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# The Benefits of Transaction Cost Economics: The Beginning of a New Direction

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# THE BENEFITS OF TRANSACTION COST ECONOMICS: THE BEGINNING OF A NEW DIRECTION

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## Abstract

*In this conceptual paper, we argue that the organizational focus on transaction costs needs to be balanced by an attention to transaction benefits, both at the individual and organizational levels. To the transaction characteristics suggested by transaction costs economics, we add four additional ones likely to foster transaction benefits: intensity of knowledge, segmentation of knowledge, dispersion of knowledge, and scarcity of knowledge. The need to maximize transaction benefits while minimizing transaction costs results in the mixing of governance structures, where two (or more) “pure” governance structures are combined. We create a model of the relationships between transaction characteristics, mix of governance structures, transaction costs and benefits, and information systems; from an instantiated version of this general model, we elaborate four propositions. Moreover, with two “real world” examples (Google and JBoss), we illustrate the existence of the proposed transaction characteristics and mixed governance structures. We conclude by discussing how information systems generate opportunities for creating transaction benefits.*

*Keywords: Transaction Cost Economics, Benefits, Governance structures.*

# 1 THE SINGLE MINDEDNESS OF TRANSACTION COST ECONOMICS

Transaction cost economics (TCE) is a highly influential theory. The initiating work (Coase 1937) has more than 5,000 citations,<sup>1</sup> but it is not without its critics (Ghoshal 2005). TCE, especially as elaborated by Williamson (1975), advocates that for many situations a command and control hierarchical governance structure is needed to limit opportunistic behavior. This approach, however, can produce the very behaviors that command and control is supposed to limit (Ghoshal and Moran 1996). We contend that the shortcomings of TCE are due to its one-sided view of humans, who are guided by both rational and social goals (Simon 1957). Furthermore, TCE focuses only on one side of a transaction, the costs, and seems to ignore the benefits of a transaction, which frequently cater to the social side of humans.

It is not surprising that Coase had a rather monocular economic view of a transaction. His work was written in the 1930s, when much of the world was blighted by an enduring depression. In an era of mass poverty when many were intensely focused on finding any sort of job, the rational human factor was supremely dominant and social needs were put aside. Conditions are quite different today. Affluence is widespread in developed economies, and those with highly developed skills are in much demand, in many cases irrespective of where they live. Those who design today's organizations cannot ignore human's social needs and will fail to engage fully their employees' talents if they construct a command and control hierarchy. Indeed, it might be the case that rather than just balancing rational and social forces, organizational designers should heed the words of James Q. Wilson (1993), "On balance, I think other-regarding features of human nature outweigh the self-regarding ones," and bias design towards our social inheritance.

Furthermore, TCE was conceived in the era when physical goods dominated consumption and transactions were predominantly physical. TCE needs to be re-examined in the context of a service economy and electronic transactions. Many services have shifted from co-located labor-intensive delivery to self-service electronic consumption. Organizational designers cannot ignore the impact of information systems on governance structures. They enable organizations to create systems (e.g., email, video conferencing, databases) that enable many interdependent tasks (Thompson 1967) to be geographically distributed for the benefit of the organization and the individual. In designing these new structures, entrepreneurs need a framework, because, as one of the period's most influential scholars of strategy Michael Porter asserts, managers prefer frameworks to theories (Argyres and McGahan 2002) for thinking about how to use information systems to create organizations. The organization's focus on transaction costs needs to be balanced by an attention to transaction benefits. The organization is both a nexus of contracts (Demsetz 1988) and a nexus of relationships, and from our vantage point as IS scholars, these nexuses are mediated and enabled by information systems.

In this article, we apply the transaction benefits perspective (Blomqvist, Kyläheiko, and Virolainen 2002, Watson et al. 2005) to understand how collaborate and cooperate now coexist with command and control in the mixed governance structure found in many current organizations (Adler 2001). We thus seek to uncover how both transaction costs and benefits intersect to create governance structures. We are particularly concerned with how the new administrative forms arising from the forge of the Internet are intertwining transaction costs and benefits to create mixed governance structures. We commence our investigation with a review of TCE (which is at the organizational level) and then elaborate on Watson et al's (2005) idea of transaction benefits (which we posit are both at the individual and organizational levels). Thus, our units of analysis are both the organization and the individual, as some advocate (Rousseau 1985). We illustrate the mixed governance structures with

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<sup>1</sup> scholar.google.com on 2006.10.08

examples of two recently emerged organizations, Google and JBoss, and then conclude with a discussion on how information systems create many opportunities for leveraging transaction benefits and mixed governance structures.

## 2 TRANSACTION COST ECONOMICS

TCE asserts that the transaction is the basic unit of economic activity, where a transaction “may be said to occur when a good or service is traded across a technologically separable interface” (Williamson 1993). A transaction cost is a cost incurred in making an economic exchange. Transaction costs are those over and beyond the price of the product or service procured. They broadly break down into motivation and coordination costs (Milgrom and Roberts 1992). Opportunism (Williamson 1985) and agency costs (Jensen and Meckling 1976) are components of motivation costs. Coordination costs include search (Stigler 1961), input coordination (Armen and Demsetz 1972), and measurement costs (Barzel 1982). In reality, these costs can be extended across multiple economic exchanges.

Williamson defined a governance structure as an “institutional framework in which the integrity of a transaction or related set of transactions is decided” (Williamson, 1996, p. 11). Governance thus consists of formal and informal structures and rules that enable carrying out economic transactions in an economic manner (Wieland, 2005). TCE maintains that hierarchies and markets are alternative governance structures to organizing economic activity (Arrow 1974) and that firms need to align governance structure and transaction characteristics (Williamson 1985; Silverman, Nickerson, and Freeman 1997). The basic argument of TCE is that decision makers will choose whichever governance structure minimizes the total cost associated with a transaction (Coase 1937) (see Figure 1).

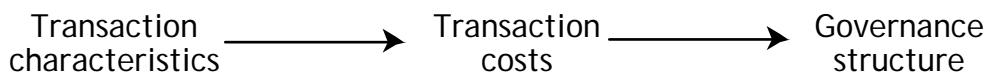


Figure 1 Transaction cost economics model

Although TCE mainly focuses on transaction costs, the basic criterion for organizing transactions is to economize on the sum of both production expenses and transaction costs (Williamson 1981). If the total cost of using a market is too high, other governance structures, such as hierarchical production in a firm, are more appropriate.

TCE argues that transactions have distinct characteristics that, in combination with the attributes of alternate governance structures, produce different production and transaction costs. The three key transaction characteristics are (1) asset specificity, (2) uncertainty, and (3) frequency of transactions (Williamson 1981).

**Asset specificity** refers to the degree to which the investments necessary for a transaction are specific to that particular transaction (Williamson 1981). If the transaction fails, the investments would be less valuable in some second best use (Williamson 1986). Such a situation can lead to dependencies between buyers and suppliers, since, for example, buyers cannot easily turn to an alternative supplier, and are thus “locked into” the transaction for a considerable time after (Williamson 1981). The transaction partner who invests in specialized assets is vulnerable to opportunism and will consequently make special efforts to protect investments by implementing, monitoring, and enforcing contractual safeguards (Rindfleisch et al. 1997). One solution to the safeguarding problem is to integrate vertically, i.e., to produce the good or service in a hierarchy rather than buying it on a market (Klein, Crawford et al. 1978). Hence, with higher levels of asset specificity, a firm will prefer to internally organize production instead of market governance.

The second transaction characteristic, **uncertainty**, can come from different sources, most notably environmental variability and behavioral uncertainty (Rindfleisch and Heide 1997). Environmental uncertainty, such as technological uncertainty, deals with the difficulty to foresee and anticipate

changes in the relevant environment (Rindfleisch and Heide 1997). When faced with high environmental uncertainty, writing complete contracts is difficult, and as unforeseen events emerge, contractual gaps might appear and require renegotiating and adaptation (Williamson 1979). Contract adaptation and re-negotiation are a costly process and will increase transaction costs. As to behavioral uncertainty, it is based on the threat of opportunism and refers to the difficulty of monitoring and evaluating the behavior and performance of the transaction partner. Whereas environmental uncertainty makes it impossible to specify contracts *ex ante*, behavioral uncertainty refers to the difficulty to verify the performance of the transaction partner *ex post* (Geyskens, Steenkamp et al. 2006). Governance structures have a varying ability to cope with certain kinds of uncertainty. It is assumed that with higher levels of uncertainty, firms tend to produce products and services internally.

Finally, TCE asserts that the **frequency of transactions** influences both transaction and production costs. So far, this transaction characteristic has received little attention in academic research (Rindfleisch and Heide 1997; Geyskens, Steenkamp et al. 2006), and it should be of interest to information systems researchers because of the emergence of high transaction volume electronic partnerships (Chatterjee, Segars, and Watson 2006). In general, firms have an incentive to internalize production with increasing transaction frequency (Williamson 1987). Though other viewpoints implicitly argue that in the age of the Internet there are competitive advantages in externalizing many high volume transactions that can be executed electronically (Watson, Zinkhan, and Pitt 2004; Chatterjee, Segars, and Watson 2006; Glassberg and Merhout, 2007)

### 3 TRANSACTION BENEFITS

Beyond market and hierarchy, other governance structures have been suggested. Ouchi (1979, 1980) extended TCE by introducing the clan as a governance structure which, he suggested, should be used when performance ambiguity reaches very high levels. Clan governance requires extensive socialization and long-term relationships. The network is another governance structure, one that is “especially useful for the exchange of commodities whose value is not easily measured” (Powell, 1990, p. 304). The bazaar is yet another which appears to be particularly useful to describe the organization of open source software development (Demil and Lecocq 2003). Others have used the community as a better label to describe this phenomenon (Sharma et al., 2002). We argue that all of these alternative governance structures distinguish themselves from the traditional market and hierarchy governance structures in that they point to *transaction benefits*, in addition to transaction costs.

Indeed, the focus of TCE is on transactions costs, but transactions also have benefits. In a manner analogous to transaction costs, transaction benefits are the benefits incurred in making an economic exchange (Watson et al. 2005). Transaction benefits are above and beyond those benefits of direct financial return. They can exist at an individual level and/or an organizational level. For example, at an individual level, a person employed by a firm gets direct benefits of a salary, health insurance, and so forth. The same person might gain transaction benefits of reputation, collegiality, intellectual challenge, skill development, and enhanced self-esteem. At an organizational level, a firm opting for a market governance structure might reap transaction benefits such as economies of scale due to specialization and flexibility (Blomqvist, Kyläheiko, and Virolainen 2002). Alternatively, the hierarchy as a governance structure might lead a firm to benefit from cumulative learning, increased economies of scope, and possible exploitation of monopoly power (Blomqvist, Kyläheiko, and Virolainen 2002). As to the community governance structure, it is well-suited to innovation, a crucial organizational benefit in a knowledge based economy (Adler 2001).

Considering both transaction costs and benefits, a firm needs to consider all possible transaction characteristics. To those acknowledged by TCE, we propose that four additional transaction characteristics are relevant in the context of benefits: (1) the intensity of knowledge, (2) the segmentation of knowledge, (3) the dispersion of knowledge, and (4) the scarcity of knowledge. The

open source community, as one of the more recent governance structures proposed (Sharma et al., 2002), is used to illustrate each of these transaction characteristics.

**Intensity of knowledge** refers to the degree to which the execution of a transaction relies primarily on knowledge and skill rather than physical goods. In the case of a community such as the ones surrounding open source development, the nature of the transaction (i.e., software development) qualifies as knowledge intensive – more so than, for example, the manufacturing of widgets, which relies heavily on physical tools and goods. Given that modern economies are increasingly knowledge intensive (Adler 2001), the extent of this characteristic on business transactions is on the rise. Electronic networks enable knowledge work to be moved from co-location, physical settings to distributed communication networks. Moreover, whereas it is accepted that the hierarchy and market governance structures are effective in low-knowledge-intensity transactions (Adler 2001), another type of governance structure, or combination of them, may be called for when the intensity of knowledge of a transaction is high.

**Segmentation of knowledge** is the need for involving more than two parties (the principal and the agent) to execute a transaction. Given a certain level of complexity, many more parties may need to be involved for a transaction to be executed and completed. Software development according to the open source model usually involves many often very independent parties, each specializing in a given area. As such, a given open source project may include a project leader, some core members, many active developers, peripheral developers, bug fixers, and bug reporters. Each party has its area of expertise, and all need to collaborate to achieve success. Such involvement of multiple parties is only possible if the transaction can be modularized, that is, divisible into concrete, smaller chunks (Gallivan et al., 1994).

**Dispersion of knowledge** refers to the extent to which the knowledge required to accomplish a transaction is dispersed in multiple locations. Again, open source communities constitute a salient example of such a transaction, as it is typical for a given project to involve developers physically located in many different areas around the globe. Recruiting community members based on talent, unfettered by physical location, thus ensures that high quality expertise is provided and innovative ideas are contributed. For instance, open source firm Trolltech has employees originating from 20 different countries. The mantra for knowledge work is *connection, connection, connection*.<sup>2</sup>

Finally, **scarcity of knowledge** is the extent to which the knowledge required to accomplish a transaction is rare, i.e., possessed by relatively few individuals. Knowledge intensive industries, such as software development, are highly reliant on an elite and talented innovative core to create their future (e.g., product design team at Apple). Such personnel are not motivated by command and control or purely by financial returns. Open source developers, for example, highly value intellectual stimulation and self-improvement, among other motivating factors (Lakhani and Wolf, 2005). Consequently, additional individual benefits might need to be provided to entice such personnel in a given transaction.

Thus, we believe that the TCE model needs to be extended by including transaction benefits (Figure 2). Also, we assert that with modern information systems, and more particularly the Internet, the influence of the aforementioned transaction characteristics is magnified. Indeed, with information systems, it is easier to manage knowledge intensive activities, as knowledge can be codified, captured, manipulated, stored, and communicated. Moreover, information systems can help in the handling of highly modularized transactions, such that the many parties involved in a complex task can still collaborate. Furthermore, information systems can make it easier for a dispersed group of people to collaborate, whether they reside in the same office building or are spread around the globe. Lastly, through information systems, it is possible for employers to get more efficient access to scarce resources, that is, employees with sought skills are more easily reachable.

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<sup>2</sup> Real estate agents speak of *location, location, location* as the key to success.

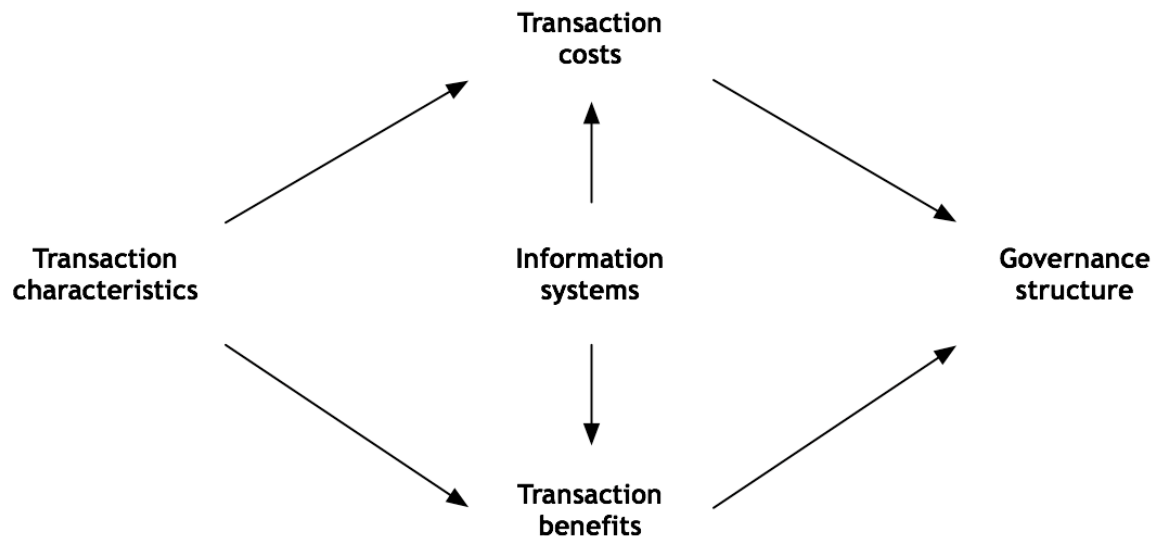


Figure 2. *Transaction costs and benefits model*

To illustrate, consider the case of a firm in the software business that hires programmers to write code. The firm encounters all the traditional transaction costs (e.g., selecting employees, monitoring their performance, etc.) and major direct costs of paying the programmers. The favored governance structure is a hierarchy with high control mechanisms to motivate employees and coordinate their work. On the other hand, reflect on the situation of another firm that takes the approach of recruiting volunteers to work on writing similar software. In this case, the transaction costs are much lower, but not zero (Demil and Lecocq 2003), and the entrepreneur has few direct costs. However, in order to accomplish the project’s goals, the firm must find a way of creating individual transaction benefits in order to motivate the programmers because they receive no direct financial benefits. We postulate that transaction benefits and costs both influence the choice of governance structure, especially for the many modern firms with an emphasis on knowledge and innovation.

#### 4 MIXING GOVERNANCE STRUCTURES

Each of the aforementioned governance structures, however, is a “pure” type, and as such, rarely uniquely fits a given situation. A combination of these governance structures is called for each organizational transaction a firm needs to execute (Adler 2001). Firms are thus generally using “mixed” governance structures (i.e., the combining of different governance structures) to handle different aspects of their business. Over time, given the characteristics of a transaction and its surrounding organizational context, mixed governance structures may be altered to adjust to specific organizational and individual needs.

The search for organizational transaction benefits, combined with the need to provide employees with transaction benefits and to minimize organizational transaction costs, thus results in the mixing governance structures. The organization may operate in transaction cost mode for the bulk of its time, but if it also considers individual transaction benefits, such as when it gives discretion to employees over their time and task assignment, it will favor a mix of governance structures that will better leverage the need to minimize organizational costs and maximize individual benefits. The shift to an electronic network based knowledge intensive and service oriented economy facilitates governance mixing. Indeed, it is required if transaction benefits are to be provided for employees. Universities have long been based on a mix of governance structures, as faculty move between teaching (hierarchy) and research (community).

Consideration of organizational transaction costs, individual transaction benefits, and organizational transaction benefits, and the notion of mixing governance structures lead to a general model, represented in Figure 3.

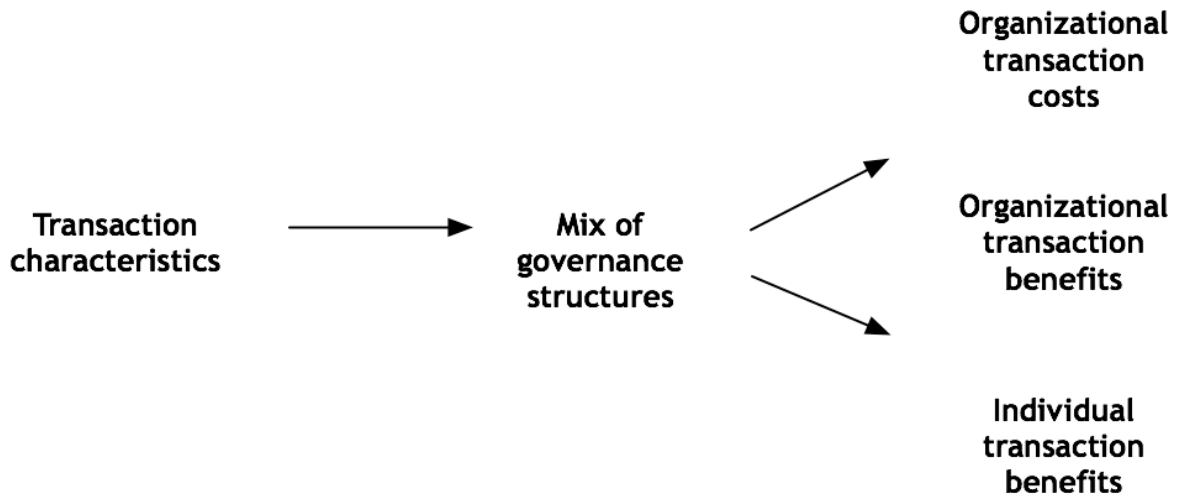


Figure 3. Governance mixing relationships

An instance of this general model is presented in Figure 4. The most salient transaction characteristic, in this case, is scarcity of expertise. An appropriate mixed governance would combine hierarchy with community. As to the resulting benefits, we propose that innovation would be the most relevant at the organizational level and creative freedom would be an important one at the individual level. From this instance of the general model, we put forward four propositions.



Figure 4. Particular Instance of Governance mixing relationships

Knowledge intensive industries, such as in the area of software development, often face the challenge of responding to a lack of talented and knowledgeable resources so as to stay competitive. Such human resources may be motivated by above average financial compensations, but other transaction benefits are typically needed to attract and retain them. Thus, combining governance structures to respond to this transaction characteristic is important. Accordingly, we propose that:

P1. Governance mixing to support transaction benefits will be more prevalent in industries where there is a scarcity of expertise (e.g., knowledge intensive industries).

Innovation is possibly the only form of competitive advantage, and thus an important organizational benefit, as many cutting edge firms, research and development units, and universities illustrate. When firms need innovation, strong hierarchical control or market discipline may not be the answer (Dyer 1996; Adler 2001). Innovation is possible when a community governance structure can be leveraged, in addition to possibly other governance structures (Adler 2001). We thus propose that:

P2. Governance mixing supports greater innovation.



Firms and their employees will use information systems to support alternate governance structures (Glassberg and Merhout, 2007), and, we propose, governance mixing. In particular, electronic networks will be used to enable employees to select when and where they work and with whom they connect, and they will also be used to enable access to electronic resources from any network connection. Thus, we contend that:

P3. Information systems promote governance mixing because they support quick mode switching for individual employees and enable the connection of distributed employees.

Similarly, and mainly for completeness as others have advanced this proposition, we propose that:

P4. Information systems promotes innovation by supporting interactions between distributed knowledge workers with and without a firm.

As the preceding propositions and as Figure 3 and Figure 4 suggest, information systems have a critical role to play in establishing transaction costs (Gurbaxani and Whang 1991; Malone, Yates, and Benjamin, 1987), as already recognized, and transaction benefits, as we suggest. Next, through the description of two recently emerged organizations, Google and JBoss, we illustrate the existence of some of the transaction characteristics discussed above, along with the existence of mixed governance structures.

## 5 GOOGLE

Incorporated in September 1998, Google Inc. operates the leading Internet search engine. As one of Silicon Valley's hottest companies, it generates revenue primarily by delivering online advertising and has gained great prominence within a few short years. Headquartered in Silicon Valley, Google has offices throughout the Americas, Europe, and Asia Pacific. With legions of Google fans, the company has spawned a variety of products, concepts, and projects, such as Gmail, Google Map, Google Scholar, Google Earth, Google Print, etc. Nowadays it seems that Google is not merely an Internet search engine, rather it has transformed into something of a phenomenon. The trademark "Google" has even become an entry as a verb in the Merriam-Webster dictionary.

A knowledge-intensive engineering company, many Google projects span geographically dispersed engineering offices. In pursuit of its mission of "organizing the world's information and making it universally accessible and useful," Google has been focusing its efforts on managing knowledge and knowledge workers from offices around the globe – a growing team of talented programmers and computer scientists with expertise in a wide range of topics.

Through a mixed governance structure, Google has made itself a workplace where knowledge flows freely and ingenuity is valued. First, a lot of Google's creativity and spontaneity results from the freedom it has granted its engineers. Google's well-known philosophy of "20 percent time" enables engineers to spend one day a week on personal interests. During the 20 percent of their office hours, they are free to explore and pursue projects which are not necessarily in their job scope, and to come up with innovative new ideas. With the freedom and well-equipped work environment enabling them to be as creative as they want, Google engineers derive job satisfaction from having their research interests highly respected, encouraged, and nurtured. Despite the lack of formal hierarchical control during the "20 percent time," Google has also generated impressive outcomes by keeping its knowledge workers happy. According to Google's Vice President of Search Products and User Experience, it is estimated that half of new product launches originated from the "20 percent time" (Mayer, 2006). Google News, Google Suggest, AdSense for Content, and Orkut – products which might otherwise have taken an entire project cycle to launch, are some of the outcomes of the "20 percent time." For example, Orkut, an Internet social network service, is named after a Turkish software engineer who created it during the 20 percent time at Google.

Furthermore, Google has a flat organization, where engineers can communicate their ideas for a product or a strategic innovation through effective and efficient feedback loops, rather than moving

them up a hierarchical political system. The organization strives to accommodate each engineer's interests by giving them great discretion in joining the projects about which they are passionate. The open idea posting page and a company-wide suggestion box allow employees to post ideas, from feedbacks on day-to-day operations to a suggestion for the next killer application. The ideas will be peer-reviewed, and the best ones will get on the R&D agenda.

Google has been portrayed by its fans as the ultimate work place for "techno geeks" – a place where recreational amenities and snack rooms are scattered throughout the campus, and where engineers are granted considerable freedom to pursue personal interests and collaborate with global Googlers who share the same passion. Under the mixed governance structure, each of Google's engineers holds a position in the company's hierarchy, while they work at their own discretion one day a week and during the other four days they are involved in different project teams, often with membership spanning different countries. In order to keep its competitive edge by retaining its creative engineers, Google constructs and preserves a collaborative and innovative ambience in the hierarchical command-and-order environment, by cultivating a relaxed company culture and emphasizing the fun elements at work – the funky office setup, the tweaking of its brand name, the pets allowed in the office policy, etc.

This brief review of some key features of Google illustrates how corporations can blend a command and control hierarchy with the environment of a collaborate and control community. Google provides many individual transaction benefits to attract needed talent and engage them innovatively. The extent of innovation fostered by Google is the firm's main organizational transaction benefit.

## 6 JBOSS

JBoss, since 2006 a division of Red Hat, was founded in 2001 and has since evolved into the market leader of the J2EE application server market as well as the professional open source movement (Watson et al. 2005). JBoss has created a profitable portfolio of successful open source products, with the JBoss application server as the lead product. A part of the proliferation of JBoss products can be ascribed to its organizational model that combines traditional software development with the strengths of software development in an open community.

Software development is an excellent example of a transaction that frequently emphasizes the previously discussed transaction characteristics. Software development is indeed knowledge intensive work that usually relies on multiple parties that can be located at multiple locations and have specific, and often scarce, skills. Although software development as a transaction has been successfully organized within a hierarchy (traditionally software development process) and within communities (peer-production or *bazaar* software development process), JBoss manages to combine the strengths of both by organizing its software development process as a mixed form of hierarchy and community. Each governance form on its own exhibits specific benefits. One of the main strengths of the traditional software development process under a hierarchy is the possibility to purposefully coordinate and command the developers according to a broader road map. One of the main advantages of the more chaotic open source development process is the use of the contributions of a broad base of volunteer community members. In JBoss, a small group of core developers works within a traditional hierarchical employment relationship. These core developers guarantee the support, consistency, and accountability of the source code. At the same time JBoss has managed to attract a broad user base that contributes new code, tests new releases, debugs and contributes bug fixes, and provides general feedback about the software product. The users are self-organized into a community and voluntarily help and advance JBoss products.

The mix between community and hierarchy governance structures gives the individual employees as well as the organization several transaction benefits. On the individual side, the community model allows the employees to work relatively independently at different physical locations. This individual benefit simultaneously allows JBoss to recruit the most talented developers worldwide who are

already familiar with the product through participation in the community and are able to produce code immediately. The employment contract under the hierarchy model guarantees the employees a reliable income stream that they would not have in a pure community model. On the organizational side, the organization is able to profit from the contributions of a wider participant base than would be possible under a hierarchy governance form. Although each contribution of the users within the community might be small, collectively they significantly influence the innovative and qualitative development of the software. Almost none of the contributions alone would justify an employment contract and still JBoss is able to profit from the diffused knowledge of its customers through incorporating the user community in its development process and ensure, for example, higher turnover rates for bug fixes. Concurrently, JBoss ensures the quality and integrity of the source by employing the group of core developers within a traditional command structure hierarchy. JBoss thus merges two governance structures and is able to benefit from the innovative benefits of the community governance structure as well as the coordination and command benefits of the hierarchy governance structure.

## 7 CONCLUSION

When a new technology is introduced, we often see initially only the obvious consequences, such as replacing an old work habit with the new technology (e.g., email is a substitute for letter writing) and the foreseen theoretical consequences are limited. With time and musing, we start to see deeper patterns. As a result, some fundamental ideas and entrenched theories, when re-examined for the impact of technological change, need elaboration (e.g., Glassberg and Merhout, 2007). Furthermore, a social-based theory that has its origins in a different social milieu might need extending to account for societal, organizational, and cultural changes over time.

In this paper, we examined a well-accepted theory, transaction cost economics, to see how it would explain contemporary governance structures. We introduced individual and organizational transaction benefits as a parallel to organizational transaction costs to explain the mixed governance structures we see operating in some firms, particularly those in knowledge intensive industries reliant on scarce human talent.

Because information systems, specifically electronic networks, change the way in which people can interact, they open opportunities for fashioning new relationships among employees and between employees and the firm. These new relations create occasions for establishing additional transaction benefits. The firm then faces the problem of how to operate in the dual mode of minimizing transactions costs while maximizing transaction benefits. We suggest, based on observation of some knowledge management firms and insight, that some firms now dynamically mix governance modes so they can use hierarchies to manage transaction costs and communities to drive innovation. Both the firm and its employees learn how to operate in this dual governance setting.

As IS scholars, we need to continue to investigate the deeper implications of technological change. Our contributions will be more valuable when we show how to elaborate existing theories (and more importantly develop new theories) compared to taking existing theories and applying them in an IS setting. Such innovation and fundamental improvement needs nourishment and encouragement and should not be judged by the same standards as applying theory to an IS problem if we are to avoid suppressing innovation (Horrobin 1990; Dirk 1999). It is in this spirit that we present an extension of TCE that we believe is innovative. It is, however, the beginning of a new direction and will need much research and elaboration before it can stand on the same podium as TCE, but we should remember that TCE started as an undergraduate's musing (Coase 1937) on the nature of the firm.

## References

- Adler, Paul S. (2001). Market, hierarchy, and trust: the knowledge economy and the future of capitalism. *Organization Science*, 12 (2), 215-234.
- Alchian, A. and Demsetz, H. (1972). Production, information costs, and economic organization. *American Economic Review*, 62, 777-795.
- Argyres, N. and McGahan, A.M. (2002). An interview with Michael Porter. *Academy of Management Executive*, 16 (2), 43-52.
- Arrow, K.J. (1974). *The limits of organization (Fels lectures on public policy analysis)*. 1st Edition. Norton, New York.
- Barzel, Y. (1982). Measurement costs and the organization of markets. *Journal of Law and Economics*, 25, 27-48.
- Blomqvist, K., Kyläheiko, K. and Virolainen, V.M. (2002). Filling a gap in traditional transaction cost economics: Towards transaction benefits-based analysis. *International Journal of Production Economics*, 79 (1), 1-14.
- Chatterjee, D., Segars, A.H. and Watson, R.T. (2006). Realizing the promise of e-business: developing and leveraging electronic partnering options. *California Management Review*, 48 (4), 60-83.
- Coase, R. (1937). The Nature of the Firm. *Economica*, 4, 386-405.
- Demil, B. and Lecocq, X. (2004). Neither market nor hierarchy or network: the emerging bazaar governance. Available from <http://opensource.mit.edu/papers/>.
- Demsetz, H. (1988). The theory of the firm revisited. *Journal of Law, Economics, and Organization*, 4, 141-161.
- Dirk, L. (1999). A measure of originality: The elements of science. *Social Studies in Science*, 29 (5), 765-776.
- Dyer, J. H. (1996). Does governance matter? Keiretsu alliances and asset specificity as sources of Japanese competitive advantage, *Organization Science*, 7(6), 649-666.
- Geyskens, I., Steenkamp, J. and Kumar, N. (2006). Make, buy, or ally: A transaction cost theory meta-analysis, *Academy of Management Journal*, 49 (3), 519-543.
- Ghoshal, S. (2005). Bad management theories are destroying good management practices. *Academy of Management Learning & Education*, 4 (1), 75-91.
- Ghoshal, S. and Moran, P. (1996). Bad for practice: A critique of the transaction cost theory. *Academy of Management Review*, 21 (1), 13-47.
- Glassberg, B. C. and Merhout, J. W. (2007). Electronic markets hypothesis redux: where are we now?. *Communication of the ACM* 50(2), 51-55.
- Gurbaxani, V. and Whang, S. (1991). The impact of information systems on organizations and markets. *Communications of the ACM*, 34 (1), 59-73.
- Horrobin, D.F. (1990). The philosophical basis of peer review and the suppression of innovation. *Journal of the American Medical Association*, 16, 1438-1441.
- Jensen, M.C. and Meckling, W.H. (1976). Theory of the firm: managerial behavior, agency costs and ownership structure. *Journal of Financial Economics*, 3, 303-360.
- Klein, B., Crawford, R.G. and Alchian, A.A. (1978). Vertical Integration, Appropriable Rents, and the Competitive Contracting Process. *Journal of Law and Economics*, 21(2), 297-326.
- Lakhani, K. and Wolf, R.G. (2005). Why Hackers Do What They Do: Understanding Motivation and Effort in Free/Open Source Software Projects, In: Feller, J., B. Fitzgerald, S. Hissam, K. Lakhani (eds.), *Perspectives on Free and Open Source Software*, MIT Press, Cambridge.
- Malone, T.W., Yates, J., and Benjamin, R. I. (1987). Electronic markets and electronic hierarchies, *Communications of the ACM*, 30(6), 484-497.
- Mayer, M. (2006). Nine lessons learned about creativity at Google. Available from <http://edcorner.stanford.edu/authorMaterialInfo.html?mid=1554>.
- Milgrom, P.R. and Roberts, J. (1992). *Economics, organization, and management*. Prentice-Hall, Englewood Cliffs, N.J.
- Ouchi, W.G. (1980). Markets, bureaucracies, and clans. *Administrative Science Quarterly*, 25 (1), 129-141.

- Raymond, E.S. (2001). *The cathedral and the bazaar: musings on Linux and Open Source by an accidental revolutionary*. O'Reilly, Cambridge, Mass.
- Rindfleisch, A. and Heide, J.B. (1997). Transaction Cost Analysis: Past, Present, and Future Applications. *Journal of Marketing*, 61(4), 30-54.
- Rousseau, D. (1985). Technology in organizations: A constructive review and analytical framework. In *Assessing organizational change* (Seashore, S.E. and Lawler, E.E., Eds), JAI Press, Greenwich, CT.
- Sharma, S., V. Sugumaran, and B. Rajagopalan. (2002). A Framework for creating hybrid-open source software communities. *Information Systems Journal* 12 (1):7-25.
- Silverman, B.S., Nickerson, J.A. and Freeman, J. (1997). Profitability, transactional alignment, and organizational mortality in the U.S. trucking industry. *Strategic Management Journal*, 18, 31-52.
- Simon, H.A. (1957). *Models of man: social and rational*. Wiley, New York.
- Stigler, G.J. (1961). The economics of information. *Journal of Political Economy*, 69 (3), 213-225.
- Thompson, J.D. (1967). *Organizations in action*. McGraw-Hill, New York.
- Uzzi, B. (1996). The sources and consequences of embeddedness for the economic performance of organizations: The network effect. *American Sociological Review*, 61, 674-698.
- Watson, R.T., Boudreau, M.-C., Greiner, M., Wynn, D., York, P. and Gul, R. (2005). Governance and global communities. *Journal of International Management*, 11 (2), 125-142.
- Watson, R.T., Zinkhan, G.M. and Pitt, L.F. (2004). Object orientation: a tool for enterprise design. *California Management Review*, 46 (4), 89-110.
- Watson, R.T., Wynn, D. and Boudreau, M.-C. (2005). JBOSS: The Evolution of Professional Open Source Software. *MIS Quarterly Executive*, 4(3), 329-341.
- Wieland, J. (2005). Corporate Governance, Values Management, and Standards: A European Perspective, *Business Society*, 44, 74-93.
- Williamson, O.E. (1975). *Markets and hierarchies: analysis and antitrust implications*. Free Press, New York.
- . (1979). Transaction-Cost Economics: The Governance of Contractual Relations. *Journal of Law and Economics*, 22(2), 233-261.
- . (1981). The Economics of Organization: The Transaction Cost Approach. *The American Journal of Sociology*, 87(3), 548-577.
- . (1985). *The economic institutions of capitalism: firms, markets, relational contracting*. Free Press, New York.
- . (1986). *Economic Organization. Firms, Markets and Policy Control*. New York University Press, Washington Square, New York.
- . (1993). *The economic analysis of institutions and organizations - In general and with respect to country studies*. OECD, Paris.
- . (1996). *The mechanisms of governance*. Oxford University Press, New York.
- Wilson, J.Q. (1993). *The moral sense*. Free Press, New York.