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Systems Theory: Tying It All Together

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Abstract

Organizations spend significant effort optimizing the performance of individual departments or pieces of the organization, but do not spend enough time focusing on tying all the pieces together. By enculturating a systems thinking perspective into the organization that appreciates the nature of open systems and the need for caring followers and leaders, organizational performance can be immediately and significantly improved and bottom-line performance optimized.

Table of Contents

Systems Theory: Tying It All Together

In organizations, a lot of effort it given to making sure all the pieces or individual departments work well. Often the same level of effort is not provided to ensuring they work well together. To address this, companies have implemented matrix organizations with horizontal management responsible to tying the functional organizations together. However, this often is a reactive model that uses the horizontal manager as little more than a gum-shoe responsible to identifying problems to the executive leadership team. A better approach is to adopt a systems perspective and to build that perspective in the culture of the organization. Systems theory is a holistic mental model for ordering reality. In contrast to the thinking taught by Descartes, which suggests that complex issues should be broken into component parts and studied separately, systems theory suggests that components act differently when separated from the whole, and that they must be understood from a holistic perspective (Checkland, 2000). *Systems thinking* depicts the world in closer approximation to reality than the *separation of parts* method allows, and it constructs reality by providing order where chaos exists. It suggests that the whole is greater than the sum of its parts, and that the interfaces and interactions must be understood in equity to the component parts. Bertalanffy (1969) puts it this way:

> It is necessary to study not only parts and processes in isolation, but also to solve the decisive problems found in the organization and [the] order unifying them, resulting from dynamic interaction of parts, and making the behavior of parts different when studied in isolation or within the whole (p. 31).

It is this dynamic activity and effect of the whole that separates the mental model of Descartes from the system thinkers of today. Senge (1990, 2006) defines mental models as "deeply ingrained assumptions, generalizations, or even pictures or images that influence how

we understand the world and how we take action" (p. 8). System thinkers create or construct models of reality in order not only to understand the parts, but to also understand the whole. Models are building blocks that should be used to tackle organization problems from new perspectives, and to develop new and more relevant theories (Morgan, 1998).

What is important to the systems theorist is that systems are viewed and examined holistically. The systems thinker chooses to see both the discrete building blocks and their dynamic interaction. The systems' thinker will focus on this dynamic interaction. Additionally, the systems thinker will understand that in human activities systems the output is significantly impacting by the caring nature of the people involved. Thus, the systems thinker will focus on both the interaction between the parts and heightening the caring of the people involved.

Discussion

Although many holistic thinkers existed throughout history, it was not until the 1950s that this thinking was institutionalized (Checkland, 2000). During this initial decade, only one type of systems thinking was being considered, and that was the mathematically expressed thinking of the general theorist (Checkland, 2000). This type of thinking tends to be closed in nature. A closed system's final state is determined by its initial conditions (Bertalanffy, 1969), and the results of a mathematical problem or the output of a machine are determined by their initial state.

On the other hand, based on the studies of Checkland and others, systems' thinking was applied to human activities, and it is this type of systems' thinking that is required to be enculturated for high performance. What separates human activity systems from non-human ones is that the human systems can be anything they wish (Checkland, 2000). Additionally, in an open system, the final state is reach from different initial conditions and in different manners (Bertalanffy, 1969).

A closed system is isolated from its environment, while an open system is not, and any system that has human activity involved is exposed to the unexplainable, but undeniable influence of *free-will*. Bertalanffy (1969) indicates that open systems can only be accomplished by "soul-like vitalistic [sic] factors" (p. 40). When constructing the mental model of systems theory, it is important to understand both open and closed systems. Additionally, it is equally important to view this from both the component and holistic perspectives. The mental models of *man* and machine or of the human heart and operational mechanics may best model this system's reality.

The Mechanics

A mechanical machine is a closed system when it is isolated from its environment. Bertalanffy (1969) states that a system is closed if no material [information] enters or leaves it. However, closed systems use information internally. An example of this can be demonstrated through the theory of cybernetics. According to Ashby, the leading cybernetic theorist in the 1950s and 1960s, cybernetics is all forms of behavior that are regular, determinate, or reproducible (Checkland, 2000). An example of this type of cybernetics is the theory of servomechanisms in technology.

This high technology was demonstrated during "Desert Storm," which was a battle during the early 1990's between the United States and Iraq, in response to Iraq's invasion of Kuwait. This battle was unique because it was literally broadcast live and in significant detail. One of the most significant demonstrations in the battle was the use of "smart-bomb" technology. This technology uses servomechanisms for it guidance. More specifically, it uses optical tracking systems to guide the weapon to its target.

In a laboratory, this type of system is regular, determinate, and reproducible. The servo-system works through the elaborate use of information and negative feedback. The target is initially identified to the tracking system through its sensing mechanism, and when the target is moved, information is generated by the servo-system that depicts where the weapon is headed and where the target is currently located. This information is fed back to the weapons positioning system, and the weapon corrects itself to move back on target. Whenever the tracking system detects that the weapon is headed in the wrong direction, it corrects this by providing feedback, which is used change the weapons course in the opposite direction.

However, as was demonstrated in the battle and broadcast on the news, these bombs did not always hit their intended targets. When used in battle, they were influenced by their environment, and the outcome was unpredictable based on the initial launch condition. That is, cybernetics, as defined by Norbert Weiner and introduced to the world in 1947, is "the entire field of control and communication theory, whether in machine or in animal" (Checkland, 2000), and not just closed systems as Ashby suggest. The concept that cybernetics applies to both open and closed systems is shared by Bertalanffy (1969) where he suggests cybernetics is the transfer of information within the system, and between the system and the environment.

Even though these mechanical systems are designed to be closed in their nature, when they are subjected to a wider system, they become open in their nature. Checkland (2000) states that what constitutes a system are relative and are not absolute concepts. "Systems thinking requires thinking in layers defined by an observer" (Checkland, 2000, p. A24). All closed systems become systems impacted by the flow of information from outside sources when they are viewed at the next higher layer in system perspective.

Although thinking of this smart-bomb system in closed perspective helps people understand this system when it is closed, no system can be fully understood in a closed environment. The scientific approach of Descartes and others suggests that systems should be broken into their component parts and studied separately; however, smart-bombs and similar systems are man-made. These man-made systems are designed to meet some human purpose; thus, they are subject to human influence (Checkland, 2000). The mere act of design is an example of a human activity system that is ordered in wholes as a result of some underlying purpose (Checkland, 2000), and it is humans and their discourse that accomplishes this ordering. This influence by people on all systems they touch is what makes human activity systems open.

Tying It All Together

If humans are involved, they exercise free-will and this exercise ensures all systems, in and out of the laboratory, are open systems. The concept of a closed system is a human construction to help in ordering reality, and to his credit, Descartes reductionism accomplishes this feat. The breaking of the whole into component parts permits the construction of a nearly closed system, which permits increased understanding of it. This approach worked fine for Descartes because he viewed all systems as machines, and at some level, he viewed all systems closed. Descartes did not have a problem with his animal machine because it was a creation of a divine watchmaker (Bertalanffy, 1969). That is, each step in the hierarchy of the system causes it to become closed, until we reach divinity, which controls everything.

Dissimilarly, systems' thinking requires that each step in the hierarchy creates greater openness instead of greater control, and this is the major point in systems thinking! That is, at some level, all systems are open, and although human activity systems are also open systems, they are fundamentally different from other ones (Checkland, 2000). The origin of this difference

is humanity, and what set humans apart from all other natural and man-made systems is self-consciousness (Checkland, 2000). Mackay states “you and I” are free to choose (Checkland, 2000, p. 117), and whether this is because of human nature, human soul, or the human heart; it is undeniably what ties it all together. People must be given the opportunity to care if high performance and maximum team work is to be achieved.

When considering human activity systems, Senge (1990, 2006) suggests that five components converge to innovate learning organizations. “Systems thinking,” “personal mastery,” “mental models,” “building shared vision,” and “team learning” each provide a vital dimension in building organizations that can learn (Senge, 1990, 2006). Senge (1990, 2006) defines personal mastery as people being committed to their lifelong learning that enables them to obtain results that matter most deeply to them, and he defines building shared vision as people excelling and learning because their personal desire. Additionally, he defines mental models as deeply ingrained beliefs that people have and use to understand their world and to guild their activity, and he defines team learning as people dialoging in order to create synergistic growth (Senge, 1990, 2006). Finally, Senge (1990, 2006) suggests that systems thinking is a body of knowledge and tools that people use to see events that are distant in time and space, but are connected within the same pattern. Senge’s point about distant in time and space should not be under estimated, as this is a key tenet of a systems thinker.

Two points are prevalent in Senge’s model of a learning organization. The first is that each of these component technologies must be viewed in combination with the others in order to create a systems perspective. The second is that each of these component technologies involves people doing something. That is, the learning organization depends on people passing information between each other, and it depends on people bringing new information into the

organization. To construct a learning organization, an open system mental model must be used to create an environment where internal and external exchange of information is used to "synergize" human activity.

In creating this open system, Bertalanffy's concept of "equifinality" must be accepted and promoted by the organization's leaders. Equifinality is "the tendency towards a characteristic final state from different initial states and in different ways, based upon dynamic interaction in an open system attaining a steady state" (Bertalanffy, 1969, p. 46). In open systems, the same final state can be reached from different starting points and in different ways (Bertalanffy, 1969); thus, if a leader is to create a learning organization, he or she must encourage dynamic interaction through dialog, and facilitate growth in new and differing ways. That is, leaders must understand there are many ways to *skin a cat*.

This requires assisting workers in finding meaning in their life. People find meaning in life by creating works or doing deeds (Frankl, 1984), and the astute systems thinking leader will ensure an organization is constructed that facilitates workers to construct their own personal vision. Organizations must construct strong commitments and partnerships in order to create learning organizations, and love alone is capable of uniting beings in a manner that completes and fulfills them (Bergquist, 1993).

Conclusion

Systems theory is a mental model that helps people both understand and construct their reality. This model distinguishes itself from other models for understanding by concentrating on the interaction of component parts, and by focusing on the changes in the components created by these interactions. Systems theory is broadly categorized into closed and open systems; however, closed systems exist only through reductionism, which was promoted by Descartes. Although

closed systems can be approximated by human intervention, the mere act of the intervention creates an open system. That is, human activities are by nature open systems because they are guided by the human search for purpose or meaning. The search for purpose catalyzes the creation of the learning organization, and people discover purpose through genuine caring. Thus, it is important to understand the mechanics of systems theory, but it is genuine caring of individuals that ties it all together.

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