

Others

The New Open System Model for Technology-Driven Organizations

Abstract

The article presents a conceptual model on how technology-driven organizations may move into a paradigm of open system collaboration with others outside the place of employment. Individuals may choose to contribute to paid and non-paid solution-boards that will serve as sources to turn tacit knowledge into explicit knowledge and allow organizations to rely on outside experts rather than a highly compensated in-house technical workforce. The open system for technology-driven organizations will allow complex problems to **besolved** by combining in-house and outside expertise. The system is built around the concept of transparency **andsharing** to solve complex manufacturing problems, drive innovation, and foster a level global field.

Keywords

Open system, model, technology-driven, collaboration, paradigm, manufacturing, innovation

Introduction

In a world filled with instant messaging, instant pudding, instant feedback, and instant gratification, the old model of a closed system as an organizational paradigm is obsolete. It has a valid foundation, in which environments shape the organization, making it a product of that environment, but the internal and external components need to change, and the organizational boundaries need to expand in ways unheard of heretofore (Scott & Davis, 2007). Recent economic events and unstable economies have uncovered many flaws in the current organizational model, and a positive deliverable that comes from this economic event could be a shift in how organizations are structured (Zakaria, 2008). Zakaria (2008) suggests that the current economic crises have forced us to reevaluate the way organizations are structured. Recognizing that a new paradigm will not change overnight; the process is an evolution in change, revolution, and revitalization (LeCoure& Mills, 2008).

Background of the Organization

An Open System is compatible with the common term of *transparency* that many organizations have adopted and are attempting to practice. Open System paradigms operate within the forces in or surrounding the organization. Typical sources or roots to open system organizations include management, marketing, finance, production, statistics, engineering, psychology, and the behavioral sciences (Cochran, 2009). Team participation is encouraged and there are many organizations structured around the team concept. Many organizations include items like being a good team player as an essential part of the screening and hiring process. Systems design, characterized by fostering design-use during the organizational design process through analysis of participation have begun to catch on in the academic world, and are finding some practical applications, such as simulation and design caves for manufacturing design (Barcellini, Detienne&Burkhardt, 2009), and CAD drawings taking place in the virtual world on many platforms. Another variation of the typical open system paradigm is the theory of contingency. The hypothesis behind the approach is that most organizations that closely match the demands of their environment, relative to internal aspects will achieve the best adaptation (Scott & Davis, 2007). Although the open system was

the last of the three main types of organizational paradigms; rational, natural, and open; the open system model has not made the others obsolete.

Boundaries are a core area of importance to an organizations existence, but the boundaries of many organizations are beginning to blur. A definition of boundary setting is the area of influence that an organization controls, including suppliers (Santos & Eisenhardt, 2005). Changing boundaries are indicative of an evolutionary process at work.

Santos and Eisenhardt (2005) further state that organizational boundaries are set at a point by reducing operating costs. As organizations change, boundary spanning is to come inside the organization. Sources of information come from within or outside the organization, and may even come from competitors through the interaction of employees of different organizations meeting and speaking of their respective organization. Information can come from within the field of work that can share best practices to the suggestions with a new perspective from someone outside the environment. When organizations adapt and change, a more knowledgeable and flexible organization emerges (Kerson, 2002). This change may be a long and slow process, and the organization needs to accept new concepts and experience antecedents to accept a new reality.

Collaboration is taking over and in some cases organizations are abandoning the belief that intellectual property is valuable and secretive, and even in some instances willingly giving it up to keep the options of the business viable. In a study by Almeida, Hohberger, and Parada (2011), results indicated a greater sense of innovation and patent quality when scientists collaborated externally, and some organizations have already identified strategic alliances, which can be the foundation of the model discussed. An example of successful open source collaboration in the technology area is the development of Mozilla Firefox. Firefox has gained considerable market share in the browser market at the expense of Microsoft (Oshri, de Vries, & de Vries, 2010).

The organization described above utilizing an open system can be anything from a research organization to a manufacturing operation. Experts in their respective areas dominate this environment, and these individuals command the high end of the payroll process. When an organization needs expert information to advance or improve their process, they search and bring in the best to support activities. If they work multiple shifts, they may have these expenses for each shift, so that the high level of activity can continue for the entire workday. Payroll and employee benefits are a tremendous burden to the operation of the organization. Span of control is narrow and an even higher paid administrative manager often acts as a leader for the defined area of responsibility.

The Proposed Paradigm

Smaller numbers of workers at all levels may populate the new organizational paradigm. At least the numbers of internal workers within the organization will diminish. The number of contributors, counting those the organization never meets and the individuals that penetrate the organizational boundaries from outside traditional walls may expand exponentially. The organization may never pay some of the key contributors for contributions. The new paradigm will be an open system model and will be boundary spanning. The Span of control will be wide, and the boundaries will be extremely porous. People who contribute to the organization attaining the goals may come and go, and serve the needs of multiple organizations. It will not matter if associated with large or small, routine or technical, cerebral or a production environment. The new model will require fewer individuals to operate because of the resources available to all online and using new technology.

Instant answers, and more access to what was once thought of as tacit knowledge is converted to explicit knowledge with the ability to access online databases and private and public information solution sites. Employees may refer to the organization where they work as the *industry* rather than the organization name because they will be active in the resolution of problems and challenges for several organizations. Organizations will no longer have static characteristics, adapting to the ever-changing environment that they are a part.

For organizations performing research, they will not continue to hire talent to fill missing knowledge gaps, they will subscribe to open innovation sites in which outsiders can contribute to solving organizational problems, either free or for a fee. There are already some early starts in this area. A current example is Eli Lilly created a collaborative site called *InnoCentive* (George, Works, & Watson-Hemphill, 2005). On this collaborative site, the pharmaceutical industry is solving important medical problems by posting issues or problems that they have yet to resolve and open it up to the world. Most companies in this industry would have large research and development organizations, but these **will have a reduced importance** and size because the closed model will no longer be relevant. Typically, the organizations would also collaborate with a Tier One University for research activities, but even that approach is too limiting, **and needs rethinking**. If organizations are willing to discuss problems that are the keys to new discoveries, and share what was considered secret intellectual property in the past is now openly shared so that a solution can be achieved using company-based and outside information. The combination of internal and external resources will be the key to solve technical and increasingly challenging problems, which will lead to new

discoveries and new approaches to technology-based processes. Not just one tier one university partner, but multiple tier one, tier two researchers, industry scientists and engineers, and literally the interested intellect of the planet all become part of the organization (George, Works, & Watson-Hemphill, 2005). In the example cited, members screened and registered serve as contributors. More than 170,000 people have signed up on to the InnoCentive site to be solvers (Hagel & Brown, 2009). When Dr. Schmid did not have resources to dedicate to a problem, Eli Lilly authorized the posting of problem that they unsuccessfully had pursued for some time. A \$25,000 challenge award posted to the InnoCentive site, and three months later Eli Lilly had the solution. It cost them a fraction of the normal cost of hiring a new research scientist (George, Works, & Watson-Hemphill, 2005).

Pharmaceutical organizations, medical discoveries, intellectual property dominant research, and development will not dominate this model. Even production and manufacturing organizations will migrate to this new model. Already production processing chat rooms and question posting sites exist, but to-date this is an informal process. The practice will grow, and more sophisticated sites like InnoCentive will become commonplace. Rather than an abundance of technicians and engineers, organizations will rely on pushing their organizational boundaries to perform problem-solving activities. If, for example, an injection molding company has a particularly tough problem that they are not able to process around, by describing the tool, the material, the processing parameters, and the cycle, they will be able to post, and receive technical advice from others with industry knowledge. Internally, the acquired tacit knowledge is stored on a database, and this will become an explicit repository for internal workers to tap and to solve problems. Organizational structure will encourage participation on these sites to post and receive solutions from the outside, but also participate and to help solve the problems that other organizations need solved. Employees will receive necessary information from other boundary spanning organizations, and they will contribute to the well-being and successful operation of others within their industry cluster. In a rare instance where an organization desires contributors to gather on-site or all together, the organization will turn to talent through contract employees, or university partners employing students to gain experience and to understand their role in the new configuration.

This environment requires in-house experts because someone needs to evaluate and process information coming in and going out of the organization. The difference between the old and the new organization is that there is only one expert for the new organization opposed to multiples to populate each shift. Technicians, engineers, and even scientists will strive to prove that they are worthy of the organization's expert role. If they are, the salary and other benefits will reflect the tremendous responsibility that they bear. An engineer unable to differentiate him or her from the pack will become part of a growing number of commodity technicians. In today's terms, this group will be underemployed, and will be a concern that the human resources community will address. When an organization needs new or additional information to advance the process or to solve a problem the organization will post the item on one of the virtual boards that expand the boundaries of the organization. Individual salaries will be high for those designated as organizational experts, but the total employee count reduced greatly in the new model. Payroll as a percent of total cost is less than 50% of the original paradigm, given the expert role, and organizations will search for the best individuals possible when the expert positions vacate. In a high-tech environment, employee numbers tend to be reduced as the level of technical requirements rise (Silva, 2008). Manufacturing has historically grown the labor base because of competition, difficulty in measuring indirect efficiency, and a propensity to a large bureaucratic model (Silva, 2008).

Technology has opened the expert-based resources beyond the traditional organizational walls and onto the World Wide Web. Companies will seek help beyond traditional borders and technical intelligence will create networks for technical information outside the institution (Bughin, Chui, & Manyika, 2010). This will effectively continue to expand organizational boundaries and create a more open technology environment.

The movement is taking shape in other fields as well. An online physician network, Sermo, allows physicians to join free and gain access to discussion groups, medical articles, and to ask questions of other members (Bughin et al., 2010). Non-physicians can join, but for them there is a fee. The *freemium* model of online networks with basic services for free and premium services for a fee could be applied to the manufacturing environment (Bughin et al., 2010). In resource-starved environments involving technology, many young individuals who embrace technology are being creative and creating disruptive business models requiring less than what was considered needed in individual talent in older models (Bughin et al., 2010). Bechtel, a design and engineering organization has created an open-collaboration database for design information in global projects (Bughin, 2010). Span of control becomes broad, and there is no evidence of the departmental silos present in an old model. The leader or manager will no longer play a passive role and he or she will actively participate in the activity occurring inside and outside the traditional organizational boundaries. An early example of an open system, which provided the foundation for this new model, was the development of the Linux operating system. This system received

contributions from thousands of unpaid, open source volunteer programmers (Scott & Davis, 2007). This activity did not go far enough to classify it into the proposed new open system paradigm, but it was an early attempt to span organizational boundaries and show what collaboration and reaching out to external resources could do for the organization. The new model with contributors moving in and out of the organization and the cost of labor being relatively low compared to hiring a number of high-end technical personnel will dominate the landscape. Lower payroll budgets will help to level the field when operating in a global environment. Low-cost producing areas will lose any labor-cost advantage and the level field will push technological improvements for continual improvements. A prototype for injection molding was developed and tested using the Java Agent Development Framework (JADE) to collaboratively solve quality problem defects in the manufacturing process (Mikos, Ferreira, Gomes, & Lorenzo, 2010). The model supports the use of geographically distributed resources made up of experts forming a network for information and communication (Mikos et al., 2010).

Evaluation and Sustenance of the New Organization

The new paradigm introduced in this paper is a model of what forward thinking, and innovative organizations will emulate over the next several years as organizations evolve fully into the information age; resources will span well beyond the traditional boundaries that existed for the life of most of today's workers. This may be such a shift from the original open system concept that existed since World War II that it might spin off into a completely new paradigm. Morroni (2007) suggests that organizational boundaries naturally occur by interacting and the way an individual contributes to organizational performance. The new paradigm supports the boundary-spanning model necessary to gain access and to share knowledge; in ways that most organizations have yet to experience.

Information Technology will finally reach a pinnacle and will begin to gain a greater organizational status, as the entire new organizational paradigm will be dependent on creative new repositories used both internal and external to the boundaries of the organization. The acquisition of tacit knowledge, converted into explicit knowledge by powerful systems will create new knowledge for the organization. Payroll costs are becoming prohibitive, but the described model will help to reduce the total payroll and benefit expenses for the organization. Additional message boards, answer sites, both paid and unpaid will spring up, creating a new kind of competition in which the best and most informative sites will survive. Larger organizations within industry clusters will host these sites, and they too will become a source of revenue. The smaller organizations within each cluster will still use the porous structure, but they will rely on the dominant neighbor, or a global site to succeed in the new organizational paradigm. The smaller entities will not have the resources necessary to support such a tool, but they will import pieces to have the complete system in place. Virtual tools expand to the point that conferences, lectures, classes, collaborative design, and training are commonplace without physically leaving the premises. Some design and prototype work is beginning to appear in the virtual world on such domains as Second Life and Open Sim. Organizations will increasingly become more decentralized and stand-alone operations will have the skills and resources available to resolve most issues. Corporate staffs and support personnel will diminish, but not totally disappear as the primary purpose will evolve and become a human resources support function. Companies in the new paradigm will invest heavily in training and development to increase employee's value to the organization. Values related to human resources encourage and support work attitudes and behaviors will be reinforced. With a heavy investment in the key workers, employers want to do everything they can to retain good performers (Donnelly, Gibson & Ivancevich, 1998). Some of these changes will require the addition of a Learning Commons, which is an area where employees can socialize, talk, interact, and serve as a resource for technology-based collaboration (Moore & Wells, 2009). The other functional experts will reside at the logical site depending on the nature of the business. In manufacturing for an example, the experts will reside at the producing locations.

Knowledge-based economies and the quick deployment of information continue to create significant developments in the way organizations conduct business and organize activities. Many researchers identify the boundary to the organization as the void between the organization and environment (Santos & Eisenhardt, 2005). The new organizational paradigm suggests that the void between the organization and environment have disappeared. At very least the void is no longer a clear feature. Organizational contributors will come and go, may never be an employee, and may never visit the organization. They may never come to the continent in which they are contributing to an organizations success and well-being. Linux, considered an early experiment along the open source concept; with thousands of unpaid contributors, developed the Linux operating system, and the system works on millions of computers (Scott & Davis, 2007).

Conclusion

As an organization grows and evolves, many changes take place, which provides answers to the voids and missing activities from the original structure (Scott & Davis, 2007). More organizations will accept the new model as a way to sustain operations, as it is highly flexible and fosters knowledge sharing. The low-cost permanent wage component makes sharing a viable option for anyone who utilizes the organization's products or services. Resources become a viable option to anyone who is anywhere on Earth. The sharing component makes the organization highly adaptable, thus able to change with the environment.

Using boundary spanning, organizations receive organizational knowledge with an outcome of organizational success. Suppliers are participants in the supply chain, and the new information technology sites will be a tool in delivering solutions to customers. Suppliers may participate in new ways such as being assigned a task and having the responsibility to develop the product. More brick and mortar organizations will become virtual organizations, contracting out all products and services, but maintaining a presence and a recognized organizational presence.

The millennial generation has grown up with accessibility to computers since they were infants so this becomes a natural link and a way to bridge the generation gap that organizations seem to struggle with every new group of employees. Millennial individuals will be comfortable in this new paradigm, and quickly fill the gaps of the retiring boomers. Immediately, millennial individuals will have the correct skill-set for a successful career. New technologies as discussed in the new model will foster a flexible workplace and provide for communication around the world. Communication is always a critical component of organizational success, and this is no different. Communication up and down, inside and outside the organization will be necessary for the successful employee operating in the new model. Organizations will search for disruptive solutions for the workforce and the organization. The paradigm as described certainly presents a disruptive option. Organizational contributors may be individuals within the organization, working for themselves and offering expertise to many different firms; perhaps by replying to paid challenges, setting individual work hours, and perhaps serving an industry in which they can reside anywhere. Virtual message and information boards will grow and expand, setting the stage for a type of employee-employer relationship the world has yet to see.

The exercise of defining and analyzing organizational boundaries is fast becoming obsolete. Internal and external work components are essential, but the organization that survives will evolve into the new organizational paradigm, which will improve efficiency, profitability and give the customer what he or she want at an acceptable price. The evolution of high technology has begun and will continue to grow.

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