

Title	Learning to be Responsible? A Systems View of the Organization-Environment Relationship
Author(s)	Amanda, Gregory
Citation	
Issue Date	2005-11
Type	Conference Paper
Text version	publisher
URL	<a href="http://hdl.handle.net/10119/3807">http://hdl.handle.net/10119/3807</a>
Rights	2005 JAIST Press
Description	The original publication is available at JAIST Press <a href="http://www.jaist.ac.jp/library/jaist-press/index.html">http://www.jaist.ac.jp/library/jaist-press/index.html</a> , IFSR 2005 : Proceedings of the First World Congress of the International Federation for Systems Research : The New Roles of Systems Sciences For a Knowledge-based Society : Nov. 14-17, 2005, Kobe, Japan, Symposium 2, Session 1 : Creation of Agent-Based Social Systems Sciences Systems Thinking and Applications

# Learning to be Responsible? A Systems View of the Organization-Environment Relationship

Amanda Gregory

Centre for Systems Studies, Hull University Business School, Hull HU6 7RX, United Kingdom

## ABSTRACT

In this paper the issue of whether organizations can learn to become responsible will be addressed. Zadek [1] suggests that organizations 'pass through 5 stages of corporate responsibility: 1. defensive, 2. compliance, 3. managerial, 4. strategic, and 5. civil'. Further, Zadek argues that responsibility cannot be achieved without an external focus, "Beyond just getting their own houses in order, companies need to stay abreast of the public's ideas about corporate roles and responsibilities." [1, p.125]. Whilst Zadek gives apparent validity to his model by citing examples from his work with such global organizations as Nike, the argument will be advanced that the model is too simple to make sense of the complex and dynamic organization-environment relationship.

Using systems theory and the model of autopoiesis as a heuristic device, this paper will seek to address how an organization might come to learn what being responsible implies for it within the context of the on-going relationship between the organization and key stakeholder groups in its environment (including consumers, civil activists and the media). Concepts such as self-production and structural-coupling will be used to demonstrate how an organization's actions may be constrained by the cultural values within its own internal environment and its co-evolution with key stakeholder groups.

**Keywords:** corporate responsibility, autopoiesis, structural coupling, organizational learning, societal learning.

## 1. INTRODUCTION

Humankind is currently committed to perpetuating an economic system populated by business organizations that are serving to undermine the conditions for the preservation of the environment (ecological and social) that sustains it. In this paper the issue of whether organizations can learn to become responsible by balancing the divergent needs of society and ecology on the one hand and business economy on the other will be

addressed. This is an ambitious aim and in order for it to be achieved, it will be necessary to subject a model that is advanced by a key thinker and practitioner in the field of corporate responsibility to critique.

The civil-learning tool, which combines Zadek's work on the stages of corporate learning with the Novo Nordisk stages of issue maturity, will be described. It is claimed that this model can help organizations learn how to position future business strategies in ways that society will embrace. This model will be subjected to critique which will provide the basis for the introduction of ideas relating to systems thinking, in general, and autopoiesis, in particular.

Using systems theory and the model of autopoiesis as a heuristic device, this paper will seek to address how an organization might come to learn what being responsible implies for it within the context of the on-going relationship between the organization and key stakeholder groups in its environment (including consumers, civil activists and the media). Concepts such as self-production and structural-coupling will be used to demonstrate how an organization's actions may be constrained by the cultural values within its own internal environment and its co-evolution with key stakeholder groups.

## 2. ZADEK'S CIVIL-LEARNING TOOL

Zadek has worked with many global organizations helping them to grapple with the complex challenges of responsible business practices. This experience has led to Zadek to argue that "When it comes to developing a sense of corporate responsibility, organizations typically go through five stages as they move along the learning curve." [1, p.127]. Further, Zadek recognises that society's views do not remain static whilst the organization's evolves and this implies that "companies need to stay abreast of the public's evolving ideas about corporate roles and responsibilities. A company's journey through these two dimensions of learning – organizational and societal – invariably leads it to engage in what I call "civil learning"" [1, pp.125-6]. Zadek recognises that organizations learning paths are complex and iterative and this has surely been the case with Nike, the organization with which Zadek seeks to

illustrate his model. Nike's business model was (is?) to market high-end consumer products manufactured in cost-efficient supply chains and in the 1990s it was a prime target for a campaign against the worker conditions in its supply chain. In summary, Zadek illustrates his arguments with reference to the Nike case, thus:

#### *Stage 1: Defensive*

What organizations do: Deny practices, outcomes, or responsibilities

Why they do it: To defend against attacks to their reputation that in the short term could affect sales, recruitment, productivity and the brand

Example: Labour activists in the early 1990s were exerting enormous pressure on premium-brand companies to adopt codes of conduct in their global supply chains. Nike's first reaction was defensive: 'Wait a minute; we've got the best corporate values in the world, so why aren't you yelling at the other folks?' [1, p.128].

#### *Stage 2: Compliance*

What organizations do: Adopt a policy-based compliance approach as a cost of doing business

Why they do it: To mitigate the erosion of economic value in the medium term because of ongoing reputation and litigation risks

Example: Nike responded to activists' demands for labour codes and agreed to external audits to verify whether these codes were being enforced. Nike hired high-profile firms or individuals to conduct the audits but these parties had little auditing experience or credibility.

#### *Stage 3: Managerial*

What organizations do: Embed the societal issue in their core management processes

Why they do it: To mitigate the erosion of economic value in the medium term and to achieve longer-term gains by integrating responsible business practices into their daily operations

Example: In 1996, Nike created its first department specifically responsible for managing its supply chain partners' compliance with labour standards. Further, in 1998, a Corporate Responsibility department was established to audit its suppliers. Revelations about Nike's failure to adhere to its own labour codes led to a review team of senior managers and external parties being established that considered issues at the factory level as symptoms of a larger systemic problem. After six months, it was concluded that the root of the problem was the approach to doing business with Nike's incentives to its procurement teams undermining efforts to comply with its own codes of conduct. The review

team proposed that Nike grade all factories according to their labour conditions and then tax or reward procurement teams based on the grade of the supplier they used.

#### *Stage 4: Strategic*

What organizations do: Integrate the societal issue into their core business strategies

Why they do it: To enhance economic value in the long term and to gain first-mover advantage by aligning strategy and process innovations with the societal issue

Example: In 2004 Nike acquired the value athletic apparel and footwear brand Starter. This acquisition posed a challenge to Nike's corporate responsibility strategy because customers whose prime consideration is price are less responsive to ethical propositions. Nike responded to this challenge by pushing for regulated international labour standards, which would serve to offset any possible competitive disadvantage that might be incurred by going it alone.

#### *Stage 5: Civil*

What organizations do: Promote broad industry participation in corporate responsibility

Why they do it: To enhance long-term economic value by overcoming any first-mover disadvantages and to realize gains through collective action

Example: Nike has been involved in various initiatives designed to bridge corporate responsibility and public policy. For example, in July 2000, CEO Phil Knight attended the launch of the Global Compact, UN Secretary-General Kofi Annan's multistakeholder initiative designed to encourage responsible business practices

In further developing his model, Zadek draws on a scale to measure the maturity of societal issues and the public's expectations around the issues developed by pharmaceutical company Novo Nordisk. In summary, there are four stages of issue maturity:

*Latent* – Activists and NGOs are aware of the issue but there is little evidence and the issue is largely ignored by the business community.

*Emerging* – There is political and media awareness of the issue together with an emerging body of research and leading businesses experiment with approaches to dealing with the issue.

*Consolidating* – Development of voluntary standards and business practices around the issue and litigation causing an increasing awareness of the need for legislation.

*Institutionalized* – Legislation and business norms are established becoming a normal part of a business excellence model.

The civil-learning tool combines in a graphical form the stages of corporate learning on the vertical axis with the stages of issue maturity along the horizontal. As such, Zadek claims that the tool reflects both organizational and societal learning. The aim of the tool is to “help companies see where they and their competitors fall on a particular societal issue. It can help organizations figure out how to develop and position their future business strategies in ways that society will embrace.” [1, p.129]. By way of example, Zadek argues that when an issue is just emerging it can ‘get away with’ defensive actions but the more mature an issue becomes then the further up the learning curve an organization must be to steer clear of risk and take advantage of opportunities.

### 3. CRITIQUE AND DISCUSSION

The fact that Zadek has done much to disseminate ideas about corporate responsibility is beyond dispute. The status of the five stages of learning coupled with the civil-learning tool is somewhat more questionable. Were Zadek merely advancing a descriptive model grounded in his own observations then there would be no problem. But his claim that the civil-learning tool “...can help organizations figure out how to develop and position their future business strategies in was that society will embrace.” [1, p.129] opens his work to critique. The model is problematic because it:

- is based on an outdated managerial view – that managers always put the interests of the organization first and that organizations only act responsibly if it will lead to some kind of competitive advantage. Hence Zadek’s statement that organizations come to develop “a sense of corporate responsibility” [1, p.127] is highly significant:
  - in Zadek’s model organizations are not learning about corporate responsibility, rather they are learning how to adapt their business model to environmental pressures to ensure competitive advantage and financial viability. This is most clearly demonstrated in his rationale for why organizations act as they do at each stage.
  - organizations may, to a certain extent, define their own actions but they do not define whether those actions are responsible. What is responsible action is judged by others hence they must strive to understand how external parties will judge them

(their own internal image that is project to the world and projected back).

- advances the notion of progress along the learning curve but fails to articulate the motivation for that progress:
  - are organizations forced into ever more responsible reactions because of ever more damaging actions on the part of pressure groups? This appears to be the motivation in the first three stages of Zadek’s model (defensive, compliance and managerial stages) but it does not explain the apparent shift to proactivity in the strategic and civil stages. It might be assumed that this proactivity is driven by the organization internalising the values of social responsibility but doesn’t explain how this internalisation has come about.
  - moving along the learning curve is significant although one must question, ‘What happens after stage 5?’. Although Zadek concedes that “Organizations’ learning pathways are complex and iterative” [1, p.126] scant attention is paid to organizations that stick at one particular stage or that move backwards rather than forwards.
- the civil-learning tool seeks to combine the notion of organizational learning with that of issue maturity and in so doing goes some way to incorporating some sense of the organization-environment dynamic. However, this is a relatively simple model that:
  - struggles to incorporate a necessary discussion of factors that drive an organization’s corporate responsibility strategies. Hence such factors are, in earlier stages of the tool, included as environmental actions that cause organizational reactions and, in later stages, the organization being proactive. Are we to assume that this shift is attributable to learning? And if so, how does that learning come about and what drives it?
  - emphasises the organization-environment split without any form of questioning, or boundary critique, about how the internal is differentiated from the external or how the two overlap since members of the organization are also members of society.
- treats resistance to change with the lightest of touches. Zadek cites at least two instances that might be considered as ‘resistance to change’ in his discussion of Nike. For example, when Nike started to look at what was driving system behaviour and frustrating

efforts to comply with its own labour codes, it was found that established procurement and reward systems were acting to circumvent code compliance. However, it was recognised that it was not a simple matter of aligning such systems to ensure that one does not undermine any other as such changes were recognised to bring both commercial and cultural challenges. How Nike addressed these challenges, according to Zadek, was to “offset any first-mover disadvantage by getting both its competitors and suppliers involved.” [1, p.130]. This seems a rather simple approach and one that would easily be seen through by more cynical competitors and consumers.

In summary, Zadek’s civil-learning tool is problematic. In following sections, systems theory and the model of autopoiesis will be used as a heuristic device to address how an organization might come to learn what being responsible implies for it within the context of the on-going relationship between the organization and its environment.

#### 4. AUTOPOIESIS: A SUMMARY

The theory of autopoiesis evolved from Maturana and Varela’s [2] exploration of what distinguishes living systems from non-living and how living systems persist despite changes in structure and components. In order to appreciate the theory of autopoiesis, it is necessary to define a number of key concepts (it should be noted that this is a very simplified view of autopoiesis and interested readers should consult the original accounts referred to):

- *Self-production and self-preservation*  
Maturana and Varela proposed that the fundamental characteristic of living systems is autonomy which is realised through the self-production of the component parts. Indeed, Maturana states “...autonomy in living systems is a feature of self-production...” [3, p.313]. Hence, an autopoietic system is made up of networks of recurring interactions of the production of component parts which enables the distinction of the autopoietic system from its environmental background. In goal terms then, maintenance of the autopoietic processes is the prime objective of the system and all other objectives are subordinate to it. Maturana states “...everything that takes place in an autopoietic system is subordinated to the realization of its autopoiesis...” [3, p.313].
- *Organization and structure*  
Mingers [4] claims that Maturana makes an important distinction between the use of the terms organization and structure. As Mingers has it “...organization is

the relations between components and the necessary properties of the components which characterize or define the unity general as belonging to a particular type of class...Structure, on the other hand, describes the actual components and actual relations of a particular real example of any such entity...” [4, p.163]. By way of illustration, Mingers cites the example of the organization of a car as being “...the necessary relations between components such as steering, brakes, seating, power, etc.” [4, p.163]. Mingers goes on to say that “...the structure can change or be changed without necessarily altering the organization, for example, as the car ages, has new parts, and gets resprayed, it still maintains its identity as a car. Some changes, however, will not be compatible with the maintenance of the organization, e.g., a crash which changes the car to a wreck.” [4, pp.163-164].

- *Structural coupling*  
It has been suggested that there is a tension within the theory of autopoiesis between the notions of self-production and the closure of the system with the coupling of the system to its environment [5]. Notwithstanding this tension, though, the autopoietic model offers much insight into the system:environment split. The autopoietic system interacts with its environment in the acquisition of inputs and the disposal of outputs. So, whilst the autopoietic entity cannot be said to be environmentally determined, the system is not totally closed to its environment either; rather it changes in response to environmental perturbations. The autopoietic system responds to the environment by producing a feasible set of responses from which the environment selects. However, the autopoietic entity is structurally constrained to react to the environment in a manner amenable to the maintenance of its own autopoietic state. Therefore, the autopoietic system is neither determined by its environment nor its internal operations alone, more it is a product of the interaction of the two, hence, it is said that the organization is temporarily structurally coupled to other systems in its environment and through their interaction the two co-evolve. An image which portrays this interlinking of different systems is shown in Figure 1. This image might be enhanced were the dynamic nature of the cogs shifting and turning captured (the shifting would illustrate the temporary nature of the coupling and the turning would show that no one cog (system) is able to move independently without affecting the behaviour of the others and that the behaviour of the whole is a product of their interactions) together with the cogs expanding and contracting in size (this would illustrate how the

cogs (systems) influence and exert pressure on one another). Also, this image is important because it captures the idea of horizontal and the vertical linkages within and between systems.

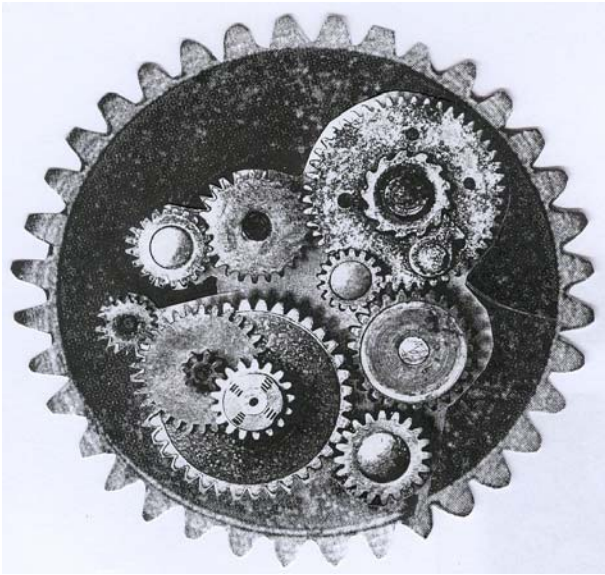


Figure 1. A view of the autopoietic organization

The application of autopoiesis to human-activity systems such as organizations has always been a contentious issue. Maturana has always had reservations about its direct applicability to such systems and a summary review of the literature reveals that theorists have adopted different stances.

Robb [6] articulated the argument that organizations may be said to generate and maintain distinctive cultures by means of autopoietic processes. Others, for example Gomez and Probst [7], claim that organizations are not truly autopoietic on the grounds that the component parts of the system are not physically produced by the organization, but are products of a variant of autopoiesis known as organizational closure. Hence cultural attitudes, norms, and values [following 8, 9, 10] might be regarded as the self-produced component parts of the autopoietic system. Gomez and Probst go on to observe that "...systems of corporate culture...generate their own internal regularities and maintain their organization in a changing environment." [7, p.31 and this very much draws into question the ability to effect change in such systems in response to environmental perturbations

## 5. HOW DOES AUTOPOIESIS HELP US GAIN KNOWLEDGE ABOUT CORPORATE RESPONSIBILITY?

Earlier it was argued that Zadek's model is problematic. Let us now take each of those criticisms in turn and see what light autopoiesis throws on them.

- based on an outdated managerial view
  - in Zadek's model organizations are not learning about corporate responsibility, rather they are learning how to adapt their business model to environmental pressures to ensure competitive advantage and financial viability. This is to adopt a very cynical view of managers but perhaps it is not an unrealistic one since Bird and Waters [11] do talk about there being a 'moral muteness' in organizations. This moral muteness may, perhaps, be attributable to the subjugation of members' personal values to organizational and/or professional values but this situation may well be turned on its head. The faith based company represents a good example of a type of organization strongly orientated toward the perpetuation and realization of members' values. Insight might be gleaned were we to focus on this as a systems problem and focus equally on the alignment of values at the individual (sub-system), organizational (system) and societal (meta-system) levels. If system parts become self-serving, or pathologically autopoietic, through for example their emphasis on their own short term survival even if this has the effect of undermining the wider system of which it is a part, they should not be allowed to survive. This does not, though, imply that more control would be necessary within our organizations and society since, as Beer advises, the only restriction on the autonomy of the parts stem from the requirement that they continue to belong to the whole organisation.
  - organizations may, to a certain extent, define their own actions but whether they also define whether those actions are responsible is an interesting question. It may be argued that what is responsible action is judged by others. Vanderstraeten [5] talks about society's capacity for observing itself and also mechanisms for the observation of one sub-system by another, hence organizations must strive to understand how external parties will judge them through the comparison between the projection of its own internal image with that which is projected back. But this is to deny the organization a capacity for self-awareness –

judging itself whether its actions are responsible. The notion of self-awareness is an interesting one that is clearly related to the notion of moral agency and responsibility. If we are to regard organizations as having a human capacity for certain human faculties such as learning and the legal status of a person then why should we deprive it of a conscience and responsibility for its actions?

- advances the notion of progress along the learning curve
  - are organizations forced into more responsible reactions because of ever more damaging actions on the part of pressure groups or are they being proactive in learning to accept their corporate responsibilities? As Senge states, “All too often, “proactiveness” is reactivity in disguise. If we simply become more aggressive fighting the “enemy out there,” we are reacting – regardless of what we call it.” [12, p.21]. The autopoietic view offers a slightly different perspective on this complex relationship, viewing it not merely as each being responsive to the other in a tit-for-tat way but being structurally-coupled: organizations respond to consumer and citizen pressures in their own way according to the organization’s own internal logic (culture) and, similarly, consumers/citizens respond to the actions of organizations but, again, in their own way. This proviso, in their own way, may be viewed as positive in that it serves to enable systems to maintain an identity despite changes to structure which gives a sense of reliability to all those familiar with the system. An organization may adopt an aggressive drive to act responsibly but this would be a strategy option congruent with its core values (and it would only be with reference to those core values that the ‘why’ for the organizations strategy may be elicited – ethical responsibility or economic advantage). Hence with autopoiesis there is no notion of progress or learning rather systems are structurally coupled and, as such, co-evolve. Any change in one part of the systems impacts on other systems. Hence an organization is not merely trying to predict sector response since, through complex feedback mechanisms, it plays a part in creating that response.
- is based on a simple view of the organization-environment dynamic
  - the civil-learning tool struggles to incorporate a necessary discussion of factors that impinge on an organization’s corporate responsibility strategies.

Hence such factors are either included as an action that drives a reaction or proaction; the apparent shift from reactivity to proactivity is not explained. In the autopoietic view, organizations are rarely, if ever, merely reactive. In autopoietic terms, environmental perturbations, such as consumer/activist demands, would be managed through the development of appropriate strategies and, although many strategic responses may be possible, the system’s present dominant attitudes, norms and values would serve to define which would be regarded as feasible. Chapman has recognised this in stating, “The ways issues are formulated, the terms of reference of committees, the mindsets of the people involved and the network of working relationships between them all serve to keep the existing structures and processes in place.” [13, p.53]. It is important to recognise, though, that these attitudes, norms and values are not static, rather they are in the process of evolving in such a way as to be consistent with past and future attitudes, norms and values.

- Zadek appears to take for granted the notion that the boundary between the organization and its environment is a clear one and consequently there is a failure to engage in any form of questioning, or boundary critique, regarding how the internal is differentiated from the external or how the two overlap since members of the organization are also members of society.
- treats resistance to change with the lightest of touches
  - Zadek does not provide an adequate discussion of resistance to change (on the one hand it may be taken that this is not discussed because it does not occur suggesting an easy responsiveness but on the other it may be that this aspect of organizations may be down-played because, as will be discussed, it introduces questions about the persistence of such organizations). The notion that the autopoietic systems changes ‘in its own way’ may be viewed as signalling the potential for resistance to change. Chapman views this resistance in terms of resilience, thus “Viewed from this perspective the resistance to change exhibited by many organisations is not because of bloody-mindedness on the part of the individuals involved, although that may be a contributing factor. The resistance to change is actually a measure of an organisation’s ability to adapt; it is a measure of its resilience. This resilience is therefore expected to be greater the longer the institution has existed and been required to adapt – which is broadly the case.” [13,

p.53]. Given the resilience of such systems, the important question is whether this is desirable or not. It should not be assumed that all theorists who have argued for the existence of the autopoietic organization are claiming that the existence of such organizations is desirable. According to Beer, quoted by Mingers, "...any cohesive social institution is an autopoietic system – because it survives, because its methods of survival answer the autopoietic criteria, and because it may well change its entire appearance and its apparent purpose in the process." [4, p.172]. This ability to persist despite, as Mingers puts it, "...deliberate and sustained attempts to destroy them..." [4, p.172] surely introduces doubt about whether or not such organizations can be managed or directed. Indeed, Robb declares that, "To those who would see the achievement of autopoietic organization as a desirable objective in organizing, I warn that such an aim may result ultimately in the subordination of all human aspirations and ambitions, values, and welfare to the service of preserving the unity of such systems, and not to any human end. Once formed such organizations appear to be beyond human control, indeed to be real-world systems." [14, p.348].

## 6. CONCLUSIONS

The aim of this paper was to use systems thinking, particularly ideas related to autopoiesis, to develop an understanding of the organization-environment relationship and the issue of whether organizations can learn to be responsible. Zadek's civil-learning tool suggests that environments (consumer and civil groups) serve to teach organizations to be responsible. In the light of Zadek's work one must question, 'Organizations may have been taught but have they learnt?'. Following a summary review of a number of key concepts related to autopoiesis (particularly self-production and structural-coupling), the issue of how this theory can be applied to human activity systems was taken up. The view was advanced that such systems generate and maintain distinctive cultures by means of autopoietic processes. In the light of this view it was further argued that such systems (organizations) may be said to be structurally-coupled to other significant systems (such as consumer and pressure groups) in their environments. Hence from an autopoietic view, organizations do respond to environmental pressures but in their own way and, similarly, consumer and pressure groups respond to the actions of organizations but, again, in their own way. This proviso, 'in their own way', may be viewed as important as it raises the question of whether

it is desirable that organizations should be resilient to external perturbations and pressures.

This paper represents an attempt to use systems thinking, particularly ideas relating to autopoiesis, to develop understanding about the complex and dynamic organization-environment relationship and whether organizations can learn to be responsible. It can be concluded that the autopoietic model throws considerable light on this but this knowledge must be put to use. How we can engender further learning about creating responsible organization and what to do about organizations that resist attempts to mediate their behaviours? These are important given current concerns regarding the effectiveness of legislation, the rights attributed to organizations and increasing rate of environmental degradation.

## REFERENCES

- [1] Zadek, S. (2004) The path to corporate responsibility, *Harvard Business Review*, 82(12).
- [2] Maturana, H.R. and Varela, F.J. (1980) *Autopoiesis and Cognition: The Realization of the Living*, Reidel Publishing Co., Dordrecht, Holland.
- [3] Maturana, H.R. (1975) The organization of the living: a theory of the living organization, *International Journal of Man-Machine Studies*, 7.
- [4] Mingers, J. (1989) An introduction to autopoiesis – implications and applications, *Systems Practice* 2(2).
- [5] Vanderstraeten (2005) System and environment: Notes on the autopoiesis of modern society, *Systems Research and Behavioral Science*, 22(6).
- [6] Robb, F.F. (1989) The limits to human organisation: The emergence of autopoietic systems, in: *Operational Research and the Social Sciences*, edited by M.C. Jackson, P. Keys and S. Cropper, Plenum Press, New York.
- [7] Gomez, P. and Probst, G.J.B. (1989) 'Organizational closure in management: A complementary view to contingency approaches', *Cybernetics and Systems*, 20.
- [8] Ajzen, J. and Fishbein, M. (1977) 'Attitude, behaviour relations: A theoretical analysis and review of the empirical research', *Psychological Bulletin*, 84.
- [9] Hofstede, G. H. (1991) *Cultures and Organisations: Cultures of the Mind*, McGraw Hill, London.
- [10] Schlebe, K. E. (1970) *Beliefs and Values*, Holt Reinhart and Winston, New York.
- [11] Bird, F. and Waters, J. (1989) The moral muteness of managers, *California Management Review*, 32(1).
- [12] Senge, P.M. (1990) *The Fifth Discipline: The Art and Practice of the Learning Organization*, Century Business, London.



[13] Chapman, J. (2004) *System failure: Why governments must learn to think differently*, 2nd Ed., Demos, London.

[14] Robb, F.F. (1989) The application of autopoiesis to social organization – A comment on John Mingers’ “An introduction to autopoiesis – implications and applications”, *Systems Practice* 2(3).