

**NEITHER MARKET NOR HIERARCHY OR NETWORK: THE
EMERGING BAZAAR GOVERNANCE**

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Abstract: Despite the growing body of literature describing the open-source phenomenon, few contributions have been theoretically grounded and research has largely focused on the software industry. Drawing on transaction cost economics, we go beyond these limitations and advance that open source constitutes a new generic governance structure—which we label bazaar governance—based on a specific contract. We characterize this structure in terms of its strengths and weaknesses and in comparison with market, firm and network structures. We consider how bazaar governance is actualized within an industry and the institutional entrepreneur’s crucial role in this process. Finally, we propose that bazaar governance has a profound impact on the structure of the industry in which it is introduced. Our propositions offer a potential basis for future research further developing governance theory.

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New forms of relationships between economic agents have appeared in recent years, most strikingly in the computer software industry, and have led to the emergence of communities organized and coordinated around open-source products (Von Hippel, 2001). The most famous example is the Linux operating system, which against the odds has won recognition as a credible competitor to Microsoft and has gained support from a community of several thousands of co-developers and millions of buyers and users worldwide. In the past four years, the concept of open source has begun to be broadly acknowledged in newspapers and business-oriented magazines, on Internet forums and at scientific conferences, especially as far as information technologies are concerned (e.g. Di Bona, Ockman & Stone, 1999; Raymond, 1999; Von Hippel, 2001; Wayner, 2000). Academics too have joined the bandwagon, with the implications of open source generating discussion especially in the fields of economics and management. Topics that have been given particular attention include: incentives in open-source projects (Lerner & Tirole, 2000), the public-private good status of open-source products (Von Hippel & Von Krogh, 2002), business models of open-source enterprises (Pal & Madanmohan, 2002), a new methodology for innovation (Von Hippel, 2001), competition between proprietary and open-source software (Dalle & Julien, 2002; McKelvey, 2001), how open-source developer communities are organized (Raymond, 1999; Tuomi, 2000), and open source as an ideological movement (Stallman, 1999).

Open-source projects have not, however, been envisaged in terms of a generic governance structure coordinating economic transactions. Yet transactions between agents in an open-source system are not coordinated by price mechanisms as market exchanges are, because certain products are distributed free of charge. Neither are open-source systems organized hierarchically on the basis of formal fiat, as firms are, or via the strong personal ties between agents that typify network structures.

Drawing on the idea that open-source projects are characterized by a specific contractual framework (an open license) and by innovative coordination mechanisms, we identify a new structure of governance, which we call “bazaar governance.” We argue that this structure is potentially as efficient a generic form of governance as market, firm and network structures are. Drawing on transaction costs economics (TCE) to describe the features of bazaar governance, we then consider its dynamics, how it is introduced into an industry by an institutional entrepreneur, and its diffusion. This leads us to question the potential impacts bazaar governance may have on industry structure.

The paper is organized in three sections. The first details the concept of open source and briefly retraces its history. The second section characterizes governance structures in terms of transaction costs economics and supports our proposition that the bazaar organizational pattern constitutes an alternative form of governance. The third and final section explores how bazaar governance is actualized in an industry and its impact on industry structure. We present a series of propositions to contrast bazaar governance with traditional forms, further developing governance theory.

THE CONCEPT OF OPEN SOURCE

In this section we trace the history of open source and its recent recognition among managers and academics. We then introduce the specific contractual framework structuring transactions between agents within open-source communities.

A Brief History of Open Source

Through the 1960s, the sharing of basic software source code among programmers was commonplace and informal (Lerner & Tirole, 2000), but the concept of cooperative source-code development across a network was born with the Advanced Research Projects Agency Network (ARPANet), established in

1969 by the U.S. Department of Defense. By the beginning of the 1980s, efforts to formalize this informal development methodology had appeared. In 1985, Richard Stallman created the Free Software Foundation and designed the GNU General Public License (GPL), open source's first formal licensing contract. The GPL authorizes anyone to use and modify the software, as long as he or she agrees to keep the source code freely available and not to impose further restrictions on other agents, distributing it or any software derived from it only under the continued terms of this open license.

In 1991, Linus Torvalds released the core source code for the Linux operating system onto an Internet newsgroup, looking for improvements. But it was not until Internet access became widespread that open-source software really bloomed. The term "open source," coined to unite the various free software licenses then circulating, gained public recognition in 1998, when Netscape decided to make its Web browser an open-source product (Mozilla) and IBM adopted the Apache Web server. Interactions between open-source projects and private companies soon became commonplace, demonstrating that open source is not only an ideological movement but also a sustainable business model.

It is important to understand that what distinguishes open source is a matter of freedom, not price. An open-source product is not necessarily free of charge, and can be bought and sold. An example is the for-profit companies that are now selling Linux through traditional retail stores. Moreover, even freely distributed open-source products can generate revenues in complementary areas such as product support (Khalak, 2000). The Red Hat business model is based on the supply of applications and technical support for Linux users.

The open-source movement has reached a critical mass. There are now several thousand open-source projects worldwide,ⁱ a few of which have developed products that have become market leaders or credible challengers in market niches (the Linux operating system is used by at least dozens of millions of people worldwide and Apache dominates the Web server market). Prominent actors in IT industries are starting to take open-source software into account when formulating and implementing

their market strategies. For instance, IBM, Hewlett Packard, Compaq, Dell, Intel, Oracle, and Sybase have all made major commitments to Linux. To summarize, open-source projects are no longer tangential to the world of business.

A New Kind of Contract: The Open License

Open-source (or copylefted) products are developed within a specific contractual framework: the open license. The GNU General Public License was the first open license enacted, but there are now almost as many open licenses as open-source projects. However, to various degrees these contracts promote a specific application of property rightsⁱⁱ. As Tuomi (2000) notes, the central characteristic of open-source projects is the specific way in which they invoke and use property rights.

The Free Software Foundation's definition of open source stresses the abandonment of property rights, which it terms "copylefting." Copyleft uses copyright law, but flips it over to serve the opposite of its usual purpose: instead of a means of privatizing software, it becomes a contractual means of keeping software open. Open-source software is distributed with its code source and with the rights to use, copy, improve, change and distribute a product. The open license challenges the traditional economic assumption that owning property rights (or, more generally, asset control) is a necessary condition to capture economic value from that property. Within the open-license framework, the copyleft principle makes it impossible for anyone to appropriate rights over the open-source product as a whole, contrary to the contractual forms identified by Macneil (1978). Firms traditionally take advantage of their assets in a variety of ways: they might be valorized internally, through secrecy or the ownership of patents or copyrights (Granstrand, 2000); the organization may exchange its property rights on the market (Alchian & Demsetz, 1973); or cooperate within a network using traditional licensing or cross-licensing agreements (Granstrand, 2000; Grindley & Teece, 1997; Nickerson, 1996). The open license implies a property-rights regime that differs from the contracts underlying traditional forms of governance.

A second characteristic of open licenses rests in the two kinds of agents it links together. The open license enables the owner of an asset to allow other agents to use, copy, modify, improve or distribute that asset. In the following discussion we use the term “sponsor” to denote an asset-holder who originally attaches an open license to this asset, establishing it as an open-source project. We use “adopters” to describe agents who have subsequently obtained the copylefted product. As using the product constitutes implicit acceptance of the contractual terms of the open license attached to it, an agent becomes an adopter by procuring the copylefted product (whether by downloading it free of charge or buying it). Together, sponsors and adopters constitute a community (Von Hippel, 2001). In the open-license contractual framework, the sponsor cannot choose or select adopters, and adopters may attempt to generate revenue by improving or distributing the copylefted product. As open source is built on the copyleft principle, any agent can transact with the sponsor, becoming an adopter.

INTRODUCING BAZAAR GOVERNANCE

As Williamson has shown, specific contracts define and provide support for each generic form of governance (Williamson, 1975, 1981, 1985, 1991, 1996). In this section we argue that open licenses support a new form of governance: bazaar governance.ⁱⁱⁱ

Why have we chosen this term? First, because Eric Raymond, a founder of the open-source movement, uses the image of a bazaar to characterize how open-source projects function. Unlike the usual approach to building important software “like cathedrals, carefully crafted by individual wizards or small bands of mages working in splendid isolation,” Raymond notes that Linux is more like “a great babbling bazaar of differing agendas and approaches” (1999: 30). Second, the bazaar as an oriental market refers to a specific organization of economic transactions with chaotic appearance, which enables products varying greatly in quality to be proposed (Geertz, 1978).^{iv} These features are congruent with our development of bazaar governance.

To support our argument, we first develop the defining characteristics of governance structures on the basis of the TCE framework. We then seek to demonstrate that the bazaar model exhibits these characteristics.

Characterizing a Governance Structure

The concept of governance structure is central to transaction cost economics, a theoretical framework that draws on the work of Commons (1932, 1934), who proposed that the transaction should be regarded as the basic unit of analysis of economic activity. Ronald Coase emphasized that transactions may be organized through a market or within a firm, and that each of these structures displays specific functioning costs. According to Coase, firms generate distinctive costs of their own, and expand to the point where the costs of organizing an extra transaction within the firm are equal to the costs of carrying out a similar transaction in the market (Coase, 1937). Arrow and Williamson picked up and developed some of these arguments nearly forty years later. Arrow (1974) recognized that firms and markets are alternative way to organize economic activity. Later, Williamson (1975, 1985, 1991) projects to study governance structures in a comparative institutional way. The core of his theoretical development is that transactions entail uncertainty about their outcome, due to the bounded rationality and opportunism of agents. To overcome this uncertainty, and as a means of reducing transaction costs, agents implement a governance structure, which Williamson defined as “the explicit or implicit contractual framework within which a transaction is located” (Williamson, 1981: 1544). Thus, “governance is a means by which to infuse order in a relation where potential conflict threatens to undo or upset opportunities to realize mutual gains” (Williamson, 1999: 1090). The choice of governance mode should be aligned with the characteristics of the transaction, especially in terms of the specific investments required (Williamson, 1985). If transactions are properly aligned, firms enjoy superior performance (Silverman, Nickerson & Freeman, 1997).

According to Williamson, market, hierarchical and hybrid (network) forms of organization are discrete structural alternatives for any transaction, and each is supported by a distinctive contract. Markets are supported by classical contract law, in which the identities of the transacting parties are irrelevant and dependence slight. In this form of governance, strict adherence to contractual terms prevails and courts are appealed to in case of dispute. Firms, as hierarchical structures, are grounded on the principle of forbearance. As noted by Williamson, “hierarchy is its own ultimate court of appeal” (Williamson, 1996, p. 98). The parties in a dispute resolve their differences internally, drawing on fiat that cannot be exercised in market. Hybrid organizations are supported by neoclassical contracts, in which the identity of trading partners is important. Beyond contractual forms, each of these governance modes employs different means to regulate exchanges and is characterized by trade-offs in the form of incentives and controls (Williamson, 1991). Williamson argues that “not only do alternative modes of governance differ in kind, but each generic mode of governance is defined by an internally consistent syndrome of attributes—which is to say that each mode of governance possesses distinctive strengths and weaknesses” (Williamson, 2002: 6).

The following discussion aims to establish that the bazaar is a generic governance structure presenting consistent attributes. Our argument so far suggests that if we are to successfully characterize the bazaar as an original form of governance we must satisfy five criteria. We must (1) demonstrate that a variety of transactions can occur within the open-license framework; (2) show that bazaar enables agents to economize on transaction costs; (3) establish that bazaar governance presents original features in terms of coordination; (4) establish that it presents original features in terms of uncertainty; and (5) show that these four features are consistent with each other—that the system is efficient.

Transactions within the Open-License Framework

If bazaar governance professes to be a governance structure in accordance with the tenets of TCE, it has to be able to organize various transactions within a specific contractual framework.

Through the open license, any adoption constitutes a transaction between an agent who proposes a copylefted product (the sponsor or a previous adopter) and a new adopter. This is congruent with Williamson's definition of transactions, in which he reasons that a transaction occurs "when a good or service is transferred across a technologically separable interface. One stage of processing or assembly activity terminates and another begins" (Williamson, 1981: 1544). Correspondingly, downloading Linux constitutes a transaction. The adopter can then test it, debug the operating system, develop new applications or devices, or even produce a user's guide (Dalle & Jullien, 2002; Khalak, 2000; Mac Kelvey, 2001; Raymond, 1999; Tuomi, 2000; Von Hippel, 2001). Even when an adopter simply uses the operating system as is, a transaction has still occurred. These different scenarios show that various kinds of transactions can be organized through the open license. Moreover, by presenting the community with an improvement, an adopter may well generate a slew of new transactions.

Economizing on Transaction Costs within the Bazaar Governance Structure

According to Williamson (1975, 1981, 1985), one of the main characteristics of a governance structure is its capacity to economize on transaction costs. By identifying and evaluating transaction costs we can compare different governance structures, whatever the nature of the envisaged transaction.

We suggest that the bazaar promotes a reduction of transaction costs both for the sponsor and for adopters. For one thing, as there is no selection of entrants in the community, the sponsor does not have to collect information about potential adopters or negotiate with partners in deciding who to include. The sponsor simply writes and proposes an open license, which agents then freely choose whether to adopt or not. Moreover, the contract is the same for all adopters, whatever production operations they realize.

For adopters, economies on transaction costs arise *ex-ante*, as while there may be discovery costs, there are no costs involved in negotiating and writing. Although each adopter may transact with

other adopters several times in improving the copylefted product, further transactions are free of the initial costs of discovering the open-licence contract.

Proposition 1: Bazaar governance can generate transaction costs that are lower than those of other governance structures.

While these mechanisms reduce transaction costs within the bazaar, costs are not null. The bazaar, like all governance structures, also generates transaction costs. Sponsors have to elaborate their open license and promote it to potential adopters. Adopters have transaction costs in discovering the sponsor and the open-license contract. Furthermore, as the product and its technology may evolve very rapidly through the frequent improvements that an open-source community can provide, adopters have costs in collecting information to keep up with developments in the community. They may have to realize transaction-specific investments to adapt their capabilities to use or improve the evolving copylefted product. These are all discovery and learning costs. All those involved also have to preserve the copyleft principle and to ensure that no one copyrights products they have contributed to develop. Sponsors and adopters may find they have to enforce the terms of the open license.

Coordination under Bazaar Governance

Governance structures are also characterized by coordination mechanisms that “permit the parties to work through their differences and get on with the job” (Williamson, 1999: 1090). Three elements contribute to coordination in a form of organization: a means of communication (Powell, 1990), an incentives structure, and a control intensity (Williamson, 1975, 1985, 1999) (see Table 1). By incentive structures we mean the incentives that motivate agents to be effective in their production functions. Control intensity refers to the capacity of a governance structure to contain opportunistic behaviors and to align the behavior of agents implicated in a transaction.

In market, price is the main means of communication. Agents are motivated by competition incentive, and control intensity is weak. Within firm, routines and hierarchical structures ensure communication between agents (March and Simon, 1958), and administrative controls give greater power to monitor and discipline agents than a market structure permits (Powell, 1990). But although hierarchies promote a wide range of incentives (career advancement, mobility, status markers), incentive intensity remains generally weaker in firm than in market or network. Network governance relies on interpersonal relationships and norms of reciprocity concerning a vast array of stakes that go well beyond those of purely economic transactions (Uzzi, 1996). Agents communicate through these relational ties. Reciprocity is the basis for a medium intensity of incentives, and social controls similarly promote a medium intensity of control.

Although the “community” terminology frequently used to describe open-source projects is often associated with interpersonal relations, in contrast to network governance, the bazaar does not presuppose any strong ties between agents. In bazaar governance, the copylefted product is the channel for communication between agents, yet Krishnamurthy’s 2002 empirical study of the top 100 mature open-source software projects found most programs did not generate a lot of discussion among community members.

The features of the copylefted product constitute the main vehicle for communication within the bazaar, as its characteristics call for action from members of the community and restrain the range of potential transactions by generating “affordances.” The word “affordance” was coined by the perceptual psychologist J. J. Gibson (1977) to refer to the actionable properties that exist between actors and the world around them. According to Norman, affordances “refer to the perceived and actual properties of the thing, primarily those fundamental properties that determine just how the thing could possibly be used” (Norman, 1990: 9). Affordances are meaningful to actors, as it is through them that how an object is to be used becomes obvious. The affordance concept has been adopted by social theorists and particularly applied to actor-network theory, to demonstrate how human and non-human actors (technical artifacts) are intricate and interact. For example, Callon states that: “From a certain

point of view, a piece of equipment enacts a space of use that can be reinterpreted, redefined [...], but which exists anyway. In essence, the piece of equipment transmits the speech of those who conceived, elaborated, improved or produced it” (Callon, 1988: 17, our translation). From this socio-technical view, an open-source community could be considered to be actors (individuals or organizations) with a relationship to a product (a technical artifact) that contributes to coordinating their actions by way of the behavior its affordances induce. In a bazaar, a copylefted product constitutes a standard^v for a community. Brunsson and Jacobsson (2000), note that standardization facilitates cooperation and coordination without direct interactions between actors, although, as Callon (1988) argues, different technical artifacts prescribe the behavior of human actors with different levels of precision and authority. Moreover, further evolutions of the copylefted product generate new affordances.

Proposition 2: Under bazaar governance, coordination depends more on the features of the copylefted product than on price, routines or relations between agents.

Paradoxically, the bazaar structure does not seem efficient if we consider only incentives and control intensity. Although the agents adopting an open license constitute a community around the copylefted product (Von Hippel, 2001), social control mechanisms and incentives to be efficient in production functions remain weak.

Incentive mechanisms within bazaar lie in the reputation effects induced by the community phenomenon. For instance, Raymond (1999) notes that successful contributors to an open-source project benefit from an enhanced reputation among their peers, increased attention, and better cooperation from others. These elements have been interpreted by Lerner and Tirole (2000) as signaling incentives. However, despite these reputation concerns, the incentives to be effective in terms of production remain slight for bazaar governance, and compare poorly with the high intensity of incentives in market and the medium intensity of incentives found in network structure (Powell, 1990). A survey of open-source communities conducted in 2000 included 12,000 developers involved in open-source projects (Ghosh & Prakash, 2000). The study found that the top 10% of the developers were

credited with more than 70% of the code. We must emphasize that, even if a user is a *de facto* adopter, as buying or acquiring the copylefted product implies acceptance of the terms of the open license, most adopters do not provide improvements to the product (no debugging, enhancements or testing). This suggests that only a few adopters accomplish production and that the signaling incentive is inefficient for the vast majority of developers.

Proposition 3: Under bazaar governance, the intensity of incentives to be effective in production is lower than under market or network forms of governance.

Bazaar governance displays few formal or informal administrative control mechanisms, according to the terms of Raymond (1999), Tuomi (2000), MacKelvey (2001) and Lerner and Tirole (2000). Bazaar exhibits no formal fiat, as hierarchical structures do, nor is there a strong system of social control as within a network structure. In the bazaar, negative consequences of free riding or opportunistic behavior are limited to reputational concerns—but contrary to network governance, free-riders or opportunistic agents cannot be formally excluded from the open-source community (Raymond, 1999).

Proposition 4: Under bazaar governance, control intensity is lower than under hierarchical or network forms of governance.

Our discussion suggests that bazaar governance contrasts with other governance structures that counterbalance a low intensity of incentives with strong control (firm) or vice-versa (market), or balance both characteristics (network). The distinctive configuration we find with the bazaar (a low intensity of incentives and weak control) participates in the important residual uncertainty characterizing this form of governance.

Uncertainty in Bazaar Governance

We argue that the bazaar is the most uncertain governance structure for agents transacting within it, and for several reasons. First, a sponsor initially faces uncertainty with regards to the occurrence of any transactions at all with adopters. A sponsor might propose an open-source product but fail to generate interest among potential adopters, and if nobody is interested in an open-source project “it can just as easily die out or run into a dead-end” (McKelvey, 2001: 225). Consequently, the sponsor endures more uncertainty than late adopters do. Secondly, even if the sponsor manages to induce adoption and transactions do occur, there may be a temporal gap between the release of the open license and the commencement of a body of transactions with adopters. Both sponsor and early adopters face uncertainty concerning the entry of future adopters into the open-source community. Thirdly, the nature of an adopter’s production is not defined *a priori*. This argument is congruent with Raymond (1999) when he notes that, in the absence of fiat or formal division of labor, Linux developers pick and choose what they want to work on. Finally, even if the transaction conforms to the sponsor’s or another adopter’s expectations, there remains uncertainty about the quality of the adopters’ production, as the open license does not prescribe any level of quality. As we noted above, under bazaar governance, incentive intensity is low and controls few: with the result that, following McKelvey (2001: 221), in an open-source project “quality may vary from excellent to terrible.”

Proposition 5: Under bazaar governance, agents endure more uncertainty in relation to the occurrence of transactions and the nature and the quality of production than under other governance structures.

Uncertainty about transactions in the bazaar is related to the concept of affordances we mentioned previously. While the affordances generated by a copylefted product influence the nature of production, they do not totally determine it. Agents interpret the features of the copylefted product to determine the nature of their production. Thus, an agent might realize production operations towards

“producing complementary products” or “developing new versions of the copylefted product”. These transactions may or may not match the sponsor’s initial expectations.

Factors Fostering Bazaar Efficiency

Taking only the features we’ve been discussing above into account (weak incentives and control intensity, a sizeable degree of uncertainty about transactions), bazaar governance seems less attractive than other forms of organization. However, as Williamson recognizes, each governance structure has its own strengths and weaknesses. In fact, bazaar draws its efficiency from three particular mechanisms.

The first lies in the sweeping economies of transaction and production costs that an open-source project benefits from. According to transaction costs economics, the choice of organizational form depends on minimizing the sum of production and transaction costs (Williamson, 1979: 245). Within a bazaar system, the uniqueness of the contract (the open license) permits an economy of transaction costs that brings agents together into a developing community around a copylefted product. Moreover, non-monetary rewards may strongly reduce or even nullify production costs for some transactions. For example, the debugging of Linux is largely due to voluntary programmers rewarded by reputation concerns, allowing Linux to develop a product at very low cost.

Proposition 6: Production costs are lower under bazaar governance than under other forms of governance.

A second mechanism counterbalances the high level of uncertainty present in a bazaar governance structure. As there is no selection process to enter the community, the number of adopters is potentially very high. Indeed, the copyleft principle does not allow the sponsor or other users to select new adopters for transactions. This contrasts with firm, market and network forms of governance in which agents are scrutinized and selected before any production operations begin. Within the framework of

the open license, several adopters may attempt the same production operation at the same time—they are limited only by their capabilities and the affordances of the copylefted product. This potential multiplicity of transactions provides an opportunity for an agent to foresee the production he expects to be realized by another adopter. Linus Torvalds was originally looking for transactions such as “improving the operating system,” to supply a credible alternative to proprietary operating systems. Torvalds adopted the open-source principle, which favored the emergence of a programmer community, and by doing so achieved the improvements to his operating system that he was looking for. But other kinds of transactions, not envisaged in the initial project, rapidly appeared. Numerous applications have now been written for Linux or have been made compatible with the operating system; some of these software interfaces are device drivers that enable Linux to run on a wide variety of hardware systems (McKelvey, 2001). Other adopters realized valuable transactions of “testing” various applications or the operating system itself.

Proposition 7: Under bazaar governance, the uncertainty attached to a given transaction with a given adopter is counterbalanced by the potentially high number of adopters able to produce the expected output.

This mechanism does not presuppose the complete anonymity of members of the open-source community. Even if a sponsor is looking less for trustworthy and reliable partners than for a multiplication of adopters to generate effectiveness by quantitatively increasing transactions, the identity of the sponsor and of certain adopters can matter. Esteemed actors can add to the community’s reputation (Wade, 1995, 1996). Essentially, although when compared to their number, the identity of adopters is not crucial in bazaar governance, unlike network governance (Powell, 1990), identity sometimes does matter.

The final process that adds to the efficiency of the bazaar is rooted in the cumulative and mutually beneficial effects that characterize communities (Lawrence, 1995). Such effects prevail in bazaar governance, as an agent transacting with the open license commits herself to keep her own

production partially open^{vi} for the rest of the community (Lerner & Tirole, 2000). This original mechanism, based on the copyleft principle, exists only in bazaar governance and gives adopters free access to a major part of the production realized previously by agents of the community. The upshot is that the utility of adopters is tightly correlated with the number of previous transactions that have taken place in that community, as a transaction gives the user access, with the same open license, to all products (improvements of the copylefted products, tests, complementary products) released under copyleft in that community. This mechanism enables each agent to incorporate products from other agents into his or her own products. The bazaar in this way reinforces positive network externalities^{vii} (Garud, Jain & Kuramaswamy, 2002) as the utility of each agent increases as the number of transactions that have occurred increases (Farrell & Saloner, 1986) and as the number of potential adopters who will transact increases (Katz & Shapiro, 1992). This benefit ensues from the cumulative effect of transactions within the bazaar.

Proposition 8: Under bazaar governance, as more products are released under copyleft by agents within a community, the utility of each agent increases.

Propositions 7 and 8 stress the necessity to move from the single transaction unit of analysis put forward in TCE to the cumulative effect of transactions. This point is analogous to recent developments that emphasize the transactional interdependencies of governance choice (Argyres & Liebeskind, 1999; Nickerson & Silverman, 1997). Without taking this level of analysis into account, bazaar governance will permanently be considered to be inefficient.

The preceding arguments suggest that the uncertainty that prevails in the bazaar is counterbalanced by three strong mechanisms: reduced transaction and production costs (economy mechanism); the potentially high number of adopters able to produce an expected output (effectiveness mechanism); and network externalities related to the number of products released under copyleft by agents of a community (efficiency mechanism). Paradoxically, these strengths are drawn from the weaknesses of this governance structure: there is no selection of transacting agents, incentives for

production efficiency and control intensity are weak. The consistency of the features of the bazaar structure produces efficiency. For example, the weakness of control and incentives accounts for this governance structure's appeal for a great number of agents, which in turn amplifies the number of transactions and the subsequent network externalities.

Bazaar governance's particular strengths and drawbacks suggest that an agent who wants to minimize production and transaction costs and is willing to accept a high level of uncertainty in terms of transaction expectations would have good reason to choose the bazaar as a structure in which to transact, whereas an agent wanting to transact with less uncertainty and in a definite temporal framework would be better off choosing another governance structure. From the discussion we have elaborated so far, and drawing on the work of Williamson (1975, 1979, 1981, 1985, 1991, 1996, 2002) and Powell (1990), Table 1 summarizes the main features of each generic governance structure, allowing us to make an institutional comparison contrasting bazaar governance with market, hierarchy and network structures.

Insert Table 1 about here

Moving to a level of analysis below that of generic modes, governance structures empirically present a wide variety of forms. In a bazaar, agents may try to influence and change certain characteristics of the structure to reduce some of its weaknesses. As individual adopters have no predefined role within a community, it is not uncommon to find that other agents are engaged in the same type of transactions. For instance, in the role-playing game industry, more than eighty companies released competing complementary products following the introduction of a copylefted product (Lecocq & Demil, 2002).

Competition induced by the presence of others introduced competition within a community (Burt, 1992; Brandenburger & Nalebluff, 1997). This type of drawback can be offset by mixing in elements from other governance forms (Powell, 1990). Three mixed forms in particular are emerging as potential evolutions in the bazaar: an informal hierarchy may develop within the community; certain agents may develop strong ties to each other; or some agents may copyright their products that have been based on the copylefted product. These three evolutions lead respectively to bazaar-firm, bazaar-network and bazaar-market hybrids. For example, Linux's ongoing success arguably lies in the quasi-hierarchical management of Linus Torvalds and his "lieutenants." The Apache community too presents a kind of centralization. The hierarchization of these worldwide communities is a result of a need to determine which improvements will or will not be incorporated into the copylefted product's main architecture (McKelvey, 2001). It reduces competition and limits the explosion of transaction costs as the number of adopters and transactions increases.

ACTUALIZING BAZAAR GOVERNANCE AND ITS IMPACT ON AN INDUSTRY

We have shown that agents can cause the generic governance mode to evolve towards a mixing of forms in order to preserve the efficiency of the structure. In the following discussion we argue that agents may go beyond this adaptative logic and behave as institutional entrepreneurs, introducing bazaar governance into an industry so as to pursue strategic goals,^{viii} We then propose that instituting bazaar has a profound impact on an industry's structure.

Introducing Bazaar Governance into an Industry

The recent development of bazaar governance illustrates that this structure does not have to pre-exist in an industry to be implemented. The development of the ARPAnet project in the 1960s and the values it

promoted laid the foundations of bazaar governance. In the 1980s, Richard Stallman's General Public License introduced a legal framework for this structure, and the extraordinary diffusion of Linux in the 1990s brought this governance structure to the attention of people working outside the software industry. The first instance of bazaar governance being introduced into a low-tech sector was its implementation by the role-playing game industry in 2000 (Lecocq & Demil, 2002). This brief historical panorama suggests that agents can deliberately choose to implement this governance structure and that industries are not constrained to adopt only pre-existing forms of organization. This argument is largely congruent with economic sociology, which stresses the active role actors have in shaping economic institutions (Callon, 1998; Garcia, 1986; Granovetter & Swedberg, 2001). Several authors have clearly shown that actors, or "institutional entrepreneurs," are able to influence or to question institutions (Beckert, 1999; DiMaggio, 1988; Fligstein, 1997; Fligstein & MacAdam, 1995; Holm, 1995), a point illustrated by Granovetter and McGuire's 1998 analysis of the active roles Thomas Edison and Samuel Insull played in creating the American electricity market and the institutions that regulate it.

We propose that institutional entrepreneurs try to shape governance structures to fulfill their strategic goals. While TCE has linked the choice of a governance structure to transaction characteristics (asset specificity, uncertainty, and frequency), we believe in the necessity of introducing strategic factors into the equation. Williamson himself suggests that the internalization of transactions may respond to strategic considerations. Discussing the findings of Teece (1986) and Liebeskind (1996), he notes that "Problems of protecting intellectual property rights can also give rise to a *node D* outcome [a firm]" (Williamson, 1999: 1091). A governance structure can, then, contribute to gaining and sustaining competitive advantage. Among the various competitive advantages each currently acknowledged governance structure offers, market exhibits low production costs and flexibility in terminating access (Hansen, 2002), hierarchy increases negotiation power (Porter, 1980) and favors differentiation (Hansen, 2002) while network gives access to specific resources with a low level of

investment (Powell, 1990) and facilitates joint problem solving (Uzzi, 1996). So, which specific competitive advantages does the bazaar favor?

Given the characteristics of bazaar governance, we can speculate that it would facilitate the attainment of two strategic goals in particular (although other strategic goals could also be achieved through the bazaar). The first relates to developing products at a low cost (Von Hippel, 2001). Even if production incentives and control are weak, bazaar governance is able to spur more innovative developments than other governance structures can, especially the firm (Tuomi, 2000). The second strategic goal facilitated by the bazaar is more original, and relates to industry standardization. The absence of selection in an open-source community and the opportunity each agent has to freely obtain the source code of the copylefted product and to use, modify and distribute it can result in strong organizational support^{ix}. This organizational support can readily lead to the emergence of an installed base of customers and the release of complementary products, and increases the reputation of the community and its products (Garud, Jain & Kumaraswamy, 2002). These elements lay the basis for positive network externalities and bandwagon effects (Katz & Shapiro, 1985, 1992; Shapiro & Varian, 1999; Wade, 1995, 1996). Consequently, we suggest that beyond cost-reduction logic, entrepreneurs might implement bazaar governance to exploit network externalities in an industry and to diffuse or impose their standard (Garud & Kumaraswamy, 1993; Garud, Jain & Kumaraswamy, 2002; Gruber 2000; Shapiro & Varian, 1999). This argument is congruent with Gruber (2000) who notes that any problematic of standardization implies externalities. However, an entrepreneur will reach these two strategic goals (innovation and standardization) only if adopters anticipate the success of the copylefted product or positively value the potential or existing customer base (Farrell & Saloner, 1986; Katz & Shapiro, 1985, 1992; Kogut, Walker & Kim, 1995; Postrel, 1990).

To succeed in attracting numerous adopters and to overcome the “liability of newness” (Stinchcombe, 1965) attached to bazaar governance, an entrepreneur has to energize efforts to legitimate this institutional arrangement and to co-opt strategic constituents of the industry (Aldrich & Fiol, 1994; Scott, 1995). An institutional entrepreneur introduces bazaar governance by proposing an

open license to actors within the industry (Stallman, 1999). This stage is difficult to manage because the entrepreneur has to attract actors whose repertoires (or mental models) of governance structures do not include the bazaar to create a virtuous circle of externalities. This necessitates a process of legitimization within the industry (Zimmerman & Zeitz, 2002). The entrepreneur may create a foundation to promote the bazaar, as we have seen with the Free Software Foundation in the software sector or the Open Gaming Foundation in the role-playing game industry. She may try to gain endorsement from a standards organization, as when Sun approached the International Organization for Standardization (ISO) to gain recognition. Or she might try to emphasize the correspondence her initiative has with values and beliefs that prevail in the given institutional field—as Richard Stallman did to promote free software. Other tactics include highlighting the entrepreneur’s personal experience or resources, or demonstrating the economic interest the governance structure presents—as Wizards of The Coast (a Hasbro subsidiary) did to promote its open license within the role-playing game industry. All of these tactics help to elaborate a legitimate discourse about the collective benefits the bazaar presents for the industry, that is, they seek to justify action (Boltanski & Thévenot, 1991). In all cases, the legitimization process relies on impression management skills to mobilize support (Suchman, 1995; Arndt & Bigelow, 2000). If successful, legitimization will lead to the addition of bazaar governance into agents’ repertoires as it becomes a credible alternative governance structure and a taken-for-granted form of organization. Once this process begins, other sponsors within the industry will in all likelihood propose copylefted products through new open license contracts (an example of this is the existence today of thousands of open-source software projects). The task faced by these new sponsors is easier, as they can mobilize the cultural framing (Hirsch, 1986) that the pioneering entrepreneur has already generated.

Proposition 9: The greater the level of legitimacy accorded to bazaar governance within an industry, the more it will be used to govern transactions within this industry.

Bazaar Governance's Impact on Industry Structure

Once bazaar governance has been instituted in an industry, we argue that it could potentially have a profound impact on the structure of this industry. Our argument here is at the most speculative. According to Waterson (1990), three factors contribute to changing an industry structure: entries, exits and modifications related to the size of companies. We hypothesize that the introduction of bazaar governance might influence both the number of entries and the relative size of companies.

By weakening entry barriers, bazaar governance favors an entry induction phenomenon. The diffusion of bazaar through an industry enables potential entrants to develop their own products on the basis of a copylefted product, avoiding royalties and prohibitive entry costs or the costs of incompatibility (Farrell and Saloner, 1986). When transacting within bazaar, a new venture can release new products more quickly and at less cost than if it had to sustain the costs of developing internally its own standard (Dierickx and Cool, 1989) or to acquire the technology through market (Barney, 1986) or through a network (Schermerhorn, 1975). Facilitated access to specific assets creates strong incentives to enter into the industry and may lead to an entry induction phenomenon—particularly if there is reasonable certainty that a viable standard has been or will be established (Kogut *et al.*, 1995). This entry induction itself participates in the success of the open-source product and, more generally, to the adoption of bazaar governance.

Proposition 10: The diffusion of bazaar governance through an industry increases the number of new entrants into that industry.

Once bazaar governance has been instituted in an industry, new ventures do not have to invest heavily in developing their standards: the level of resources required to operate in the industry decreases. Companies can release products with less capital or a smaller workforce. This argument leads us to envisage a decrease in the average size of firms in an industry in which the bazaar has been

introduced. This hypothesis is supported by observation of the software industry, in which even individual programmers can release a product. But while the industry may require fewer resources to operate, new entrants must still develop competencies if they are to gain and sustain competitive advantage (Wernerfelt, 1984).

Proposition 11: The diffusion of bazaar governance through an industry decreases the average size of firms in that industry.

CONCLUSION

In this paper we have examined the open-source phenomenon that is still developing in the software industry and which has gained recognition from researchers and practitioners in various fields. The paper makes a unique contribution by theorizing open source as a governance structure—which we call bazaar governance—and consequently extends governance theory itself. Drawing on transaction costs economics (TCE), we have characterized bazaar governance by comparing it to the traditional forms of governance (market, firm and network). As in TCE, this novel governance structure has been presented here as an archetype, even if we have touched on mixing forms. Nonetheless, the open-license contracts underlying the bazaar can take on various empirical forms, i.e. they can assure more or less openness of the copylefted product. Bazaar governance presents original characteristics in terms of how it coordinates transactions and its strengths and weaknesses. Additionally, we discuss in this paper how the bazaar is introduced into an industry and the crucial role that the institutional entrepreneur plays in this process. We evoke the strategic goals, such as innovation and standardization, that motivate, beyond the costs, entrepreneurs to transact through the bazaar. We also call attention to the importance of legitimization when bazaar governance is first introduced into an industry. Finally, we propose that introducing the bazaar governance could potentially have a profound impact on the structure of the industry it operates within. Overall, this paper contributes in further bridging the gap between TCE, strategic management and industrial organization.

In introducing a new governance structure, the present contribution opens a vast potential for future research. We hope the propositions we elaborate here prove to be an initial step in spurring empirical studies on open source as a governance structure. However, we would like to emphasize that if we are to embrace this emerging field we must detach bazaar governance from the software industry in which it was born. Until now the open-source phenomenon has been closely associated with software development. Consequently, the most famous examples of open-source systems, as well as the definitions, concepts and research fields evoked in this paper, are drawn from this specific sector. Yet, the potential applications of the open-license contract range further than the software industry and its implications are relevant to a vast array of transactions. Moreover, the strategic problematic of standardization that bears on bazaar governance potentially concerns all industries, whatever their state of maturity (Brunsson & Jacobsson, 2000; MacKelvey, 2001). Standardization enables complementary products to emerge, markets to unify and economies of scale to be realized, and provides access to a greater number of customers (Chandler, 1977; Shapiro & Varian, 1999). The bazaar governance mode may be implemented purposefully and appropriately in any industry to gain organizational support. For instance, several companies launched open licenses in 2000 in the role-playing game industry (Lecocq & Demil, 2002). By trying to avoid the bias implied by the specific context of the software industry, we attempt to treat bazaar as a generic structure that could be observed in any type of industry. We hope that this paper will encourage academics to inquire into open-source topics outside the traditional context of software, and will encourage managers to be cognizant with this new governance structure and thereby enrich their repertoire.

ⁱ Sourceforge.net registered 56,748 projects on 02/19/2003.

ⁱⁱ Based on Alchian and Demsetz (1973), who define property rights as the exclusive authority to determine how a resource is used.

ⁱⁱⁱ Williamson does not exclude the possibility of identifying forms of governance other than market, firm or hybrid. For example, he evokes the bureau.

^{iv} We have to note that the comparison with the oriental bazaar economy evoked by Geertz is limited to these characteristics. Our concern is totally different from Geertz's.

^v Standards refer to an explicit architecture and not to a single product. In an open-source community, the standard can lead to various products. According to Brunsson and Jacobsson (2000), standards are produced and sponsored by identifiable actors.

^{vi} Although some open licence contracts authorize an adopter to use, modify and distribute the entire product, others authorize only partial use or distribution.

^{vii} It is important to recognize that network externalities may occur whatever the governance structure. Indeed, beyond access to products already released under copyleft, a new adopter can benefit from other factors that increase the product's utility. Elements such as benefiting from a large base of adopters, a vast range of complementary products, or the reputation associated with positive network externalities are not specific to bazaar governance. However, as we suggest in Proposition 8, bazaar governance generates specific network externalities.

^{viii} An institutional entrepreneur who implements bazaar governance in an industry is the first sponsor in that industry. Other sponsors can then use the bazaar structure to govern transactions related to their products, and build their own communities.

^{ix} Following Wade (1995, 1996), organizational support can be determined by the number of adopters a project has.

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TABLE 1

A comparison of generic governance structures

	<i>Bazaar</i>	<i>Market</i>	<i>Hierarchy</i>	<i>Network</i>
<i>Contract law regime</i>	Open license	Classical contract	Employment contract	Relational contract
<i>Normative basis</i>	Copyleft	Market exchange	Forbearance	Exchange
<i>Identity of the parties</i>	Partially relevant	Irrelevant	Irrelevant	Relevant
<i>Mean of communication</i>	Product	Price	Routines and hierarchical relations	Embedded ties
<i>Temporal framework</i>	Unlimited	One-shot	Unlimited	Long term
<i>Nature of incentives</i>	Reputational concerns, Signaling	Competition	Career advancement, status concerns	Reciprocity
<i>Incentives intensity</i>	Low	High	Low	Medium
<i>Control intensity</i>	Low	Low	High	Medium
<i>Tone or climate</i>	Coopetition	Precision and/or suspicion	Formal Bureaucratic	Coopetition

<i>Mixing of forms</i>	<p>Informal hierarchy</p> <p>Partnerships between members of the community</p> <p>Copyright of improvements</p>	<p>Repeat transactions</p> <p>Contracts as hierarchical documents</p>	<p>Informal organization</p> <p>Market-like features : profit centers, transfer pricing</p>	<p>Status hierarchies</p> <p>Multiple partners</p> <p>Formal rules</p>
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