Autopoietic Organization's Governance Supported by Information Technology

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INTRODUCTION

Recent development in the philosophy of science makes it possible to provide fresh insights into old controversies of organization theory, such as agency vs. structure, voluntarism vs. determinism, and micro vs. macro approaches, and help refine an understanding of explanation. However, in this article, the system thinking approach is accepted as the basis for further consideration of autopoietic organizations. At the core of system thinking is a concept of a whole entity which can adapt and survive, within limits, in a changing environment. The entity consists of interrelated components existing for joint purposes. The synergy effect ensures that the whole entity means more than the sum of its parts.

In the article, organizations are human products, they can act and create effects that would not be possible, if they were merely the disaggregate actions of uncoordinated individuals. Organizations possess identifiable characteristics including particularly purposefulness and direction, stability and configuration, culture and values, goals and functions, that are often believed to be visible, comparable and measurable in the research process. Organizations are seen as interacting relatively freely with its environment much in the same way we think of biological species adapting and interacting with their surroundings in an effort to survive.

The first part of the contribution covers explanation of autopoietic organization meaning for management science, although different interpretations from other sciences are also included. The concept of autopoietic systems, known from domains such as physics, chemistry and biology, has recently gained interest to be applied to technical (i.e., computerized) systems. In the article, autopoietic organization can be defined as the emergence of coherent, global behavior out of the local interactions between components. This emergent organization is characterized by intrinsic autonomy, adaptability to environmental changes, and local awareness of the most important global variables.

The next part of the article will cover analyses of autopoiesis features, i.e., self-managing, self-referring, self-influencing, self-regulating, self-sustaining, self-producing, self-sustaining, self-recognizing, self-consciousness. Self-monitoring is vital for self-organized systems, because it allows the system to have a view on its current use and state. The mentioned above characteristics receive a new interpretation in IT environment, therefore the last part of the article includes analyses of IT solutions enabling the characteristics development. Particularly, the multi-agent technology will be the subject of discussions.

Next, the characteristics of autopoiesis are discussed, i.e., openness, peering, sharing and acting globally. In the article, Internet virtual organizations are presented as examples of autopoietic organizations e.g., Wikipedia. However, generally, social systems such as families, clubs, email discussion groups, informal subcultures within organizations, communities of practices are systems that are autopoietic in the sense that they produce and reproduce information and knowledge, and they interact in such a way that the interactions become bound with the continued autopoiesis of the components. Societies are seen as complex adaptive systems that used internal feedback processes to change their structures to better survive in a turbulent and changing environment. Therefore, the open content repositories are widely discussed as autopoietic organizations. This presentation is supplemented by the reference model of open digital library architecture.

Generally, the main objectives of the article include interpretation of works done by other authors on autopoietic organization for management science and exemplification of autopoietic organization by open content repositories.

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BACKGROUND

Autopoietic System Theory

The idea of autopoietic systems stems from the theory of social systems understood as systems of communication that reproduce all their necessary, specific structures within their own self-referential closed processes (Schumacher, 2011). Therefore, systems of research communications can also be theoreticized as autopoietic systems in the sense that they generate their own components and structures within the ongoing flows of communication.

Autopoiesis is concerned with processes of production of the components which themselves constitute the system. It is essential to identify clearly what are the components of an autopoietic social system and what are its processes of production. For example, Carlsen and Gjersvik (1997) applied an autopoiesis metaphor to analyze possible organizational uses of workflow technology. For them, an autopoietic system can be an information system as a subsystem of social systems that deal only with information and communication inside them. They consider an autopoietic information system as a set of relations between communicative events that reproduce new communicative events based on previous (stored) communication. The organization of the system are the relations between communicative events described through their semantics (meaning). The structure of the system are the means that are used to produce communication described through syntax. Interactional autopoietic information systems emerge and do not depend on previously stored communication, but on current interactions between communicative events.

Luhmann's social systems theory provides a comprehensive theory of modern society on the basis of a general theory of social systems conceived as systems of communications (Luhmann, 1995).

According to Bouncken "autopoiesis is the joint birth of knowledge across actors of the system alliance" (Bouncken, 2008). Autopoiesis is formed by group cognition. Groups can be seen as collective actors with a specific set of mental models that lead to organizational learning. Luhmann adds that systems refer to themselves, they are self-referential (Luhmann, 1995).

Yolles argues that an autopoietic organization fulfills a condition of radical autonomy that defines its own boundaries relative to its environment, develops its own operational codes, implements its unique programmes, and reproduces its own elements in a closed circuit. He explains in his Viable Systems Theory that complex systems involve the consideration of concepts like self-organization (automorphosis), self-regulation (homeostasis), self-production (autopoiesis), self-reference (autopliroforiasis) and self-creation (autogenesis) (Yolles, 2006).

In 1972, Maturana coined the term "Autopoiesis" combining "auto" (Greek self-) and "poiesis " (Greek: creation, production) to name the phenomenon of inner self-reproduction (Thannhuber, 2005). Autopoiesis is the ability of a system to generate its specific constitution – its components (structure) and their interplay (organization) – on its own (Yolles, 1999). Autopoiesis can only be achieved by the unity of the components and their specific organization. Autopoietic systems show a remarkable property in a way that they interact with their environment: on the one hand building blocks and energy (including information) are exchanged with the environment, which characterizes them as open systems; on the other hand any functional mechanisms, the way the system processes, incorporates building blocks and responds to information are totally self–determined and cannot be controlled by interventions from the environment.

Autopoietic System Features

Autopoietic systems are self-producing in a sense that they produce a network of processes that enables them to produce their own components. Autopoietic systems are systems that continually produce or create themselves in closed circular processes of production. They have no other purpose and if the dynamic circularity is interrupted, they disintegrate. In an autopoietic system, the components are designed to interact with each other in such a way as to continually produce and maintain themselves and the relationships between them. The core autopoietic ideas are specified in the three points. These describe a dynamic network of interacting processes of production, contained within and producing a boundary, which is maintained by the preferential interactions of its components. The key notions, especially when considering the extension of autopoiesis to non-physical systems, are the idea of production of components, and the necessity for a boundary constituted by the produced components (Mingers, 2006).