Chapter 9
Cybernetics Principles in the Management of Intelligent Organizations

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ABSTRACT

Against the background that mechanical principles were applied in management leading to bureaucracy, an application of cybernetics principles in management would imply (1) a behaviouralist approach to organisations, (2) teleology: reintroducing the notion of purpose, (3) managing complexity, (4) systems thinking, (5) managing as building intelligence, (6) managing as integrating knowledge domains. This overcomes the rigidity embedded in bureaucracy where organizations sought stability and equilibrium and operated in a relatively stable environment for a dynamic and integrative approach to organisations which are not closed stable entities but dynamic open systems. Organisations built on cybernetics principles are agile and continuously respond to their environment through information processing and feedback loops. In this context, there is a paradigm shift from top down management processes linked with hierarchy to cross-functional, flexible, adaptable, and open to learning management principles based on knowledge networks. Alternatives to bureaucracy can be suggested in terms of flat, inverted pyramids, matrix, networked and virtual organisational structures which may stipulate a change from Michael Porter's normative approach to strategic management to Mintzberg's descriptive approach. Organisational structures are not cast in stone but respond to changes in the environment, and there is a paradigm shift in corporate culture from organisations as closed stable entities to organisations as open dynamic systems, from competition to trust and collaboration including outsourcing, consortia, joint venture, and conglomerates become better ways of satisfying customer needs. From a corporate culture there is also a change from focusing on power and ownership in decision-making to focusing on knowledge and an increased use of information and communication technologies leading to virtualisation.
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1. INTRODUCTION

Paradigms shifts in management, engineering and science in general are most of the time associated with disruptive technological innovations. A paradigm has been defined by Kuhn (1962) as "universally recognized achievements that for a time provide model problems and solutions to a community of practitioners". A disruptive innovation is an innovation that creates a new market and value network and eventually disrupts an existing market and value network, displacing established market leaders and alliance (Bower & Christensen 1995). Other authors add significant social impact as part of disruptive innovations (Marnix 2006). The link between disruptive technological innovation and unprecedented societal changes is not a new phenomenon. As Wiener (1961) has pointed out:

The thought of every age is reflected in its technique. The civil engineers of ancient days were land surveyors, astronomers and navigators; those of the seventeenth and early eighteenth centuries were clockmakers and grinders of lenses. As in ancient times, the craftsmen made their tools in the image of the heavens. A watch is nothing but a pocket orrery, moving by necessity as do the celestial spheres; and if friction and the dissipation of energy play a role in it, they are effects to be overcome, so that the resulting motion of the hands may be as periodic and regular as possible. The chief technical result of this engineering after the model of Huyghens and Newton was the age of navigation, in which for the first time it was possible to compute longitudes with a respectable precision, and to convert the commerce of the great oceans from a thing of chance and adventure to a regular understood business. It is the engineering of the mercantilists.

Wiener (1961) continues his exemplification of how paradigms have been changing within the area of physics and engineering by noting that:

To the merchant succeeded the manufacturer, and to the chronometer, the steam engine. From the Newcomen engine almost to the present time, the central field of engineering has been the study of prime movers. Heat has been converted into usable energy of rotation and translation, and the physics of Newton has been supplemented by that of Rumford, Carnot, and Joule. Thermodynamics makes its appearance, a science in which time is eminently irreversible; and although the earlier stages of this science seem to represent a region of thought almost without contact with the Newtonian dynamics, the theory of the conservation of energy and the later statistical explanation of the Carnot principle or second law of thermodynamics or principle of the degeneration of energy – that principle that makes the maximum efficiency obtainable by a steam engine depend on the working temperatures of the boiler and