

On the modelling of management decision-making processes in organized anarchy

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The paper discusses the role of the Organized Anarchy paradigm and the Garbage Can Model in strategic decision-making, and extends the idea of Organized Anarchy to the Informed Anarchy with unclear technology of allocation and dissemination of information, incomplete understanding of information, and fluid participation of information in decision processes. An example of the computer simulation is briefly presented, but the discussion in this paper is limited to the relation between the level of organization anarchy, load of problems, formal and informal information systems, and efficiency of decision-making. The models suggest that managers could enrich their decision-making by making their organization function like a net in which they catch "ingredients" needed for strategic planning and efficient decision-makings. Such nets are intelligently employed and motivated members of the organization.

1 Introduction

Information technology management was born in the stable and predictable environment of centralized information systems. The situation has dramatically changed with the explosive growth of the Internet and the appearance of the new economy. Information technology has become a technological basis of new products and services, so it has moved from the background into the core of strategic planning of contemporary organizations.

Strategic management of information technologies is becoming a crucial part of business strategy and is starting to share its uncertainty and chaotic environment. It seems to many managers that development of the new economy is so fast and unpredictable that they cannot control or plan the future of their organizations. For them success is more a coincidence than a result of planning. Others argue that nothing has dramatically changed, but many argue that, as a result of this development, strategic management in general is becoming unacceptably chaotic. Strategic management is, of course, so diverse that it could easily extend to both extremes, but we will focus mostly on its chaotic side. In the focus of the following discussion is strategic management of information technologies, but the majority of challenges and problems are the same for the strategic management in general, so will use more general phrase - strategic management.

Disorder and anarchy are more an appearance than the essence of the new economy and emerging information society [Maram, 2000]. Old paradigms or even dogmas of industrial society prevent us from detecting and understanding certain patterns in the new business landscape. That is why many managers and especially researchers are trying to re-evaluate some of the basic presumptions and to deepen their understanding

of management and business sciences in the light of the new circumstances. The main question is what contemporary managers can learn from computer sciences, from different theories and models of decision-making in a chaotic environment.

In the last thirty years numerous theories and models of decision-making and system behavior were introduced, which attracted the attention of many high-level managers and researchers. Particularly, Chaos Theory [Gleick, 1987], Complexity theory [ex. Lewin 1999] and Organized Anarchy [Cohen, March, Olsen, 1972] have been in the focus of their interest.

The framework of the Chaos Theory is very familiar to managers – complex systems with chaotic behavior, with irregular and hard to predict patterns. The Chaos Theory can in many ways better explain the behavior of the organization than can the classical methods of scientific management [Phelan, 1995]. Besides its philosophical power, the application of the theory in practice is still very limited, concentrating mostly on descriptive suggestions to managers on how to understand the nature of uncertainty, and how to balance between strategic and operational management.

A somewhat different view on complexity is expressed in the Complexity Theory. From the methodological point of view it is an interdisciplinary approach to studying dynamic processes involving the interaction of many actors. Simple sub-systems can produce very complex and hard to predict systems. The Complexity theorists argue that managers should not impose their solutions on organizations but should rather introduce some basic rules and support the creativity of their employees. That would create a synergy of

individual knowledge and increase an organization's ability to produce and detect unpredictable solutions.

The third important model for decision makers is Organized Anarchy. The following discussion is based on the Organized Anarchy paradigm and the Garbage Can Model of Organizational Choice GCM [Cohen, March, Olsen, 1972]. The idea behind this model of decision-making is widely accepted and still relevant for researchers and practitioners. Its power is in its simplicity and its human acceptance as being common sense.

2 Organized and Informed Anarchy

2.1 The Garbage Can Model (GCM)

The classical theory of rational decision-making is based on the presumption that the decision is based on known options, known consequences, defined criteria, and defined decision-making technology. Studies of decision processes in real organization have shown that the theory of rational decision-making is too often far from reality. Research, and especially practice, shows that an organization can work and survive even in situations where decisions are not optimal, not intentional, and not made on time. Cohen, March, and Olsen (1972) argued that the situation in an organization is basically an organized anarchy that they characterized as a decision environment with *problematic preferences*, *unclear decision-making technology* and *fluid participation*. They developed a model for decision-making based on the organized anarchy paradigm (Garbage Can Model of Organizational Choice - GCM).

In the GCM we find the mix of *problems*, *choices opportunities*, *solutions*, and *participants*. The model viewed the choice opportunities as a garbage can into which the members of the organization dropped the various unresolved problems and possible solutions. The authors described the organization as a collection of choices looking for problems, problems or issues looking for decision situations in which they might be aired, situations looking for problems to which they might be the answer, and decision-makers looking for decision-making. In everyday life, solutions discovered by "accident" are as equally good as solutions found through the process of rational decision-making. From the managerial point of view, only the results are important. The model also explained why an organization could work in non-predictable or even chaotic circumstances. An organization can survive only if the "Garbage Can" decision-making process produces enough rational or useful decisions.

Later studies [Padgett, 1980; Carley, 1986; Anderson and Fisher, 1986; Masuch and Lapotin, 1989] improved some aspects of the GCM, adding features of organizational hierarchies and elements of formal decision-making, or else formalized some features of the model [Heitsch, Hinck, Martens, 2000].

2.2 Informed Anarchy

Every decision-making depends on availability of the relevant information that could come from formal information systems or other information sources, including personal contacts. Particularly strategic management depends strongly on information sources that cannot be fully formalized in the organization's information systems. Managers are overloaded with a chaotic mixture of relevant and irrelevant information on the hand, side and the lack of some crucial information on the other. From the information point of view, it definitely makes their planning and decision processes more or less organized anarchy. In the further discussion our interest will be focused on the information side of the organized anarchy and the GCM.

We could extend the idea of Organized Anarchy to include some features of formal and informal information systems, which are only indirectly present in the Cohen, March, and Olsen model. We could call Informed Anarchy a decision-making environment with:

- *Unclear technology of allocation and dissemination* of information (members of the organization do not know where to look for information and how to disseminate it on time);
- *Incomplete understanding* of information (even when members acquire information they could still misunderstand or even deliberately misuse it);
- *Fluid participation of information* in decision-making processes (the information that supports decisions are constantly changing).

An Informed Anarchy paradigm is based on the fact that the unclear technology of allocation, dissemination, and also the faulty understanding of information are prevailing features of strategic management in many organizations. Paraphrasing the GCM, in the model of Informed Anarchy:

- information is looking for decision-making situations;
- decision-making situations are looking for information;
- information could generate decision-making situations;
- participants are looking for information and decision-making situations.

The GCM has explained how Organized Anarchy can produce enough rational decisions for an organization to be able to function and survive. Similar findings should be proved for the Informed Anarchy, which should provide the organization with enough relevant information for decision-making. To build a full-scale realistic model we should implement very complicated relations between decision-making situations, which need information, different sources of information, and knowledge of people involved in decision-making. We could also simplify models to study only selected features. Such a model is presented in the paper.

3 An example of the computer simulation

To illustrate that modeling could be very realistic we shall briefly present a selection of results from the computer model based on the GCM, extended with elements of Informed Anarchy and classical hierarchical organization. The model was developed under research on the object oriented modeling of organization [Bavec 1995]. The organization structure is represented with a colored Petri net and fuzzy logic that reflects informal and ambiguous features of organization hierarchies. The colored Petri net's superior semantic power makes possible a very rich interpretation of organization structure and computer implementation of the discrete simulations. The model describes the complex interplay of different levels of organizational rigidity or anarchy, the workload with incoming problems, the time for decision-making, and the ratio of solved problems.

The discussion in this paper is limited to two examples. The first one (Figure 1) is the relation between *level of organizational anarchy* (probability that the individual will act in accordance with his/her position in the organizational hierarchy), *load of problems* (flow of problems detected by an individual) and *efficiency of decision-making* (ratio of solved problems that were detected). It shows the following:

- Very rigid organization enables decisions in a very broad band of loads (effectiveness of decision-making is just slightly effected by the load of problems), on the other hand, the average efficiency is lower;
- An organization with low rigidity or high anarchy is

very sensitive to loads and is less effective under high loads;

- Under extremely high loads (curve 6) even slight anarchy makes the effectiveness fall sharply (such organizations could function only as a strong hierarchy);
- The model anticipates that under medium loads (curves 4 and 5) strongly hierarchal organization is less efficient, and it is a good managerial policy to allow a certain degree of anarchy (in the GCM sense). But, if anarchy increases over a certain level, the efficiency starts to decrease. Similar results are reported by Masuch and Munter (1989) using the double AISS model. In their empirical research, Collins and Munter (1990) also concluded, that under high loads the range of informal communications is increased.
- The model also anticipates that under low problem loads the efficiency rises constantly (curves 1 and 2). It is difficult to assess how realistic this assumption is in practice, but it indicates that organizations that face a small flow of problems (though they could of course be very serious for the particular organization) should rely on the self-initiative of their members.

It is a well-known fact that a certain degree of intentional or unintentional anarchy in an organization increases its effectiveness. This is the foundation of all contemporary business organizations: Our model however shows also the third dimension – the load of problems, which could dramatically change some intuitive assumption about efficiency.

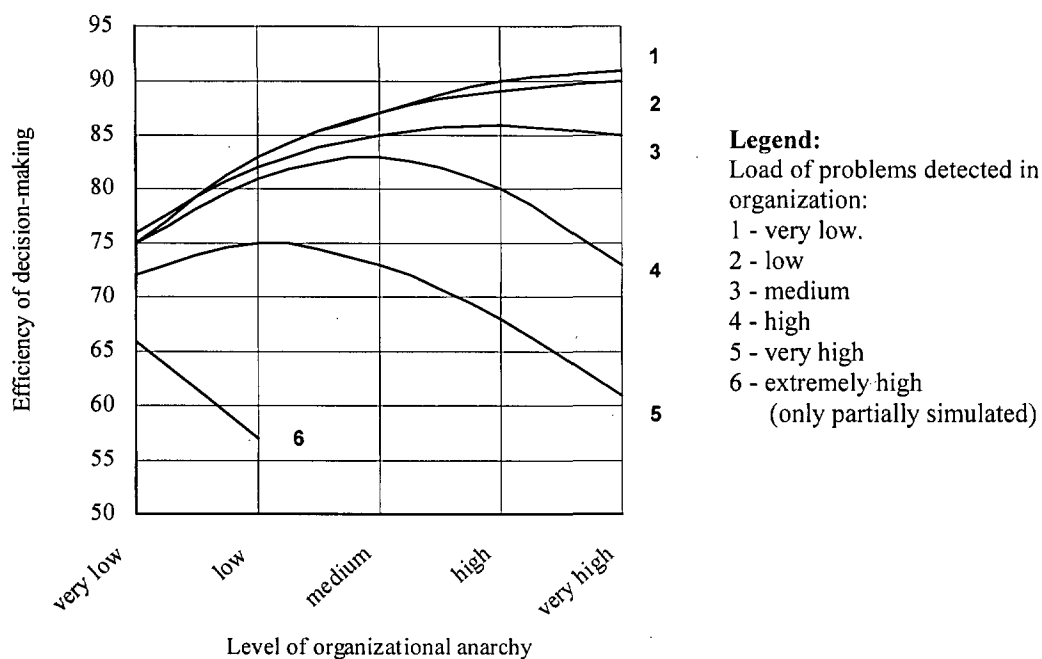


Figure 1: Efficiency of management decision-making of as a function of the level of organizational anarchy and load of problems

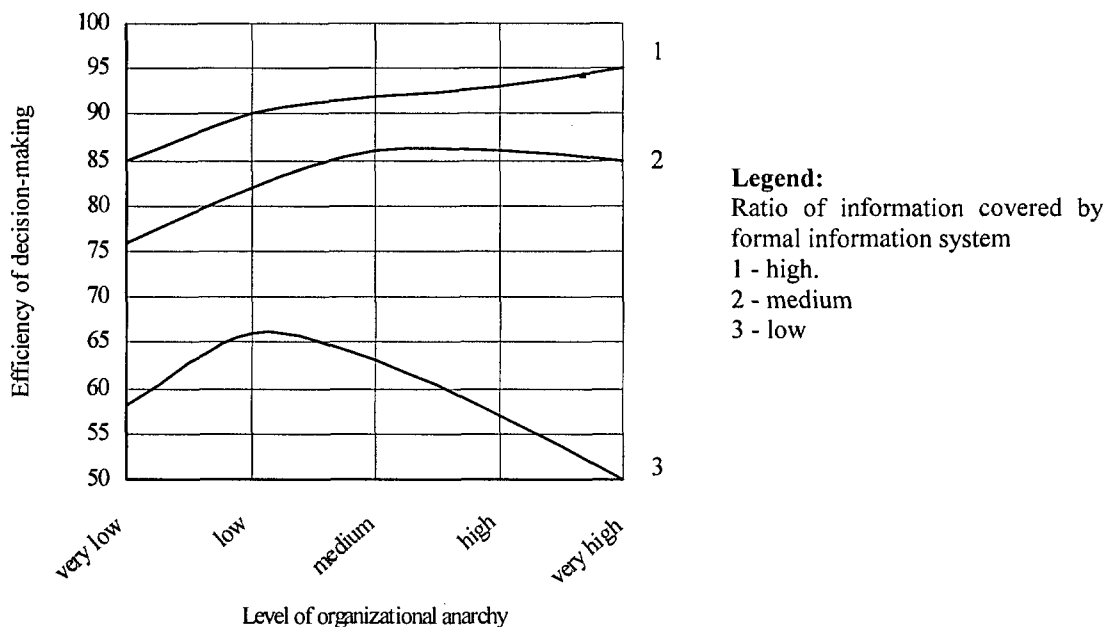


Figure 2: Efficiency of management decision-making of as a function of the level of organizational anarchy and the ratio of information covered by formal information system

Another example (Figure 2) from the same model shows the relation between *level of organizational anarchy*, *ratio of information covered by formal information system* and *efficiency of decision-making*. The new parameter introduced - ratio of information covered by formal information system - presents two different information sources for decision making: formal information systems and informal information sources.

In the model we experimented with statistical probability to get part of information for decision-making through fast and relatively accurate communication channels (from the computerized information systems), and part of information through less accurate and significantly slower channels (from informal information sources like personal contacts). We tried to simulate as realistic situations as possible, including different assumptions for strategic, tactical, and operational decision levels. Results of the simulation show the following:

- The efficiency of decision-making is very sensitive to load of problems in the decision-making environment with high level of informal information resources – at the beginning it increases with the rise of organizational anarchy but, it soon starts to decrease even in moderate organizational anarchy (curve 3). The model predicts that rigid organizations are more efficient in decision-making situations with predominantly non-computerized information systems. From the historic perspective it makes a sense. We are moving into digital economy with total computerization, virtual organizations [Strausak

1998, Mowshowitz 1999, Franke 2001], and ambiguous business environment;

- On the other side, in the situations with higher utilization of the formal information systems the efficiency of decision making is less sensitive to the load of problems (curves 1 and 2). This result could also be, at least intuitively confirmed in real organizations – one of the primary goals of modern information systems is to increase efficiency of decision-making under high pressure of very diverse problems.

The described model also simulate some other parameters in decision-making situations like *time for making decisions*, but the purpose of this brief presentation is just to demonstrate that the computer simulation based on the GCM and the Informed Anarchy, as described in the previous section, can present realistic results that could be confirmed in experience.

4 Discussion

There will be always room for rational decision-making, but contemporary managers should also master other side of the coin – how to manage uncertain and ambiguous situations with a high level of information anarchy. Different theories and models could provide them with an insight into decision-making technology and draw their attention also to new approaches that could be very far from traditional scientific management. This is particularly important for strategic decision-making, which is usually faced with ambiguous and even chaotic situations.

Understanding the nature of decision-making in an ambiguous environment, also gives managers an opportunity to develop new criteria for measuring their effectiveness and, even more importantly, the effectiveness of their organization. The new management paradigms or even doctrines must incorporate new definitions of risk and responsibilities of managers in decision-making. As an example, even now there is a very noticeable difference between managers' attitude in Europe and America toward risk in decision-making.

It cannot be done in a totally chaotic manner, so we need methodologies that are simple enough and useful to managers in everyday life. Many authors [Drucker 1999; Morabito, Sack, Bhate 1999] point to basic differences in traditional and new management approaches and techniques. Nevertheless, strategic management has not yet developed efficient methodologies and recommendations to cope with the extremely fast changing environment of the new economy. Modeling and computer simulations, as ones based on the Chaos Theory, Complexity theory, and particularly the Organized Anarchy, could be one of the useful tools for researchers and practitioners to describe and study new management paradigms, and also to develop new efficiency and benchmarking criteria.

5 Conclusion

The models and theories described imply that information, problems, solutions, and opportunities are around us, and they come and go. The main strategic task of management is to detect and to utilize them. The models suggest that managers could enrich their decision-making processes and raise the quality of organizational decisions to simulate something like fishing with nets. A fisherman is not aiming at a particular fish but rather at the shoal. Similar, management should design the organization to function like a net in which they would catch all "ingredients" needed for strategic planning and efficient decision-making. The elements of such nets are wisely employed and motivated members of the organization that are sharing, on highly organized manner, their experience and knowledge.

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