Organizational Forms in the Electronic Age

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Executive Summary

There is a fundamental shift in economics of information due to emerging information and communication technologies (ICTs). This shift has resulted in what is popularly called the 'information revolution.' Most people are quite familiar with arguments that suggested the death of organizations as we know them. While a lot of such writing was hyped, there is a definite impact of the emerging ICTs on fundamental organizing principles leading to some real changes in organizations.

This paper attempts to understand and explicate some of these influences by expanding the framework offered by Transaction Cost Theory (TCT). TCT assumes that economic actors (individuals or firms) display bounded rationality and opportunism. Bounded rationality suggests that people cannot be truly rational despite their desire to be so. Opportunism suggests that people often cheat to gain at the expense of the other party in a transaction. Hence, organizations are designed to reduce the impact of bounded rationality and safeguard against opportunism.

Transaction costs are incurred in ensuring efficient and fair exchanges between economic actors. There are three kinds of transaction costs:

- Information costs related to the search, acquisition, storing, processing, and dissemination of information associated with the transactions
- Contracting costs which refer to the cost of negotiations and contract development
- Coordination costs related to the activity concerned with satisfying each party to an exchange that the value given and received is in accordance with the formal contractual agreements and expectation.

The most efficient forms of organizations result when governance mechanisms reduce the transactions costs. Traditionally, TCT suggested that market, hierarchy, and clan were three governance mechanisms that were efficient in three different contexts.

This paper argues that the internet has increased the efficiency of market governance leading to transactions that were not feasible earlier. Large and reputed organizations now have an opportunity to reach out to customers and also increase their participation in transactions. The internet has also led to the emergence of virtual organizations based on a new mode of governance called self-governance. Organizations can now encourage their employees to be part of communities of practice for mutual benefit.

Extranets have enhanced the scope of network organizations by making network governance more viable. They provide a means of developing a reliable vendor network that gives the large organizations the benefits of the market while maintaining appropriate hierarchical control.

Finally, intranets have improved the efficiency of hierarchical governance thus expanding its scope of application. They have improved the efficiency of matrix organizations and facilitated the management of integrated and centralized organizations. Intranets have also made clan governance more feasible. This will allow large companies to build organic solidarity in a geographically distributed team to create new products.

In essence, the emerging information technologies are beneficial for the following reasons:

- They have led to the emergence of new modes of governance.
- They have increased the opportunity to govern a greater range of exchanges than was possible without them.
- They have altered the conditions under which the alternate modes of governance are suitable.

However, organizational designers need to acquaint themselves with the limitations before designing organizational forms.
There is a fundamental shift in economics of information due to emerging information and communication technologies (ICTs). This shift has resulted in what is popularly called the ‘information revolution.’ It is predicted to lead to changes in industry structures and organizations that operate within them (Evans and Wurster, 1997). In addition to the attention it has received in academic and managerial circles, it had attracted a lot of interest in the public media, particularly during the ‘dot.com’ boom. As a consequence, most people are quite familiar with arguments that suggested the death of organizations, as we know them, only to be replaced by new organizational forms that will be largely dependent on emerging ICTs. Existing organizational forms were described as brick-and-mortar organizations that had to be abandoned to adapt to the information revolution. The zealous protagonists argued that organizations would have to transform to become ‘e-organizations’ or perish. The more modest urged that organizations move to become ‘click-and-brick’ organizations which combined the old with the new. While a lot of such writing was hyped, there is a definite impact of the emerging ICTs on fundamental organizing principles leading to some real changes in organizations. This paper attempts to understand and explicate some of these influences by expanding the framework offered by the Transaction Cost Theory (TCT) and applying it to the current and emerging organizational forms.

**TRANSACTION COST THEORY**

The origin of TCT is rooted in attempts to answer the questions about why organizations exist (Coase, 1937). The conceptual underpinnings of this perspective are best illustrated in the work of Williamson (1975) and its extensions by Ouchi (1980), and Williamson and Ouchi (1981). The perspective has gradually evolved to provide a framework for the analysis of a wide variety of organizational phenomena (Barney and Hesterly, 1996).

Two fundamental assumptions in TCT, also shared by some other perspectives on organizations, are the concepts of (i) bounded rationality, and (ii) opportunism. Bounded rationality suggests that economic actors (individuals or firms) may have a desire to be rational but their attempts to be rational are bounded by their cognitive limits. They do not have the capacity to process all the information about the context within which they operate in the limited time that is normally available to them. Also, most problem situations faced by economic actors may not be fully defined. Further, even if the situations are fully defined, all relevant information to have truly rational decision-making may not be available.

Opportunism suggests that economic actors do not only act in self-interest, as is assumed by most economic theories, but are capable of pursuing their self-interest with guile. These behaviours may include lying and stealing but can be described for the purposes of this perspective as the incomplete disclosure of information, especially calculated to mislead, distort, disguise, obfuscate, or otherwise confuse a partner in an exchange (Williamson, 1975). In other words, although they may not always do so, individuals (or firms) can sometimes be expected to make calculated efforts to cheat other parties in a transaction, especially when it is difficult for them to distinguish opportunistic behaviour from expected behaviour. For example, a vendor may surreptitiously use inferior components and charge for high quality components when it is difficult to detect inferior quality after the product is fully assembled.

Within the framework of these two assumptions, TCT views economic activity as a set of transactions with the partners involved in the transactions utilizing different means to manage them. According to Williamson and Ouchi (1981):

> Faced with the bounded rationality on the one hand and the proclivity for some human agents to behave opportunistically on the other, the basic organizational design issue essentially reduces to this: organize transactions in such a way as to economize on bounded rationality while simultaneously safeguarding those transactions against the hazards of opportunism.

In the original work of Williamson (1975), two governance mechanisms were suggested: (i) market and (ii) hierarchy. These were viewed as two mechanisms that provide low transaction costs in different contexts. Ouchi (1980) extended the arguments of TCT to suggest clan governance as a third mechanism that provides lower transaction costs in a certain context.

**Transaction Costs**

Economic actors in an exchange may not share common goals. Left to themselves, they may pursue incompatible goals thus resulting in loss of potentially achievable value. In order for them to pursue a common economic
goal, they need to devise means to ensure cooperation. Transaction costs are incurred in ensuring cooperation and a fair exchange among the parties concerned (Ouchi, 1980).

Transaction costs arise principally when it is difficult to determine the value of the goods or services that are exchanged in a transaction (Ouchi, 1980). The choice of governance mechanisms is guided by the need to minimize the cost of transactions. If a transaction is viewed as a three-stage process, then the first stage is devoted to seeking information about the product or service and the potential parties involved in the exchange. The second stage involves preparing a contract that defines the parameters within which the exchange will take place. The third stage entails coordination among the parties to ensure that the exchange is executed as per the contract. Within this framework, transaction costs consist of:

- Information costs, related to the search, acquisition, storing, processing, and dissemination of information associated with the transactions.
- Contracting costs which refer to the cost of negotiations and contract development.
- Coordination costs related to the activity concerned with satisfying each party to an exchange that the value given and received is in accordance with the formal contractual agreements and expectation (Kulkarni and Heriot, 1999).

**Market Governance**

Market governance relies on market forces to keep all parties in a transaction informed of their rights and responsibilities (Barney and Hesterly, 1997). It is considered the most efficient form of governance in competitive markets. The simplest market transaction is a spot contract with all obligations being fulfilled at the time of exchange. A purchase of a light bulb, which is functioning at the time of the transaction, with no obligation for future performance, is an example of the execution of such a contract. Such a transaction has negligible information costs as market forces ensure the quality and price of the product, no contracting cost as such transactions rely on standard contracts, and no coordinating costs as there are no obligations for the future.

A more elaborate contract is a contingent claim contract that ‘specifies all the obligations of each party to an exchange, contingent upon all possible future states of nature’ (Ouchi, 1980), as market forces are less capable than in a purely competitive market to ensure fairness in an exchange. Extending the example of the light bulb, a contingent claim contract could include performance warranties for a specified period of time in order to address the uncertainty and risk of opportunism that may exist. In such a transaction, the information costs remain largely unchanged but the contracting costs and coordination costs increase making it less efficient than the spot contract. However, in most cases, the context of transactions is so uncertain and prone to opportunism that it may be difficult to include contingent claims for all possible states of nature.

A third type of contract, which is suitable when uncertainty and risk of opportunism is higher, is the sequential spot contracting, in which parties in a long-term exchange relationship renew their obligations after short intervals avoiding the need to predict all possible states of nature. In this case, even if one assumes that information costs do not increase, contracting and coordination costs increase even more than the contingent claim contract. In other words, the transaction costs in such contracts are higher than in the contracts described above.

In summary, there are conditions of low uncertainty and risk of opportunism when markets are capable of ensuring a fair exchange for which the market governance is efficient because information, contracting, and coordination costs are low. As the markets become less competitive and, as a consequence, uncertainty and risk of opportunism increase, market-based transactions become more inefficient.

**Hierarchical Governance**

As levels of uncertainty and potential for opportunism increase, there is a stage beyond which market governance becomes less efficient than hierarchical governance. Hierarchical governance brings parties in an exchange under the direct control of a third party. Parties, who could have conducted transactions using market mechanisms, find it beyond their ability in terms of information, contracting, and coordination costs to manage the exchanges efficiently. For individuals, employment becomes a means of exchanging one’s ability to produce something of value with another. For firms, it may mean being absorbed into a larger organization.

For individuals, employment reduces the impact of uncertainties and risk of opportunism even as it reduces
their ability to exploit them. A manager in the hierarchy places a value on the contribution of individuals and compensates them for it with an attempt to maintain equity among all. This reduces information costs for an individual. Contracting costs are reduced as organizational processes replace contracts and the costs are amortized over large number of internal transactions. Further, coordination costs are reduced because managers plan work activities for the employees thus reducing uncertainty experienced and also use incentives to prevent individuals from pursuing opportunistic behaviour. Similar arguments can be used to explain why larger organizations absorb smaller organizations.

In summary, when uncertainty and potential for opportunism increase beyond a point, hierarchical governance becomes more efficient than market governance. This leads to formation of groups and organizations in case of individual economic actors and the merger of transacting organizations in the case of firms. If conditions change in the opposite direction, it can lead to individuals reverting to self-employment and de-merger or break-up of large organizations.

**Clan Governance**

According to Ouchi (1980), in addition to bounded rationality and risk of opportunism, there are two other factors, namely (i) ambiguity of the measurement of performance, and (ii) the congruence of goals that have an impact on transaction costs and hence influence the choice of governance mechanism. Market governance does not require goal congruence among the parties in a transaction. Market forces ensure that parties cooperate and avoid opportunism even if their individual goals do not converge. The system works as long as measures of performance are reasonably unambiguous. Hierarchical governance is able to ensure cooperative effort and limit opportunism through managerial control and incentives even when measures of performance are somewhat ambiguous. However, just as market governance fails when uncertainty and risk of opportunism become too high, hierarchical governance fails when performance ambiguity is too high. A manager’s ability to estimate the value of contribution and maintain equitable exchange is limited, encouraging opportunism, resulting in the need for another mode of governance.

Clan governance does not require explicit monitoring of outcomes or behaviour to ensure cooperation; hence ambiguous measures of performance are less of a concern. Clans employ a traditional type, rather than a rational-legal type of authority, that does not require explicit feedback. Performance feedbacks are based on subtle signals from intimate co-workers but which cannot be translated into explicit verifiable measures. Rather than rely on hierarchical control to monitor and reward required outcomes and punish undesirable behaviours, clan governance attempts to build organic solidarity by relying on social norms. In other words, when the performance ambiguity is so high that neither market discipline nor hierarchical control can ensure cooperative effort, then it is most efficient to rely on the inner drive within individuals and implicit control of clans.

Ouchi (1980) argued that clan governance is most suitable for organizations in technologically advanced or closely integrated industries where teamwork is common, technologies change often, and, therefore, individual performance is highly ambiguous. Since performance is difficult to evaluate, these organizations need to obviate the need for evaluation by attempting to eliminate goal incongruence that actually leads to opportunism. If successful, it alleviates the need to rely on markets or hierarchies and thus significantly reduces information, contracting, and coordination costs. At the level of individual actors, this may mean formation of self-managed teams. At the level of firms, it may mean formation of consortia or joint project teams to address specific issues where such conditions prevail.

Table 1 summarizes the arguments of TCT. While TCT provides a descriptive framework to understand different mechanisms of governance and organizational forms, it can also be used as a normative framework to suggest mechanisms and forms that need to be adopted. Market governance is the most efficient when uncertainty is low, risk of opportunism is low, performance ambiguity is low, and there is little goal congruence among parties to an exchange. Hierarchical governance is suitable when there are moderate levels of uncertainty, risk of opportunism, and ambiguity in performance evaluation. Also, all parties share broad goals. Finally, clan governance is most suitable when uncertainty is high, risk of opportunism is high, and ambiguity of performance evaluation is high, but a high level of goal congruence is available or achievable.

Typically, uncertainty, risk of opportunism, and ambiguity of performance measurement are derived from the nature of economic activity and are correlated. Level of goal congruence is derived from the nature of eco-
nomic actors and may be uncorrelated with the others. Market governance does not require goal congruence and hierarchical governance requires only limited goal congruence. Hence, senior managers have to exercise little choice when opting to use markets or hierarchies. However, creating goal congruence is a difficult and long process. Hence, clan governance is not easy to implement. Also, managers need to develop the ability to manage in an environment in which their subordinates rather than they are in control. In increasingly uncertain and knowledge intensive environments, senior managers will have to come to terms with their context and move to clan governance, particularly, at higher levels in the organization.

**IMPACT OF EMERGING ICTs ON ORGANIZATIONAL FORMS**

ICTs have affected organizational forms in a variety of ways. As Fulk and DeSanctis (1999) suggest, filing systems, inter-office memo, and business meetings were early technologies that contributed to the increased efficiency of hierarchical governance. They reduced the information costs and, to some extent, the coordination costs of transactions inside an organization making organization-based transactions relatively more efficient than market-based transactions. This led to many activities, traditionally done in the market, to be brought within the boundary of organizations resulting in the emergence of large organizations run primarily on hierarchical control. Similarly, the telephone, the telegraph, and the mail systems reduced the costs associated with the transactions associated with geographically distributed organizations. These further increased the efficiency of hierarchical governance. These changes contributed to the development of multidivisional and multinational organizations and, to some extent, the early versions of network organizations. In the same way, emerging ICTs based on computer and electronic media are affecting the costs associated with various types of transactions (Gurbaxani and Whang, 1991; Malone, Yates and Benjamin, 1987), which are leading to, and are likely to lead to, further changes in organizational forms.

There are five broad features of emerging ICTs that have the ability to influence organizational forms which are as follows (Fulk and DeSanctis, 1999):

- The dramatic increase in the speed of communication, particularly in terms of high volume of rich information that may be moved over large distances.
- The reduction in technology costs that has led to a wider penetration of technologies.
- The sharp rise in communication bandwidth which allows multimedia communications.
- The vastly expanded connectivity of a large number of individuals and organizations.
- The integration of multiple technologies which is referred to as convergence.

These characteristics clearly suggest that there will be a greater implementation of ICTs in and around organizations. What is the impact of these technologies on transaction costs? What are their implications for organizational forms? We examine this issue in the remaining part of this section.

Discussions on the potential impact of ICTs on organizations can be organized in a variety of ways. In this paper, the arguments are organized around three broad applications of these technologies:

- The internet, which connects everyone, but most importantly connects customers and also competitors to the organization.
- Extranets which connect an organization to other organizations it deals with, particularly its suppliers and dealers.
- Intranets which connect individuals within an organization (Evans and Wurster, 1997).

Each of these applications may have significant overlaps with each other in their actual operations but since they can conceptually be separated, they will be discussed separately for ease of presentation. Also, even as we focus on these three streams of applications, we understand that their effects are complemented by improvements in telecommunications which are also difficult to neatly segregate in the age of convergence.

<table>
<thead>
<tr>
<th>Mode of Governance</th>
<th>Uncertainty due to Unpredictable Changes</th>
<th>Risk Due to Opportunity Potential</th>
<th>Ambiguity in Performance Measurement</th>
<th>Goal Congruence</th>
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<tr>
<td>Market</td>
<td>Low</td>
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<tr>
<td>Hierarchy</td>
<td>Medium</td>
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<td>Clan</td>
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Table 1: Modes of Governance and Context Parameters
The internet can be conceptualized as an ICT system that facilitates communication among organizations, suppliers, customers, and even competitors. By making information easily and cheaply available to such a wide cross-section of entities, the internet has the potential to (i) increase the scope of market governance, and (ii) lead to the emergence of self-governance as a new mode to manage transactions.

Increase in scope of market governance: The internet’s ability to increase the scope of market governance has two dimensions. On the one hand, it can allow transactions that would otherwise not have been possible to become a reality. On the other, it can reduce the transaction cost of market governance relative to hierarchical governance leading to transactions that were traditionally conducted within the organization to be conducted in the market.

How does the internet facilitate transactions that were not possible earlier? Information has always been a part of the transactions of physical products but was rarely seen as a separate aspect (Evans and Wurster, 1997) as there were limited tools to deal with them separately. The early attempts to separate the two may be seen in the mail-order sales systems that were either based on providing information to a broad group of potential customers through advertisements or to a narrow group by providing detailed catalogues. However, there was a compromise between richness and reach of information because of the reliance on dedicated communication channels. Richness consists of three aspects: (i) amount of information transferred from sender to receiver, (ii) the degree of customization of information, and (iii) the level of interactivity (Evans and Wurster, 1997). Rich information was very expensive to disseminate, even with catalogues, and hence there was a limit on the extent to which rich information was transferred. And, in order to increase reach, richness of information had to be compromised as in the case of advertisements. Although the mail-order systems, based on advertisements or catalogues, did allow many market exchanges that would otherwise have not been possible, their impact was quite limited.

The internet has allowed for a higher level of separation of the physical and information aspects of a product or service. Organizations can now pay greater attention to the information aspect of their products (Fulk and DeSanctis, 1999). Unlike traditional advertisements or catalogues, the internet allows organizations to overcome the compromise between richness and reach of information. It allows highly rich information (large amounts of customized information along with interactivity) to be made available without any limits to reach.

With the internet, the information costs for a potential customer have been reduced because of easy and cheap availability of rich information on a product/service and its substitutes. This helps a customer address issues of bounded rationality thus reducing the impact of uncertainty on a transaction. While contracting costs are largely unaffected, the ability to keep track of orders and payments decreases the coordination costs of a transaction. This helps a customer deal with scope for opportunism. Finally, the ability to compare performance standards to other products with ease and easy access to product ratings and comments by past users reduces ambiguity in measurement of performance. As a result, transactions that were almost impossible can now occur without too much hassle with the help of the internet. This is indicated as A1 in Figure 1.

For example, Dell Computers has ‘online’ enabled its order processing so that individuals/organizations can ‘custom’ order their needs and even track the progress of their order. Amazon.com allows persons anywhere in the world to make purchases without significant difference in transaction costs — the information, contracting, and coordination costs associated with any purchase at Amazon.com is the same. Similarly, Fabmall in Bangalore is an example of an organization that has placed substantive portion of its value adding activity in the domain of the electronic market. While some of the transactions at Fabmall would have occurred even without the internet, it allows a larger number of transactions that would otherwise not take place because of lower transaction costs.

How does the internet reduce the cost of transactions conducted in the market, relative to those conducted within the organization? Once again, the ability to separate information from the physical aspects of an offering and provide rich information without limits of reach helps organizations to allow customers take over large portions of the value chain in the delivery of a product or service. For example, the Indian Railways has placed its ticketing and reservation availability information on its website. A traveller can visit the site and have complete information on availability of tickets, routes, schedules, and even book the ticket online. Similarly,
airline tickets can be purchased and hotel rooms can be reserved using the internet. Without the internet, organizations would have to conduct a significant amount of these activities in-house.

The internet also reduces coordination costs by allowing customers to monitor the execution of the contract. Continuing with the example of Indian Railways, a customer can check his/her seat number or movement from waitlist to confirmed reservation and even view changes in schedule without having to travel or rely on the phone system. Further, if a transaction requires future obligations, the internet facilitates their coordination. For example, the courier companies allow customers to track the progress of their package as it moves towards its destination. Without the internet, an entire department had the responsibility to answer queries from customers regarding the status of the packages.

The internet has essentially improved the ability of customers, as well as organizations, to address the problems of uncertainty, risk, and performance ambiguity by providing a means of disseminating and processing rich information. This has allowed organizations to move some of the activities at the interface with the customer to the market rather than retain them in the organization. This is shown as A2 in Figure 1.

**Emergence of self-governance:** The internet has also created the scope for a new mode of governance beyond the clan governance which may be labelled as ‘self-governance.’ The emerging organization form is the virtual organization. The term as used here does not refer to a set of employees belonging to the same organization or independent organizations using the internet to better organize and coordinate their activities on behalf of their employers. In a virtual organization, people work across space, time, and traditional organizational boundaries linked by some means to pursue goals that may be independent of the goals of the organizations with which they are employed. The internet has facilitated those linkages as never before possible. It permits the coordination of activities that are quite unorganized which made them almost impossible to manage in the past. Volunteer groups, scientific research communities, and other similar informal groups are relying on the internet to facilitate efficient transactions among themselves. For example, the Soar Group is a virtual organi-
ization engaged in research and design of a general-purpose artificial intelligence architecture. The group emerged in an unplanned manner from voluntary participants of academic and corporate researchers and has no single shared physical setting (Ahuja and Carley, 1999). There is a similar virtual organization working together with the purpose of developing Linux as an operating system and software based on it. The organization develops open-source Linux-based software through the efforts of thousands of people around the world who have never worked together or even met each other except online. These people can function in such a set-up because they have tremendously high level of goal congruence — the desire to make software cheaper and accessible to a larger base of people. Their reward is typically global recognition and the satisfaction of seeing their idea adopted by others. In addition, several social bodies have been able to organize their efforts globally using volunteers across the globe (Crosby, 1999). Once again, the binding force is the strength of the congruence in goals.

Within the framework of transaction cost theory, the exchanges in these virtual organizations may be seen as occurring in highly uncertain environments with very high risks of opportunism and tremendous ambiguity in measure of performance. The environment is very uncertain because the outcome of these long-term projects may be subject to tremendous external changes; they may have to be abandoned. The risk of opportunism is high because individual participants may utilize learning from the participation and quit or use information in their favour, jeopardizing the existence of such organizations. Since these projects do not have clearly defined operative goals, they are very difficult to evaluate in terms of progress. The only reason that these virtual organizations can function is that the participants have a very high degree of goal congruence. This is shown as E in Figure 1.

In terms of transaction costs, the internet makes information and coordination costs extremely low. The contracting costs are not lowered but the need for incurring these costs is alleviated by the strength of goal congruence. As a result, truly virtual organizations have become feasible.

**Extranet**

Extranets are asset specific investments which lead to virtual vertical integration. Extranets allow companies to create a shared information space with their suppliers, business partners, and consultants. The extranet can be used to integrate some of the business processes directly in their customers’ or suppliers’ value chain so that there is a seamless functioning (Gerstein, 1992). It provides a tool for just-in-time supplier relationships and a medium for collaboration with business partners. Unlike the internet, an extranet does not provide access to everyone. It is a secure, password-protected area on an organization website that contains customized business information accessible only to certain organizations/individuals with whom the organization has exchanges. It is a fast, convenient, and relatively low-cost means of providing rapid, seamless communication among all parties concerned.

**Increase in use of network structures:** Extranets are leading to resizing and rescoping of organizations (Fulk and DeSanctis, 1999). By making transactions based on restricted markets more efficient, extranets are leading to organizations deciding to focus on the core business activity and outsourcing other activities. There are situations in which levels of uncertainty, risk of opportunism, and performance ambiguity are high enough to prevent organizations from conducting transactions in the open market, yet conducting these activities in-house results in loss of efficiencies. In such situations, organizational extranets allow the operation of a restricted market to get the benefits of market efficiency while enhancing the ability of the organization to use limited hierarchical control to deal with the arms length partner organizations. This results in smaller core organizations and a proliferation of supplier organizations.

Monge and Fulk (1999), following Powell (1990), called the intermediate organization form between market and hierarchy enabled by extranets the ‘network organization.’ While the term network structure has been used to describe a wide variety of organization forms, including geographical distributed units of a single organization, the term is used here to refer to the quasi-market context that allows multiple economic actors to work together. The term also excludes cases in which organizations have introduced outsourcing through the open market using the internet. We label the governance mechanism, which combines market and hierarchy, as ‘network governance.’ This is shown as B in Figure 1.

If an organization establishes an extranet and includes a limited number of approved suppliers, it increases the efficiency of the transactions relative to the
open market. Since the amount of information to be processed is much smaller, the information costs of the extranet are much lower than the information costs of a general internet access. This tends to encourage suppliers to participate in the network. Within the network of long-term relationships, contracting and coordination costs are in general low and they are further lowered by the extranet. If the nodal organization benefits from the efficiency of the quasi-market, it does not feel the need to manufacture the component in-house. Although the restricted market does increase scope for opportunism by the suppliers, the greater scope for monitoring using hierarchical governance prevents the negative effects.

There are several examples of network organizations of the type described above. For example, Cisco Systems posts its requirements for components on its extranet. Cisco’s suppliers, about 30 in number and only two owned by the company, post their quotes within hours which amounts to a sort of real-time bidding. This helps the organization keep its stock low. The suppliers also post their quarterly forecasts so that Cisco can also benefit from the information input about trends in the market. In India, Maruti Udyog has implemented its extranet that allows it to manage its suppliers with greater efficiency than was possible without it. Most of the global software outsourcing arrangements in India and the emerging business processing outsourcing industry rely extensively on network governance.

**Intranet**

Intranets (i) improve the functioning of the hierarchical governance, and (ii) expand the scope of the use of clan governance. Information technology affects the information processing capacity in ways that can increase or decrease centralization depending on the choice of the adopters (Fulk and DeSanctis, 1999). *Increased efficiency of hierarchical governance*: Hierarchical governance relies on the third parties’ ability to coordinate transactions between two parties within an organization better than the market. The greater the uncertainty, risk of opportunism, and performance ambiguity associated with the transaction, the more likely is the manager to have direct control. An intranet dramatically increases the ability of a manager to efficiently monitor activities at lower levels in the organization. First, information costs are reduced considerably as an intranet makes wider range and volume of information available in formats that assist decision makers. Second, coordination costs are also significantly reduced. This in effect has the ability to increase centralization without having narrow spans of control or several layers in the hierarchical structure. At Ford, its 1,70,000 staff receive a weekly note from the CEO telling them where he wants the business to go. The President of Cisco systems for Europe, Mid-East, and Africa goes further to monitor whether his e-mails are read by the employees or not and then calls those who have not to remind them. In other words, intranets can lead to extreme centralization in a hierarchical governance system. This is shown as C in Figure 1.

Alternatively, intranets also have the capacity to improve horizontal coordination that allows for greater decentralization if it is desired. Now, communications technology improves the choices available to organizational designers. For example, Verifone (now part of another firm) was a firm that relied 100 per cent on the intranet to coordinate its geographically distributed organization units. The intranet was used to disseminate information and expertise particularly to people located remotely. It was used to create *ad hoc* groups and enhance collaboration at a distance while maintaining a hierarchy (Gerstein, 1992). Similarly, Xerox has designed its intranet such that it provides employees with the ability to find and share corporate knowledge quickly and easily.

Further, intranets have improved the functioning of matrix organizations. Traditionally, when hierarchical governance was the predominant mode of organizing, all units required being located close to each other to permit rich communication which resulted in small organizations. When the organizations became unmanageable due to diversification into different products and markets, organizations had to choose between maintaining the centralized single organization or a decentralized multidivisional structure. Some organizations opted for matrix organizations to decentralize authority yet retained the ability to coordinate initiatives across divisions. A significant drawback of this organizational form was the intra-divisional conflicts. The intranet makes a matrix structure a more viable option by reducing the cost of transactions between divisions and encouraging a move towards truly transnational organizations. For example, Asea Brown Boveri (ABB) uses the ABACUS (Asea Brown Boveri Accounting and Communication System) efficiently to exert corporate control even as it delegates freedom to each division to
deal with its local concerns leading to the slogan: ‘Think Global and Act Local’ (Ghoshal, Piramal and Bartlett, 2000).

**Increase in scope for clan governance:** While, as suggested above, new information technology can be used to improve the efficiency of hierarchical control, it can also be used to improve the function of the clan form of governance. It was argued earlier that hierarchical governance is ineffective when measures of performance are ambiguous (Ouchi, 1980). Weisenfeld, Raghuram and Garud (1999) suggest that hierarchical governance is even less effective when workers are distributed across time and space. They found that the intranet can be used to increase organizational identification and binding so that organizations can rely on clan governance. Similarly, in her study, Applegate (1999) found that:

Through the design of (a) team-based structure, (b) shared authority and incentive systems, (c) networked coordinating mechanism, and (d) interactive, real-time, information-enabled operating and management processes, the study firms were able to develop a shared understanding of the business and shared purpose that mediated the development of collaboration and became the foundation of defining a new approach to managing both autonomy and control.

Constant, Sproull and Kieser (1996) also found that the intranet helps build ties among all those connected to allow better exchange of information.

In other words, the intranet can be used to develop clan governance so that its scope can improve from managing small groups to managing large numbers of people who may be remotely located/geographically distributed (Jarvenpaa and Leidner, 1998). In that sense, the intranet expands the scope of using clan governance to a larger range of transactions. For example, Cisco uses the intranet to build organic solidarity among members of geographically distributed development teams. Similarly, Nortel uses its intranet to increase the commitment of employees to its suppliers working on its project allowing it to rely on lower hierarchy to monitor their progress. This is shown as D in Figure 1.

**DIFFUSION OF ICT IN ORGANIZATIONS**

The discussions in the earlier section might suggest that ICTs have had widespread applications in organizations and are likely to lead to transformational changes in organizations. However, this is only partly true. The above discussions narrowly focused on the impact of emerging ICTs on information, contracting, and coordination costs in transactions and, using the arguments of TCT, examined the potential changes in organizational forms. However, there are several other issues that need to be addressed before the ICTs find more widespread use. A few of them are discussed below.

**Information Overload**

A significant argument in favour of using emerging ICTs was based on the reduction in information costs. However, these technologies have increased the availability of information without a comparable improvement in ability to intelligently process all the information so that it can have a real impact on transactions. Also, actors have very little ability to separate relevant from irrelevant information and spurious from real information. As a result, problems of bounded rationality may continue despite the availability of information. Several customers use the internet for comparison-shopping of the information component of the product or service and then make the final decision in a brick-and-mortar shop where they can touch and feel the physical aspects of their purchase (Sharma, 2001). Similarly, managers continue to use information and advice from people with whom they can physically interact despite huge investments in decision support systems (Scott Poole, 1999). As and when customers and managers can cope with the large amounts of information available, the impact of ICTs will be more visible. Internet search engines, with some intelligence built into them, have helped but there is scope for improvement. Similarly, extranets and intranets should also be designed to reduce information overload.

**Contracting Costs**

The earlier discussions suggested that, by and large, contract costs are not directly affected by emerging ICTs. While this is likely to be true when e-commerce becomes more established, in the short run, in the absence of clarity on how electronic contracts will be viewed by the law of the land, there is likely to be an increase in contracting costs. Contracts are devices to address the risk of opportunism present in an exchange. They facilitate transactions by giving comfort to both parties that, in case of opportunism, the legal system will ensure compliance with the agreements. However, since traditional legal phraseology does not explicitly address issues
related to electronic commerce (Bakshi, 1999), the parties have to take extra care to develop contracts. Contract enforcement still remains a problem which may explain the greater acceptance of business-to-business transactions and business-to-consumer transactions from well-reputed organizations that enter the e-commerce domain rather than new organizations. This to a large extent explains why business-to-business transactions have become more common while business-to-customer transactions have not grown as expected. The business-to-customer transactions, if at all, take place only in the case of established, larger, and reputed companies rather than young, entrepreneurial firms.

**Coordination Costs**

The impact of emerging ICTs has been examined under the pretext that they allow the separation of information and physical components of a product or service. However, in most cases, the actual experience is associated with the physical aspect of the product or service purchased. While ICTs have increased the efficiency of transactions by reducing costs associated with the information aspects, the deliveries of physical aspects of a product or service still depend on brick-and-mortar organizations. While ICTs improve coordination, the actual delivery is still based on physical distribution. For example, a book purchased through the internet still has to be transported physically from the warehouse to the customer. Hence, unless the physical component relative to the information component of a product is very small, ICTs are unlikely to facilitate transactions. This is yet another reason why business-to-customer transactions are less likely to occur than business-to-business transactions.

**Risk**

The internet exposes organizations to disturbances from the environment. Its internal systems that were normally insulated from the outside world are exposed to the problems from viruses posted on the internet and from hackers who can destroy very valuable internal information. The tighter the organization is integrated to the outside world the more likely it is to be susceptible to disturbances. Firewalls and computer security systems are attempts to address this situation. External disturbances in the extranet are less than the internet because access is protected and controlled. However, tight integration due to extranets quickly transfers disturbance in one part of the network to other parts of the organization. The new organization forms that build connections to customers and suppliers are so tightly coupled that even relatively small perturbations can lead to major disruptions (Scott Poole, 1999). Intranets may be insulated from the internet but it sometimes so tightly couples the parts of an organization that a minor disruption reverberates throughout the entire organization. A server breakdown because of one user can freeze activities in an entire organization. It is because of the risks associated with large-scale use of ICTs that we are unlikely to see the elimination of ‘old’ governance mechanisms and organizational forms.

**Resistance**

The emerging ICTs are, as discussed above, capable of causing large-scale changes in organizations which will lead to resistance that is normal with any change initiative. Further, since many of the information processing tasks are being taken over by information technology, there will be a loss of jobs during the transition. Also, just like the industrial revolution created large organizations that led to de-skilling of a lot of blue-collar jobs, the information technology revolution is also capable of doing that with a different layer of white-collar jobs (Victor and Stephens, 1999). These potential impacts of IT are likely to generate a lot of resistance from those who are affected. If such resistance can be addressed, some more radical implementation of ICTs may be feasible.

However, the resistance is real and is likely to be sustained. Hence, the impact of ICTs will be seen more slowly than the zealous protagonists suggest or want. The diffusion of ICTs will be quite gradual. Just as the earlier ICTs such as inter-office memos and telephones had a gradual impact on organizational forms and governance systems, computer and electronic technology-based ICTs are likely to see gradual diffusion before they become widely accepted. As with most innovations, the application of ICTs is also likely to follow an ‘S’ curve. We are currently at the bottom end of the curve but more radical impacts are expected to unfold in the future.

**CONCLUSION**

This paper is built on the fundamental framework offered by the TCT to understand the impact of emerging information and communication technologies on organ-
izational forms. This understanding has practical implications for managers trying to grapple with organization design in the face of the impact or potential applications of ICTs.

We have argued that the internet has increased the efficiency of market-based transactions thereby increasing the scope of market governance. One impact of the increase in scope was that certain transactions that were almost impossible are now feasible (A1 in Figure 1). The second impact is that certain transactions that were carried out by employees within the organization are now done outside it with customers performing several of the tasks themselves (A2 in Figure 1). A close scrutiny of the experience of organizations that have tried to exploit these potential applications suggests that reputed organizations (low contracting costs) dealing with relatively simple products (limited information processing required) that have high information relative to physical content (low coordination costs) are more likely to be successful than others. In other words, although the internet has facilitated more market transactions, certain organizations, as suggested above, are more likely to benefit from it than others.

The internet has also led to the emergence of virtual (or boundary-less) organizations based on a new mode of governance, which was labelled as ‘self-governance,’ as a viable mode in certain contexts that are even less structured than those conducive for clan governance (E in Figure 1). Commercial organizations, particularly those operating in the knowledge domain, can benefit greatly by facilitating their professional employees to be part of such virtual organizations referred as ‘communities of practice.’ Such organizations help individuals to keep abreast of developments in their field and help organizations by often offering solutions to complex problems that may not be easily resolved by knowledge within the organization.

Extranets have enhanced the scope of network organizations by providing a more viable mode of governance, labelled as ‘network governance,’ which can be positioned between market and hierarchy (B in Figure 1). Many Indian organizations still operate in highly integrated businesses. This is partially a hangover from the license/permit system that prevailed in the country. However, unreliable vendors and poor transportation facilities were also major reasons that contributed to large, often unwieldy, integrated business. Extranets provide a means of developing a reliable vendor network that gives the large organizations the benefits of the market while maintaining appropriate hierarchical control.

Finally, intranets have improved the efficiency of hierarchical governance thus expanding its applicability. Several holding companies had to run their wholly-owned firms as separate entities because size and distance did not permit a more hands-on management system and a matrix organization was not efficient. Now, intranets provide an opportunity for them to improve the efficiency of matrix organizations by facilitating coordination across units. If required, these organizations can be integrated and run as a more centralized organization (C in Figure 1).

Intranets have also made clan governance more feasible (D in Figure 1). New product development is an activity that has high uncertainty, opportunism, and ambiguity in performance measurement making it difficult to manage. Also, it is often difficult to create goal congruence making new product development a very political process. Hence, new product development rarely happened in teams that were geographically distributed. With intranets, large companies are in a position to build that organic solidarity in a geographically distributed team to create new products.

In summary, the emerging information and communication technologies have

• led to the emergence of new modes of governance
• enhanced the opportunity to govern a greater range of exchanges than was possible without them
• altered the conditions under which the alternate modes of governance are suitable.

However, before designing organizational forms based on the potential offered by these technologies, there is a need for organizational designers to acquaint themselves with limitations.

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All the world’s a stage,
And all the men and women merely players
They have their exits and their entrances;
And one man in his time plays many parts.

William Shakespeare