexibilization of social systems from a competence-based perspective

Autonomous decision-making as a tool to cope with complexity

In the context of business science autonomy is characterized by processes of delegation and decentralization (Kappler 1992), which can be understood as the degree of autonomous decision-making among the organization's employees. Therefore, those processes will be analyzed in their effects on flexibility and stability as well as in relation to qualitative, quantitative, temporal and spatial aspects from a competence-based perspective.

Delegation empowers the elements (members) or sub-units of the system to freely develop various patterns of competences and to make autonomous decisions, which are spatially closer to the operational level of work (Mullins 2005). Thus, the system can partially react towards changing environmental demands while the rest of the organizational structure remains unaffected. Moreover, there is a link between the spatial closeness of decision-making and the temporal effect of flexibility in autonomous, cooperating organizations. Ways of decision-making become shorter and easier as information on the level of the sub-units flow faster so that the total system's ability of problem solving quantitatively as well as qualitatively increases.

Through processes of decentralization, the entire complexity of an organization (consisting of the system's as well as the environment's complexity) can be distributed among its diverse sub-units and elements so that a reduction of the quantitative level of complexity can be achieved. These processes may be coupled with an increase of system flexibility. Instead of controlling and focusing on all of the required competences of each individual element and its system interrelations, the organization now merely

has to consider the sub-units in its processes of planning, designing, and developing competences.

However, processes of delegation and decentralization always imply the risks of intransparency and moral hazard as well as autogenous self-organization (Göbel 1998) and intergrouping conflicts (Staehle 1999), which the management needs to consider. Furthermore, it has not yet been ascertained which degree of empowerment proves to be effective and provides the most valuable contribution to a flexibilization.

Interaction as a tool to obtain redundancy and emergences

The interaction processes of autonomous, cooperating systems involve the effect of redundancy. According to the concept of autonomous cooperation, each element or subsystem of the complete system is equipped with the same assets and abilities by nature as shown for example by the individual light waves of Haken's laser light (1983) or the atoms of the dissipative structures of Prigogine (1996). Applied to social systems, it could be assumed that with a high degree of interaction and exchanged information the elements learn about each other's capabilities and know-how through organizational structures, such as job rotation or job enlargement (e.g. Schreyögg 1998; Mullins 2005). With a high degree of autonomous cooperation, each member could undertake every function of the system. This redundancy, which could be understood as a competence of the system itself, feeds the system with flexibility because its employees are able to react flexible wherever needed and even if some members turn out. However, a disadvantage of redundancy could be a lack of expertise within the system. Due to the learning of different functions, the knowledge of the employees is mainly characterized by diversity, which may cause higher costs in case expertise is needed.

Resulting from the interaction of the various system elements, the effect of emergences represents new qualities of the system. From a competence-based perspective, the latter would be defined as a competence arrangement that is characterized by an improved ability to cope with complexity and dynamics and therewith by a better fit of system structure and environmental demands. Through interaction of the system elements, for instance, a bundling of company-specific resources as core competences could evolve (Hamel 1994), which sustain competitive advantages.

Non-determinism as a tool to promote creativity

Based on the ability of autonomous decision-making, the members of an organization initially do not act in a predetermined way. As a result, a wide range of alternatives of action for the system elements is preserved, which assumably involves an increased flexibility of action and thus reaction to sudden environmental demands. By authorizing the system elements to use innovative strategies of problem-solving their creativity will be stimulated so that eventually more effective ways of organizational acting will be generated. This evolutionary process provides a basis for retention (Wolf 2003), which in this case stands for the firm maintenance and stabilization of profitable competences within the system. In Addition, the creativity will amount to context-conditional changes in the competence structure, which from an evolution-theoretic perspective would be conceptualized under the term of variation (Macharzina 2003). The formation of variation patterns bears the opportunity of selection (Wolf 2003), i.e. the opportunity of sorting out ineffectual action alternatives.

However, the organization's way of acting is not completely indetermined. One reason for this is the openness of social systems meaning that they are in a permanent process of exchange (e.g. of information and material) with their surroundings, which goes along with a permanent affection by environmental influences. Another reason can be found in the system's history. According to the theory of path dependencies, a grown system is always predetermined by its formerly made decisions. Thus, an unlimited amount of acting alternatives cannot exist (Schreyögg et al. 2003).

3.3.5 Conclusions

In the previous specifications we described the situation of a locked organization as a suboptimal situation with a limited choice of possible decisions (Schreyögg et al. 2003), meaning that the organization is caught in its own complexity and thus not longer able to make rational decisions. Organizational flexibility was identified as a means to unlock this dilemmatic situation of decision-making (Hülsmann 2005). To obtain organizational flexibility – which may be understood as a competence itself or as a basic requirement of the whole company structure (Hülsmann and Wycisk 2005) – the concept of autonomous cooperation was analyzed to determine the extent of its contribution to a flexibilization of the company from a competence-based perspective. In doing so, several links and starting points for a flexibilization through autonomous cooperation were found.

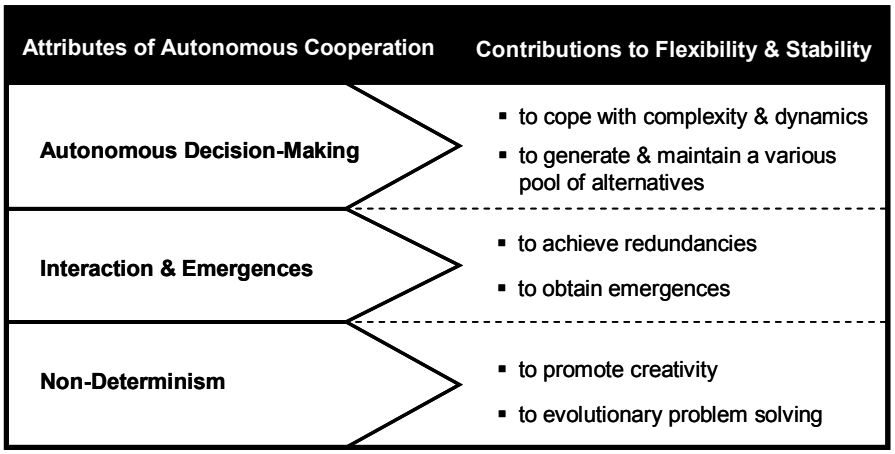

Fig. 3.2 Contributions of the concept of autonomous cooperation to generate organizational flexibility and stability

Since the previous discussion gives a rough insight into possible contributions of the concept of autonomous cooperation to flexibilize a company's structure and processes, further research tasks arise out of a scientific and pragmatic perspective.

From the scientific perspective, the achieved results of this discussion could be regarded as assumptions about the correlation of autonomous cooperation and flexibility within organizations. Unless those assumptions become a status as established statements or even a part of a theory, they need to be examined more detailed in their logical explanatory power. Further the logical statements should be verified in an empirical way, to raise their factual validity (Raffée 1995).

From the pragmatic perspective the concept of autonomous cooperation needs to be more examined regarding its manageability. For a targeted appliance of autonomous cooperation, its measurement, control and steering abilities are necessary. The process of measuring presumes visibility as well as predetermined goals of achievement. One task will therefore be to detail the concept of autonomous cooperation in its constitutive attributes to gain higher visibility. Another research requirement will be to generate a measuring system which is able to quantify the level of autonomous cooperation in a system and to evaluate these results in comparison to the desired achievements. These questions are part of the work of the CRC 637 "Autonomous Cooperating Logistic Processes: A Paradigm Shift and its Limitations".

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