The Internet, Value Chain Visibility, and Learning

Hee-Dong Yang
Management Information & Decision Systems
Case Western Reserve University
hxy11@po.cwru.edu

Robert M. Mason
Management Information & Decision Systems
Case Western Reserve University
rmm3@po.cwru.edu

Abstract

It is unquestioned that the growth of the Internet is a significant phenomenon. Not only is there an exponential growth in the exchange of goods and services over the Internet, the Internet has changed the way information can be accessed and used. This paper posits that the Internet has made a fundamental change in the nature of the information value chain. The Internet has changed the visibility of the processes in the information value chain. Visibility means both information about processes and the capability for interacting with these processes. Because of this visibility, the Internet enables the emergence of online communities and makes possible more rapid and complete learning. The paper discusses the implications of the theory of visibility and the learning perspective on information system research, design, and management.

1. Introduction

This paper links the emerging characteristics of the Internet with the perspective of organizational learning. The thesis is that the Internet is making a fundamental change in the nature of the information value chain, and this change makes possible improved capabilities for learning. The theory of visibility ([40], forthcoming) provides a basis for understanding this fundamental change, and the paper uses it to analyze the impact on learning. The paper suggests that an understanding of the nature of this change will enable researchers and managers to have a wider range of options for studying, designing, and operating information systems.

Many have argued that a capability for more rapid learning is the only basis for a sustainable competitive advantage (e.g., [35, 32, 33]). If organizations were to take this perspective seriously, they should be seeking ways to design, implement, and manage information systems that enable them to learn rapidly and to continue to improve their learning capacity. Organizational learning has been examined from multiple perspectives: behavioral (e.g., [23], interpretive (e.g., [9]), and informational (e.g., [16, 24, 25]).

This paper takes the informational view of organizational learning, acknowledging the contributions of the other perspectives. The paper focuses on the role of the individual information value chain and shows that the processes in this value chain may be mapped onto a model of individual and organizational learning. This paper compares the emerging features of the Internet, which might be considered as characterizing idealized Internet model, with the model of information system resulting from a traditional structured design and implementation approach. The paper shows that the Internet model enables individual learning and improves the organizational capabilities for learning.

Over the past several years, the Internet and Intranets have become a growth phenomenon. The total value of goods and services traded among companies over the Internet in the US will reach $8 billion this year and $327 billion in the year 2002 [13], corresponding to an average annual growth rate of 110%. Organizations have embraced the concept of Intranets, using the same Internet server network technologies for internal systems and seeing internal rates of return on the order of several thousands percent [19].

Armstrong and Hagel [2] point to the emergence of four different types of communities on the Internet (see Table 1) and argue that the real value of the Internet will be for organizations that take advantage of these communities. Table 1 illustrates the information and knowledge exchange role of the Internet in communities of interest. Learning may take place in every community type, but the “community of interest” has a primary desire for information and knowledge ex-
change--learning is an important purpose in this community.

The information value chain (IVC) is a single identifiable process (an open system with inputs and outputs) comprising a linked set of activities from an information provider (IP) to a user. Rayport & Sviokla [30] identify five steps (activities) in a proposed model for the information value chain (IVC): generate, organize, select, synthesize, and distribute. Meyer & Zack [26] propose a similar categorization of activities: acquisition, refinement, storage/retrieval, distribution, and presentation. The first model, with its steps of “generate” and “distribute,” provides more of an information provider (supply-side) perspective. The second model, with its step of “acquisition,” provides more of a user (demand-side) perspective.

This paper associates the emergence of online communities, Internet growth, and organizational learning to the Internet’s making visible upstream processes in information value chains to individuals. Visibility means that the information user both has information about the information processes (information about who knows what) and is able to interact with these processes (users can be information providers). Instead of dealing only with outcomes of an information value chain (as though the processes were embedded in a “black box”), a user can see and interact with the processes. The increased process visibility is a fundamental change from the traditional information system. It enables increased individual control of the processes value chain, and this individual control supports the emergence of online communities and, as this paper will argue, enables more complete organizational learning.

The remainder of the paper comprises three sections. The following section reviews the theory of visibility and shows how visibility is related to control of IVC processes. It compares the visibility and control of IVC processes using the Internet with the same processes in an information system implemented using a structured design method. The next section shows how the IVC models and learning models are associated and discusses the relationships among learning, visibility, and the emergence of communities on the Internet. The last section summarizes the contributions of this paper and their implications for research and practice.

2. Visibility, Encapsulation, and Power in the Information Value Chain

2.1 The Concept of Visibility

The theory of visibility ([40], forthcoming) examines the impact of process visibility on the interactions between organizations and their customers. Visible processes are those that the customer directly perceives and

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into a computer. This information will be downloaded to a robotic cutting machine at Levi’s Tennessee plant and, after subsequent processing, the blue jeans are shipped directly to customers’ home. Taking measurements and engaging the customer in the process of selecting styles and colors to make a particular pair of jeans makes visible the portion of the design and manufacturing process that is invisible when a customer simply buys off the shelf from stock.

An example for making invisible is a bank ATM machine. The bank makes visible a simple interface, enabling customers to withdraw cash, and make bill payments. The bank’s accounting procedures, including the creation of an electronic audit trail, are invisible to the customer, who gains no value from knowing the details of these processes. Similarly, some utilities offer a customer the opportunity to have the bank deduct the utility bill directly from the customer’s bank account, freeing the customer from the (invisible) details of the process by which the bank credits the utility.

Given a clearly-understood boundary, organizations and their customers can behave independently for the implementation and interface, respectively, except for well-defined communications. In the Levi situation, the boundary is much further upstream in the value chain; in the bank ATM situation, the boundary is nearer to the final outcome of the transaction. In ordering jeans, the customer is proactive and engaged in the information process; in using the ATM, the customer is reactive, choosing from a well-defined set of options.

For an organization, the trade-off is between making more visible and making invisible. In making this decision, the most robust criterion is who has the most appropriate skills required for managing the process. The organization and the customer can specialize in managing what is on its side of the boundary because each can assume that the other is more knowledgeable about its own area. The close relationship between visibility and specialty has been the main paradigm in the structured design of organizational information systems paradigm; the notion of “users,” “designers,” and “interface” imply a clear separation of roles and responsibilities and distinctly different perspectives on (i.e., visibility of) the information system processes.

Visibility is also related to accountability in the sense of “seeing” objects and comparing them along predetermined metrics. For example, visibility often is used instrumentally to reduce waste or increase efficiency by setting up standards and norms. Through such standards and norms, inefficiencies of a person are rendered clearly visible.

We make essential human beings visible by locating them in relation to an hypothesized essence, a norm, from which we characterize their deviance: we know them only through a normative judgment ([4:271]; Italics added).

When this logic is internalized by the subjects as disciplinary norms, “it entails penetrating into the very web of social life through a vast series of regulations and tools for the administration of entire populations and of the minutes of people’s lives” [27:238]. The subject has now become “an object of knowledge” in a field that is organized by normalizing judgments: the kind of knowledge that is possible in this field is one in which objects are isolated, classified, and located on a scale of differences and similarities [4:269].

What these prior works show is that visibility is a necessary condition for control. Without visibility, an organization (or superior) can not control the activities of its members (or subordinates).

2.2 Visibility on the Internet and Information Value Network

The following paragraphs examine the approaches to an information system (and consequences of these approaches) before and after the Internet is available. The above review of the literature on visibility suggests the following proposition:

Proposition 1: Compared to a structured design information system, the Internet reduces the organization’s visibility of the individual user’s IVC and increases the user’s control of the IVC.

Figure 1 illustrates the visibility along the information value chain for a structured design information system (IS) and an Internet-based system. Visibility is reviewed at two different levels: at the individual level (i.e., individuals’ capability to “see and control” the IVC) and at the organizational level (i.e., the organization’s capability to “see and control” the IVC). Thus, visibility at the individual level determines whether users can be proactive or are limited to being reactive. In the former, individuals can interact directly with information providers, or become information providers. In the latter, they are more passive and merely receive and consume what the system provides. Organizational visibility enables the organization to assign individual roles along the information value chain.
In the absence of the Internet, a user would request an information system be designed. Assuming the organization approves the request, the organization supports the user’s efforts in working with an analyst and designer to implement a system that satisfied the user’s requirements. During this design phase, all the activities in the entire value chain (up to, but not including, an external information provider’s, or IP’s processes) would be visible to, and controlled by, the team of analyst, designer, and user. The key points of this phase were that users’ requirements be identified without distortion, and that consistency of form and content along the IVC be ensured. Once users’ needs are identified, analysts and designers work their way upstream in the IVC and structure the content and form of information or data that will later flow through the system. For example, a database management systems (DBMS) design starts by identifying the data items of the final forms, then normalizes the structure of the database. Finally, designers decide how these normalized data items will be provided and filled in. This “backward” oriented approach enables the designer to maintain the consistency of information along the information value chain from the standpoint of the final users. In this environment, instantiation of the IS is accomplished at the time of the design.

Once implemented and operational, the IS can be expected to perform as designed. The IVC processes become fixed: the instantiation does not change except with a relatively formal redesign effort involving the analyst and/or the designer. User visibility (and control) would be limited to the downstream processes of synthesis and distribution. In effect, users are unable to interact with the invisible upstream processes and are limited to reacting to information provided. Users gain new knowledge related to the original data needs specifications when information providers furnish updated information.

As Figure 1 illustrates, the Internet changes the visibility of the value chain processes to the user and to the organization. Only outside IP’s processes remain invisible and unchanged.

For the user, the Internet increases the visibility of the early processes in the IVC. Moreover, each use of the Internet is, in effect, a different instantiation of an IS; each instance of access gives users the same visibility of IVC processes as they had during the design phase of the structured IS.

For the organization, however, visibility in general may actually decrease. Because it is impractical for the organization to monitors its members’ use of the Internet, the IVC used is known only by the user. The user is now able to see and interact with (i.e., control to some degree) processes in each use of the Internet. In this emerging Internet model, the roles of the IS analyst and designer (who, in the structured design approach, provided process visibility to the organization) are eliminated.

This characteristic of user control of the IVC processes means that the Internet is consistent with the recent trends toward less hierarchical organizations and greater employee empowerment. Users, since they can control their entire downstream IVC, can become information providers (IPs) themselves. Users may acquire information, then synthesize and refine the information before further generating, organizing, and dis-
tributing (higher valued) information. The Internet thus enables users to create their own individual value chains and to share the outcome of their synthesis and information organization with others.

Communication with others is standardized through the Internet conventions of universal resource locators (URLs) and the emergence of indexes (a list of “bookmarks”) and Internet search engines. These communications links mean that the Internet not only provides visibility for the processes by which information and knowledge are developed, it provides visibility (and rapid feedback) on who is developing relevant information. In other words, the Internet provides not only information itself (know-what), but information about the location of information and knowledge (know-where). This latter capability is what Wegner [38] refers to as “transactive memory.” In providing this meta-information, the Internet has liberated users from the pressure of traditional IS requirements for fixed routes to information sources.

As Internet participants identify other participants who share their interests and have related knowledge, they increase their communications with them. As noted by Armstrong and Hagel [2], communities of shared interest emerge; the Internet has transformed the IVC into a network of IVCs. Instead of an information value chain, the Internet has created an information value network (IVN). This suggests a second proposition:

Proposition 2: The Internet Creates a Linked Network of Information Value Chains, an Information Value Network (IVN)

Individuals may be members of multiple value chains, organizations, and communities. Their roles in each of these may differ. In one, the individual primarily may be an information supplier; in another, the individual may do more analysis or synthesis. The overall information value network enabled by the Internet is a linked set of learning cycles and value chains; individual participate in many of these, even though they may be contributing only a portion of their individual learning cycle output to any one of the organizations or communities.

3. Visibility, Communities, and Learning

This section argues that the two Internet phenomena of IVC process visibility and the emergence of communities produce an IS that enhances individual and organizational learning. Individual learning leads to organizational learning because the individuals are members of organizations [16]. Dixon [10] also shows that individual learning is linked to organizational learning.

The learning model assumed is the Kolb model of experiential learning. Kolb [21] proposed this model of individual learning based on a synthesis of the prior models of Dewey, Piaget, Lewin, and others. The model has a long history of application to studies of individual learning, and Kim [20] and Dixon [10] have extended the model to organizations. The model has been used (e.g., [25]) to complement the information system model of organizational learning proposed by Huber [16]. The model describes four fundamental activities placed at the edges of two dimensions: active-reflective and concrete-abstract.

Nonaka [29:15] points out that knowledge creation and organization requires the flow of information; information is a necessary medium or material for initiating and formalizing knowledge [29:16]. In other words, the information flow pattern along the IVC is associated with the capacity of organizational learning. An effective and efficient IVC can increase the potential of organizational learning. This information view of organizational learning, as taken by Huber [16], is the perspective assumed for this paper. From this perspective, the activities on the IVC may be regarded as learning activities. By mapping the IVC models of Rayport and Sviokla [30] and the organizational learning cycle [10, 16] onto the Kolb cycle, we notice a strong correspondence, as shown in Figure 2.

![Figure 2. The learning cycle and information value chain](image-url)

For the following discussion, consider the requirements for an information system that would support complete, effective learning. Such a system may be associated with three aspects of the above model: supporting the completion of the cycle (enabling the individual or organization to work through each of the steps or activities, using relevant information), increasing the speed with which an individual or organization com-
pletes the cycle, and increasing the scope of information considered in each activity in the cycle.

Considering the first aspect, Kolb [21] argued that complete learning requires going through the complete cycle: completion of the full cycle of concrete experience, reflective observation, abstract conceptualization, and active experimentation. At the same time, for an organization, the information at each step needs to be relevant to the organization’s purpose and the activity at that step. Thus an information system needs to support the entire cycle and provide relevant information for each activity.

For the second aspect, the system needs to support as many of these activities as feasible and increase the speed with which each step can be completed. All other things being equal, increasing the speed means that the learner (individual or organization) can complete more cycles in the same amount of time. A shorter learning cycle increases the capability for learning.

For the third aspect, we posit that the more diverse knowledge accessible at each stage in the cycle, the broader the scope of each activity at that stage and the greater the likelihood that all the relevant knowledge will be available for the learner. For example, more diverse knowledge at the reflective observation step can encourage more reflections and may lead to a wider range of abstract concepts at the next step in the cycle, greater experimentation, and a broader range of concrete experience.

The paragraphs below describe in more detail the benefits that the Internet provides for learning according to these three aspects of the learning cycle: completeness, speed, and scope. The Internet does this through the increased control provided to the user and the enabling of the online communities.

3.1 Completeness of Learning

Proposition 3: The Internet encourages individuals to complete the learning cycle by providing increased user flexibility and control.

Proposition 4: The Internet does not guarantee efficient or effective retrieval of all relevant information.

Completeness of learning involves both the completion of each activity in the cycle and use of complete, relevant information at each step. The information used at each activity should be relevant and appropriate for the activity.

Completeness of the cycle is critical for organizational learning. This completeness is inherent in Kolb [21]. Senge, et al [33] emphasize the need for links and loops among system entities, the need for continuous reinforcement of these loops, and the need for the reinforcements to be aligned with the organizational goals. In other words, the completeness of the cycle is compatible with the principles of cybernetics for a purposeful, self-organizing system.

Dixon [10] notes that failure in the completeness of information value chain (learning cycle) can result in the silo phenomenon in organizations. This occurs when one part of the organization does not have access to what other parts know [10: 73]. The impact of this is the inability of each part of the organization to understand and correctly interpret its own information because it lacks the context of the whole picture. In referring to this problem, Dixon says:

... Organizations typically carry out these steps (along the information value chain) in ways that severely limit organizational learning. Typically, a different part of the organization conducts each step. ...... When the steps of the organizational learning cycle are disconnected, collective learning is lost [10: 44-45].

The Internet provides support for the complete cycle. Because the Internet enables users to exercise control at each stage in the IVC; the IVC no longer comprises a sequence of “black boxes,” as it does in an IS arising from a structured development process. Consequently, we can say that the Internet, by increasing the user’s control of each step in the IVC, supports the processes throughout the value chain and throughout the learning cycle.

However, learning also requires that the information at each step be relevant to that step and to the goal of the user. The Internet model does not assert that the necessary information is available. In fact, given the status of today’s search engines, the user may access much information that is not relevant. Consequently, the user still must make judgments about the relevancy of information that is available.

The effectiveness of the Internet model, in contrast to the IS arising from a structured design process, is not fixed. System effectiveness does depend on careful design but rather on assuring the availability of a wide range of information and the rapid learning of what is relevant. The Internet enables the user to control the acquisition step and to make the relevancy decision at the point of acquiring the information—and who is in a better position to know what information is relevant? Each use of the Internet is an instantiation of an IS, and the flexibility of a new IS design for each use provides the opportunity for users to learn through consecutive trials. While the Internet model does not assure either completeness nor appropriateness of the information acquired, it does enable learning through repeated uses.
(designs). For unstructured issues, this may be more effective than trying to specify the information needed beforehand.

### 3.2 Speed of Learning (Cycle Time)

**Proposition 5:** The Internet improves the speed of organizational learning by lowering routing and distortion costs.

Individual organizations exhibit distinct characteristics in message routing, message delay, message summarizing, and message modification [8]. The first two characteristics are related to the routing costs, and the latter two influence the distortion costs. Routing costs occur during the information acquisition stage, whereas distortion costs occur later such as during interpretation and communication.

One way to view information behavior is to consider that information is acquired to reduce uncertainty (i.e., to help decide among alternatives), and it is interpreted to reduce equivocality (i.e., to make sense of an ambiguous situation). From this perspective, routing costs may be considered as the costs of uncertainty; distortion costs may be considered as the cost of equivocality. Both types of costs introduce delays in organizational learning, since each reduces the amount of information acquired, the speed of information flow through an organization, and the amount of effort required for the organization to interpret information and develop shared meaning.

Routing costs are triggered by the activities for the selection (acquisition) of information. Information acquisition aims at reducing uncertainty, which may be defined as the absence of information about the truth of a known set of propositions [34]. As noted above, Moreland, Argote & Krishnan [28] argue that the organizational performance depends on the ability to know who is good at what (i.e., knowledge acquisition routines). This argument means that some of the socially-constructed knowledge may be stored in the relationship of the community participants [7]. Badaracco [3] distinguishes this embedded knowledge from migratory knowledge, and notes that it is difficult to separate the embedded knowledge from the relationship involved. In the absence of this knowledge (again, similar to Wegner’s [38] transactive memory), the organization may spend time (costs) seeking the appropriate source of the needed information. Once located, the source needs to be available at the necessary time.

Reduced routing costs means that the user can change the search strategy “in real time,” discarding irrelevant information and continuing the search. In other words, the (abstract) concept of a search strategy is tested (active experimentation), the (concrete) results observed and compared with the (abstract) needs, thus completing the learning cycle. The complete cycle can be performed more quickly than if the user had to work with an IS designer to change the search strategy for each instantiation of the IVC.

The Internet also lowers costs associated with distortion. Distortion, or misinterpretation, and the subsequent misunderstanding of messages, delays the organizational learning cycle. Organizational learning requires shared meaning and consensus among organizational members [14, 16, 22]. Fiol distinguishes two types of consensus: a consensus on content and a consensus on the appropriate frame. Framing [12] can affect information interpretation if information has not been framed uniformly across different organization units [16]. The participants in the virtual communities emerging on the Internet, by their nature, share a similar frame; transferring and communicating knowledge within the community is more effective and efficient than transferring and communicating across different communities. Because the communications costs are lower within a community (because of the similar frame), the communities are self-selecting; the Internet has set up system that is self-reinforcing.

At the community level (especially, but not limited to, the community of interest), information users become information providers. By facilitating the interactions within such communities, the Internet facilitates the emergence of “thought collectives” [15], “thought worlds” [11], and “communities of knowing” [6, 5]. Within these communities, learning is enhanced. Just as with individuals, the Internet accelerates learning by enabling a member of the community to test an idea, get concrete feedback, reflect on the results, and modify the abstract concept quickly—the community itself can complete the learning cycle without delay. Not only do these communities share knowledge in the sense of transferring knowledge from one member to another, the communities have distributed knowledge, knowledge that arises from distributed cognition [5] and from the social process of sense-making [39], a process of interpretation and feedback that leads toward a shared sense of meaning. Thus by facilitating the sharing of distributed knowledge, the Internet helps assure the creation of new, socially-constructed knowledge.

The embedded knowledge is an important aspect of organizational learning. As Huber [16] notes, organizational learning occurs when organizational members obtain additional information, share it with others in the organization (diffuse or distribute it), and share in its interpretation (e.g., agree on its meaning and utility).
Thus organizations learn (benefit from the Internet learning of their members) only if their members who participate in the Internet communities also participate in intra-organizational communities that share information gained from the Internet communities.

Reduced distortion costs means that the users’ control over the processes stimulates faster individual learning. This individual control provides for what Hunt [17, 18] refers to as “inside out” learning, in which the learner (user) controls the pace, direction, and scope of the exploration and learning experience. Hunt [18] argues that this approach provides higher motivation for learning, a greater incentive to explore, the freedom to test new concepts, and thus accelerates the learning experience.

The reflection step in learning might seem to be an exception: how can the Internet (or any technology) accelerate reflection? People can only absorb a fixed amount of information and knowledge; and they can only contemplate at a limited speed—one may argue. The Internet can not necessarily change the rate at which an individual can move through the reflection step in learning, but communities of learners may act somewhat like parallel computer processors. Communities enable individuals to benefit from the reflections of others. Communities of knowing can accelerate the contemplation of diverse ideas and be more efficient at finding a way to make sense of apparent paradoxical viewpoints. Consequently, we conclude that even in the “reflective observation” activity, the Internet can accelerate learning.

3.3 Breadth of Learning (Scope of Activities in a Cycle)

Proposition 6: The Internet improves the breadth of organizational learning by providing diverse information.

At the same time the Internet increases the user’s control of his/her capability to generate information and become an information provider (IP), it increases the independence of the user and external IPs. This greater independence enables improved access to a greater diversity of information. Through this independence, the Internet enables information providers (supply side) to collect and present information they judge to be valuable and critical rather than being dependent on knowing the exact needs of the user. This encourages more rapid reporting of information, thus accelerating the supply side of the IVC. Independence also enables a wider range of information providers to offer information by reducing the coordination cost of making the information available.

Completeness of the learning cycle is not enough if concepts are not challenged and tested by new ideas. For continual, double-loop learning, an entity must have presented to it diverse information, information that tends to break down traditional habits and challenge established models [1, 29, 31]. Without this challenge, the entity can continue in its same path, reinforcing models and strategies that may have become obsolete and simply exploiting old knowledge [22]. The Internet raises the visibility of representations from various perspectives, enabling organizational members to compare their own frames with other ways of understanding a specific problem and to develop a working appreciation for these other alternatives [6]. By being challenged by information and knowledge created outside the organization’s own concepts and models, the organization is forced to confront contradictions and to make sense of conflicting perspectives.

This means that the Internet can overcome the limitation of traditional information systems to organizational learning. Instead of dealing with information whose frame and content was frozen at the time of design, organizations using the Internet have access to diverse information. This enables the organization not only to perform model maintenance (e.g., reduction of uncertainty) but to do model building (increasing equivocation about current models and stimulating reflection on other models) [37]. This is an essential characteristic of a true learning organization, according to Nonaka [29], who argues that efficient acquisition and processing of information is inadequate. Dixon agrees:

A basic tenet of systems theory is that heterogeneity produces energy whereas complete homogeneity leads to entropy. A closed system will increasingly develop a homogeneous view. …… Diversity is created by opening the organizational boundaries to let in new views [10: 71].

In other words, by providing a range of viewpoints, ideas, and knowledge, the Internet encourages double-loop learning.

4. Conclusion and Discussion

This paper has argued that one way to understand how the Internet creates value is by taking a visibility perspective and examining the role of an emerging Internet model (as opposed to the Internet as it currently
exists) in promoting and enhancing individual and organizational learning. The paper has shown that the Internet model, compared with an IS arising from a “structured design/development” process, increases the visibility and control of processes in the information value chain to individuals, enables more independent information production and use, and thereby facilitates the emergence of online communities. In the information value chain and in the online communities, the information provider and information user can behave more independently. This independence is significant both for motivation and for the structure of information and knowledge retrieval and creation. The combined effect is that the Internet promotes organizational learning.

The success of the Internet to date suggests that future information systems may have more Internet model characteristics than the predictable characteristics of systems implemented through the traditional systems development process. The Internet eliminates the traditional roles of information system analyst and designer. This disintermediation of the value chain signals the need for a major shift in focus for IS researchers and managers.

Researchers may make their greatest contributions by studying information systems as dynamic, self-organizing systems. Because Internet information systems may not have a sustainable steady-state, researchers may need to seek models from the field of complexity theory, ecology, and evolution rather than more traditional feedback and control systems (cybernetics). It is not that cybernetic and systems life cycle development models are wrong, but they may be inadequate as descriptive or prescriptive guides to understanding and designing the full range of information systems that will serve organizations over the next decade.

In the same manner, organizational information systems managers may need to look toward increasing their emphasis on “pull” type information systems rather than the “push” systems of the past. Akin to “just in time” material flow systems, the information systems that contribute most to organizational learning in the future may eliminate “buffer” stores of information and knowledge and depend on networks of connections. Control may be more through self-organizing principles instead of centralized or fixed controls. Design principles may be drawn from marketing; the responsibility for information quality will reside (rightly) with the information provider rather than some intermediary who tries to control for quality.

There are several limitations to these arguments. The Internet model is an idealized vision of what the Internet is today. This vision requires improvement in search tools and presumes the emergence of quality assurance processes as the Internet matures. Moreover, structured approaches to ISs will still be preferred for systems that fulfill structured tasks such as accounting, payroll, and transaction processing. As students and managers of strategic systems, however, we should look beyond the traditional models and keep in mind the range of perspectives that the Internet challenges us to examine.

5. References


