

UNDERSTANDING ORGANISATIONS: THE DOMINANCE OF SYSTEMS THEORY

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ABSTRACT

Systems theory has served us well and will continue to provide managers and students of organisations with metaphors, terminology and explanations about how organisations function. Systems theory has, in fact, dominated as a framework for managerial behaviour and organisational analysis. However, there are some emerging theories and perspectives that are starting to challenge some of the tenets of the dominant systems principles.

The purpose of this paper is to identify the dominating aspects of systems theory as it applies to work organisations and then explore some emerging theories that provide new and somewhat competing explanations about the nature of organisations. While these emerging explanations are referred to as complexity and chaos theories, they can be viewed in the context of evolutionary system theories.

INTRODUCTION

Our basic assumptions about organisations, their strategies, structures and processes can influence our behaviour towards work. If those assumptions are overly rigid, then we may have arrived at a static position in our learning. Theoretically, the process of learning ends when there is no more to be learnt. Although this appears to be an impossibility, our assumptions can lock us into a very rigid view of the world that restricts us to a form of learning in which the only novelty that occurs is within the confines of our current assumptions, values and perspectives. This form of learning, where we attempt to detect and correct errors within set parameters, is referred to as single-loop learning (Argyris and Schon 1978).

If, for some reason, we are unable or unwilling to change our basic assumptions, then we have adopted a destination mentality where the end-point is clearly defined and all we are concerned with is arriving at the predetermined situation, or with achieving a predetermined goal. On the other hand, if we are able and willing to extend and change our assumptions, then we can develop a journey mentality where the search and the ride are important and destinations are defined and redefined as they come and go. At the moment, the management literature is somewhat dominated by an end-point mentality due to the dominance of systems theory in the language and prescriptions on how to manage organisations.

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The paper is structured in terms of a number of topics. First, Scott's (1992) classification of theories of organisations in terms of rational, natural and open systems is discussed. This is important because it demonstrates that many of the significant theories can be explained in systems terms. Second, the dominant features of organisations as systems are identified. Third, chaos theory and complexity theory are introduced as emerging evolutionary system theories that offer new ways to explain organisational behaviour. These emerging explanations change our existing use of systems language and challenge some of our basic beliefs. Finally, some implications of these trends are identified for managers to grapple with.

CLASSIFYING ORGANISATION THEORIES IN TERMS OF SYSTEMS

Various authors have attempted to classify theories about organisations. To some authors, organisations are either influenced and dominated by environmental forces, or are autonomous units in control of their own destiny (Van de Ven and Astley 1981). Morgan (1986) provides another classification schema. He uses a range of metaphors to differentiate different types of theories and explanations. Organisations are described in terms of machines, organisms, psychic prisons, brains, cultures and political systems. These metaphors are identified by the consistent themes apparent in different theories and models about the nature of organisations.

Alternatively, Pfeffer (1982) maintained that a critical dimension, in terms of distinguishing among theories of organisations, is the perspective on action that has been adopted by the various authors, either implicitly or explicitly. He identified three perspectives based on action. First, action is seen as purposeful, intentional, rational, prospective and goal directed. Second, action is seen as externally constrained or situationally determined. Third, action is seen as being somewhat more random and dependent on emergent, unfolding processes. The first set of theories classifying action as rational dominates, and underpins much of the current prescriptions for managerial behaviour.

To the author's knowledge, Scott (1992) is the only author to classify organisation theories in terms of the language of systems. He classified the major theories and models as either rational, natural or open system perspectives. These three classifications provided a basis for identifying different assumptions that various authors imply about the nature of organisations.

The rational systems perspective focuses on structure as a significant tool for the efficient achievement of organisational goals. It emphasises the role of management in deciding such structures and determining the specific goals that are to be achieved. Hence, the focus is on formal structures, the specificity of goals, and the formalisation of rules and roles. Under the rational systems perspective, organisations are entities without people and the emphasis is on

control (Bennis 1959, cited in Scott 1992). This is in sharp contrast to other perspectives that recognise the social aspects of organisations. These theories align somewhat with Morgan's (1986) metaphor of the machine as implied in the definition of organisations as "... collectivities oriented to the pursuit of relatively specific goals and exhibiting relatively highly formalised social structures" (Scott, 1992, p23).

The natural systems perspective places more emphasis on informal structures and goal complexity. This perspective is concerned with the behavioural aspects of the organisation and how participants act within the context of organisational rules and structures. Goal complexity recognises that goals can be pluralistic, rather than unitary and that a variety of interests are represented in the organisational context. Within this perspective, organisations tend to evolve and adapt, rather than emerge as a consequence of rational planning and design.

The natural systems perspective is reinforced by Bennis' (1959, cited in Scott 1992) view of organisations as groups of people pursuing their interests within an organisational context. It also relies heavily on a functional analysis of organisations. Functional analysis recognises that systems have needs and those needs can be met by analysing the functions that are required to be performed through the development of structure, roles and rules. Hence, functional analysis highlights the means to achieving the needs of the various systems and sub-systems. Under this category, organisations are "... collectivities whose participants share a common interest in the survival of the system and who engage in collective activities, informally structured, to secure this end" (Scott 1992, p. 25).

While it is also concerned with structure, the open systems perspective emphasises processes more than structure. Open systems theory posits that organisations are affected by a number of factors that occur in the external environment and that they can have an effect on factors that exist in the internal environment (Burnes 1996). The open systems perspective accepts the complexity and the variability of the parts involved in a system's structure, both at the individual and group level of operation.

This perspective is concerned with the looseness of connections, rather than the tightness of connections that is promoted by a rational system description. There is a blurring of boundaries between various systems, particularly between the organisation and its environment. The organisation, under this perspective, is seen to be "... systems of interdependent activities linking shifting coalitions of participants; the systems are embedded in — dependent on continuing exchanges with and constituted by — the environments in which they operate" (Scott 1992, p. 25).

The point of referring to Scott's work is that most of the recognised theories concerning organisations can be portrayed in systems terms, either with a rational, natural or open systems bias. This illustrates the extent to which general systems theory infiltrates the study of organisations. It also illustrates the dominance of the language of systems in describing organisations.

DESCRIBING ORGANISATIONS AS SYSTEMS

Organisations are regularly described in systems terminology. Such descriptions have become an important aspect of explaining the nature of organisations and how they function. As well, these descriptions provide a common language for discussing issues relating to how

to manage them more effectively. Robbins and Barnwell (1998) point out that describing organisations as systems provides insights into their make-up. For example, Harvey and Brown (1992) use systems terminology to describe a dynamic model of organisational change. Systems theory is an abstract model for better understanding the nature of the world (Bechtold 1997). What are the main features of such descriptions?

First, organisations are comprised of a set of interdependent parts, or sub-systems, that interact with each other to form a unified whole that gives the organisation its unique identity. The organisation is seen as being capable of making changes to these sub-systems, although it is recognised that this is not a simple process. From the presence of these interdependent parts, the organisation develops configuration and structure. The sub-systems can form into a hierarchy of systems. For example, organisations are made up of individuals at the micro level. Individuals work within the context of groups at another level. The organisation is also seen as a sub-system of a larger macro system, which may be identified as a larger organisation, industry, society or economic zone.

Another way of illustrating the hierarchy within systems was presented by Kenneth Boulding (1956). Within nonliving systems, three levels are identified: static structures, simple dynamic structures such as clocks, and cybernetic systems with thermostats or equivalent acting as feedback and control loops. Within living systems, six levels are identified through various examples:

- ❑ cells which are open systems with a self-maintaining structure;
- ❑ plants which are living organisms with low information processing capability;
- ❑ animals with greater information processing capability;
- ❑ humans with a developed sense of intelligence and self-consciousness;
- ❑ social systems with the complexities of collective behaviour; and finally,
- ❑ transcendental systems which are currently unknown.

Second, human organisations are normally described as open systems. While organisations gain their identity from the boundaries that differentiate them from their context, their alliances and their competitors, organisational boundaries are permeable. Organisations are living systems based on networks of stakeholders bound together for a range of reasons. Such networks develop on the basis of the interactions that occur within the defining boundaries. But more importantly, the networks that represent the organisation prosper on the quality of the interactions that occur across the boundaries. Closed systems, such as clocks, have their boundaries clearly defined and are internally self-sustaining and self-regulating until the internal energy supply runs out. In the case of the clock, unless somebody intervenes and rewinds the spring, it stops indefinitely.

As open systems, human organisations are capable of negative entropy. Entropy refers to the natural capacity for a system to fall into decline and decay over time. It can indicate the relative degree of disorganisation or disorder in the system or the potential for it. Negative entropy is "... the ability of open systems to bring in new energy in the form of inputs and feedback from the environment in order to delay or arrest entropy, the decaying process" (Bartol and Martin 1991, p. 66).

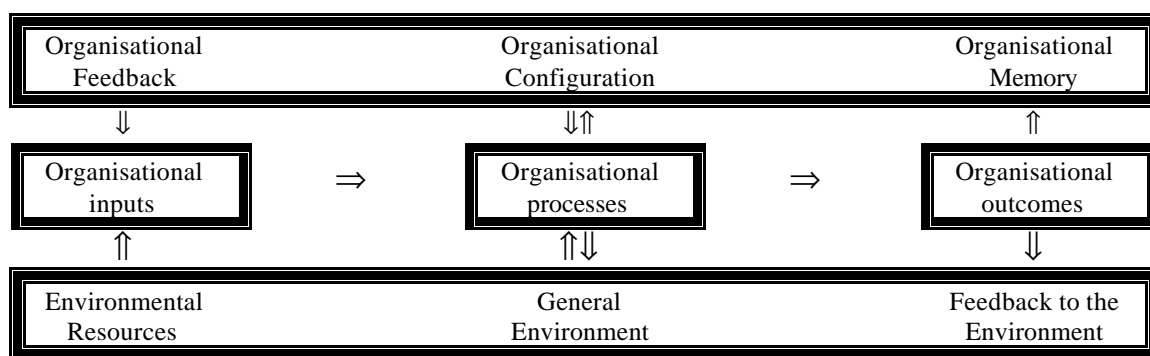
Open systems are subject to differentiation, a process that divides up the system into more and specialised sub-systems in order to deal with increasing complexity. As organisations

grow, they become more complex and more differentiated. The difficulty with this process of differentiation is that the organisation needs to remain connected across its sub-systems so that the corporate identity and culture of the whole system is sustained. The process of integration runs parallel to the process of differentiation. Integration represents the action of parts and the whole to work together in order to achieve synergies. Synergy represents the ability of an organisation to achieve more than the total achievements of the parts.

There is one final aspect of open systems worth noting. A closed system perspective, particularly that applied to nonliving systems by engineers, would suggest that there is a one best way to solve a problem in terms of cause-effect relationships. With respect to open social systems, the concept of equifinality indicates that a manager can use various methods and resources to achieve a desired outcome.

Third, and finally, organisations are regularly described as transforming systems. They are generally depicted as a dynamic entity where inputs are converted to desired outcomes by processes specifically developed for the conversion or transformation. Figure 1 is a common representation of this transforming process.

Figure 1:
Organisations as Transforming Systems



The organisation is initially presented as a linear production process where inputs are converted to outputs. But this model of an organisation is expanded to include the elements of a cybernetic loop where feedback provides the basic ingredients for control. Organisational outputs and outcomes generate products, services, information and other resources in order to transact with the environment. They also provide performance information necessary to sustaining the organisation through the development of the organisational memory or knowledge base.

Organisational inputs draw on resources from the general environment, as well as feedback from the organisation about production requirements and client needs. The feedback loops are central control mechanisms for maintaining a balance between order and chaos. The organisational production processes, to some extent, imitate the technologies available in the general environment. The production processes also are governed by the particular organisational configuration that is operating. The organisational configuration relates to structure, systems, strategies, style and culture.

The arrows in the figure represent the flow of energy and activity in and around the organisation. They represent the dynamic nature of the system. The feedback loops within

and external to the organisation represent the learning that occurs at the system level. Organisations as social transforming systems engage in single-loop and double-loop learning (Argyris & Schon 1978). Single loop learning is a process of detecting and correcting production errors in accordance with the rules of the existing organisational configuration and memory. Double-loop learning occurs when the very nature and composition of the organisational configuration and memory is under challenge and the subject of learning. Management's role is to use the configuration and organisational memory to regulate the system to get the results required.

An important aspect of organisations as transforming systems is achieving a state of equilibrium which is a "... state of balance between opposing forces or actions. (Equilibrium)... represents a state of adjustment between opposing or divergent influences or elements, or homeostasis. It can also be the normal state of existence of a system in its environment" (Smith 1982, p. 42). An example of equilibrium would be a point in time when the supply and demand for certain products produced by a manufacturing company is matched. Supply and demand represent diverse forces that managers attempt to balance. They allocate resources to manipulate demand and improve their ability to match demand at any level. Information systems are critical to managing the conditions for achieving equilibrium. They act as central elements of a cybernetic control loop.

In this section, the main features of systems theory are identified in terms of how they are used to describe the nature of organisations. First, organisations constitute a complete system made up of interdependent parts. Second, organisations are open systems distinguishable from their environment. Third, organisations are transforming systems that produce goods and services based on conditions of equilibrium and are managed by cybernetic control loops.

NEW DEVELOPMENTS IN SYSTEMS THEORY

Two particular perspectives have emerged in recent years that have started to shed new light on the way we manage organisations. The science of dynamic non-linear systems, or chaos theory, is a recent development in mathematics where quite simple equations can model complex and chaotic behaviour. The Butterfly effect describes one of its central features through the example of how a butterfly flapping its wings in Mexico can cause a storm in China. This reflects sensitive dependence on initial conditions; in other words, small changes can have large consequences.

The second perspective is complexity science. This relates to the study of the dynamics of "complex networks of adaptive agents" (Shaw 1997, p. 235). In the case of social organisations, this involves a diverse and wide range of agents as stakeholders. A complex adaptive systems perspective stimulates a different way of looking at organisational change because it "... shifts consultants' attention away from planned change to the 'messy' processes of self-organisation that produce unpredictable emergent change" (Shaw 1997, p. 235).

The two perspectives of chaos theory and complexity theory extend the boundaries of normal systems theory that has been described in the previous section and has dominated in the description and analysis of managerial behaviour for much of the latter part of the 20th century. The two perspectives offer different insights and emerge as exciting new

evolutionary system explanations on the nature and development of organisations. The following identifies two central and differentiating features of these perspectives.

a) Linear versus non-linear systems

Chaos theory is "... the proposition that systems are neither simply open or closed, but so complex that minute changes to the system can cause complex and unpredictable change" (Smither, Houston & McIntire 1996, p. 471). Chaos theory recognises that organisations are non-linear systems. This is also reinforced by complexity science. In Western society, the dominant way of thinking about cause and effect relationships is linear and unidirectional (Stacey 1993). Organisational analysts look for a direct causality between dependent and independent variables. However, if we view organisations as non-linear systems, it presents a problem for predicability because multiple forces are engaged in a dynamic where they have mutual and reciprocal influences on each other.

According to these evolutionary system perspectives, organisations do not achieve success because of their ability to predict and create planned strategies. They achieve success because of their ability to constantly realign with the environment (Burnes 1996). Under these conditions, strategies emerge as behavioural patterns over time. Chaos theory suggests that we cannot predict what will occur in an organisation's environment because small errors in our predictions can have a snowball effect, thereby having a great impact on the accuracy of our predictions (Smolowitz 1996). Put simply, if one of our predictions is incorrect then the strategy that we adopted based on the prediction may not be suitable.

This is contrary to mainstream organisational analysis. Under the dominant logic of Newtonian calculus, small errors of calculation result in small errors in prediction (Stacey 1996a). Here, little importance is attached to non-linearity where the "... possibility that one event may lead to a more-than-proportional response in terms of the next event" (Stacey 1993, p. 128). Mainstream organisational analysis is still focussed on linear cause-and-effect relationships with organisational performance and job satisfaction being key dependent variables.

We need to re-appraise our approaches to strategic planning and planned organisational change. Such approaches adopt what Collins (1998) refers to as N-step guides for change. Hence, "... we should not assume, therefore, that the various problems associated with 'defining' and 'diagnosing' change can be overcome by mechanistic methods which show no sympathy for the diverse drives, orientations, ambitions and yes, the fears of people" (Collins, 1998, p. 98).

b) Dynamic equilibrium versus far-from-equilibrium

If an organisation is not changing it is not because it is in a state of equilibrium, but because it is not responding to changes in the environment (Smither et al 1996). This view points out the constancy of change. However, the dynamic equilibrium model is fundamental to general systems theory. Dynamic equilibrium is a state of balance between various forces in opposition to each other. While the emphasis is on reaching a state of equilibrium, there is an ongoing dynamic between the forces for change and the forces opposing change.

In change management theory, Kurt Lewin's (1951) model of unfreezing, changing and refreezing an organisation is based on a dynamic equilibrium perspective. Change is about moving the system from one state of equilibrium to another. When equilibrium is disturbed, the forces for and against change move the system to another point of balance. However, under a complex adaptive systems perspective, it no longer makes sense to attempt to refreeze an organisation to a new state of equilibrium, stability and rigidity (Dawson 1994). Indeed, vision statements, long term plans and strategies may stifle organisational success if they are not flexible enough to allow an organisation to continually adapt (Crossan, White, Lane and Klus 1996). Change management is about facilitating changeability, rather than change (Michaels 1994).

The concept of organisations constantly seeking a state of dynamic equilibrium is coming under increasing scrutiny and an alternate view of a far-from-equilibrium paradigm is being put forward by Stacey (1993) who refers to the studies of Miller (1990) and Pascale (1990) which "... point to the conclusions that: continuing movement towards equilibrium is failure; success requires the maintenance of a position away from equilibrium; contradiction between stability and instability, between tight and flexible controls, between centralised and decentralised structures, are all essential to success" (p. 106). Success, in these terms, is operating in a position of far-from-equilibrium and at the edge of chaos so that the competence of dynamic organisational systems develops from tensions and contradictions, rather than from harmony and stability. Organisations need to develop their skills relevant to a far-from-equilibrium state.

In far-from-equilibrium conditions, self-organisation becomes a significant alternative to the control-oriented behaviour of management. The failures that have accumulated from attempts at organisational change are related to the fundamental, but misplaced, belief in the organisation as machine (Wheatley & Kellner 1996). The interventions and control systems used by change agents are straining under the dynamic conditions imposed by the global marketplace. On the other hand, "... self-organising systems have what all leaders crave: the capacity to respond continuously to change. In these systems, change is the organising force, not a problematic intrusion. Structures and solutions are temporary" (Wheatley & Kellner 1996, p. 19).

Self-organisation is the spontaneous development of networks of people around specific issues and these networks generally operate on the shadow or informal side of the organisation, somewhat in tension with the legitimate management system (Stacey 1996b). The need for self-organising is evident in unstable conditions and this raises the issue of the sort of leadership skills necessary to stimulate and facilitate such processes.

In this section, we have introduced some fundamental concepts about two evolutionary systems perspectives that suggest a need to re-think our approaches to strategic management. In particular, what are the implications for leaders?

IMPLICATIONS FOR MANAGEMENT

This paper has pointed to the dominance of the general systems paradigm. It has suggested that the field of organisation theory has yet to present change managers with explanations that account for the more pressing concerns regarding the dynamics of organisations today. From the emerging perspectives of chaos theory and complexity theory, a number of issues

have been raised for managers. First, how do we manage non-linear systems? Second, how do we manage in conditions that are far-from-equilibrium?

Bob Spencer (1995) offers some clues. The implication of sensitive dependence is that the future is unknowable. Consequently, strategic planning and the creation of visions to take the organisation into the future, is questionable and dangerous. It could be more by sheer chance that some companies succeed in fulfilling their long term plans. A structural adjustment from a functional to process emphasis moves the stable/unstable borders with consequences for the organisation's capability for self development. Although this switch is not necessarily undesirable, it merely points out that there will be long term consequences in the trade off between functional and customer boundaries.

The balance between negative and positive feedback is critical for organisations because this affects the way change and continuity are influenced. The processes of double and single loop learning need to be consciously addressed so that the business changes with the times, on the one hand, and integrates its identity as a strange attractor on the other hand. A strange attractor is another of the abstract terms that has arisen out of the language of chaos theory.

For a layperson, the abstract notion of strange attractors can be difficult to grasp. While systems such as the flow of fluids appear to be chaotic and random, scientists have discovered that they work according to an underlying logic. On the surface, each particle of the flow of fluids appears to behave randomly. However, on closer observation, the flow conforms to a pattern. The identity, history and sense of purpose of an organisation acts as a strange attractor or underlying logic by defining the organisation's boundaries and guiding its development (Bechtold 1997). The implication is that identity needs to be a central focus of change management approaches. However, managing identity is not a simple issue as Svyantek and DeShon (1993) indicate that the failure of change management efforts is strongly linked to the inability of management to influence the deep seated values of the prevailing organisational culture.

Businesses are managed through a series of performance indicators, such as sales ratios and quality defect numbers. The strange attractors in business will not be discovered through such indicators, since they do not attempt to bring the whole system to a single point over time (Spencer 1995). These sorts of issues point to the need for change professionals to have a basic grounding in business physics, otherwise changes will be introduced which may have short term gains, but disastrous consequences for the long term. Business physics illustrates the need for managers to become scientists of their own organisations. At the very least, they should develop a language about organisations that is the basis for individual and organisational learning. And it is organisational learning and knowledge management that is at the heart of managing organisations at the edge of chaos.

Hutchison's (1994) quote about the assumptions and beliefs that frame our managerial actions provides a significant way to conclude this paper:

Conventional thinking passes on the notion of ideal states, static equilibrium systems, and linear dynamics and continuous functions as if everything worth knowing about science had been discovered. The implication is that if students learn this catechism, then real cases can be addressed by approximation to the ideal. The fact is, of course, that physical systems are real, not ideal, and many of the most interesting systems are

discontinuous rather than continuous, nonlinear rather than linear, and dynamic as well as static. In addition, the maxim that reality is only a mild departure from the ideal isn't the case (p. 71).

Systems theory is still a fundamental part of our language and means of organisational analysis. There is no suggestion that general systems theory be abandoned as a conceptual framework for making sense of our actions. However, there is no denying that the emerging theories and explanations provide a new era for moving us forward if we are prepared to embrace what chaos and complexity might offer to managers and leaders for making sense of a future that is unknowable.

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