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Ard Huizing & Wim Bouman

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Universiteit van Amsterdam
Department of Information Management
Roetersstraat 11
1018 WB Amsterdam
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Knowledge and Learning, Markets and Organizations: Managing the Information Transaction Space

Ard Huizing & Wim Bouman

Department of Accountancy and Information Management
Universiteit van Amsterdam, The Netherlands

ABSTRACT: If knowledge cannot be managed, what can knowledge management possibly mean for organizations? In this paper, knowledge management is viewed as an organizational discipline bridging information demand and supply in support of learning processes within organizations. Its object is the information transaction space, the vast and chaotic network of information exchange necessary to achieve coordinated action between resources that can be deployed in many ways and for different purposes. A dynamic framework for managing the information transaction space is developed and grounded in economic theory, integrating the coordination, cost, and learning perspectives on the subject. This framework extends the usual market-hierarchy dichotomy in economic theory by distinguishing four equally efficient, yet differentiated governance structures for knowledge management. We argue that the allocatively, but in particular adaptively efficient economic development of organizations is dependent upon their management's 'interpretative flexibility' (Spender, 1996) while managing the information transaction space. Organization members learn and managers have to learn how they learn best. We also argue that insofar as economic growth is increasingly fueled by ideas and knowledge and less by traditional resources, the dynamic ability to make the best use of the information transaction space is a defining competitive dimension of any organization.

KEY WORDS AND PHRASES: Knowledge management, learning, economic theories of the firm, co-ordination.

Index

1. Introduction.....	4
2. Criticism of knowledge management.....	5
3. View on knowledge management	6
3.1 The dual role of exchange.....	7
3.2 Object of knowledge management: The information transaction space.....	8
3.3 Rationale and goal of knowledge management	9
4. Knowledge and strategy.....	9
5. Organizing exchange.....	10
6. Relevant cost components	12
6.1 Transaction costs.....	12
6.2 Agency costs	14
6.3 Operations costs.....	15
7. Four governance structures for knowledge management.....	16
7.1 The Market.....	17
7.2 The Organized Market.....	19
7.3 The Extended Organized Market.....	21
7.4 The Firm	22
8 Managing the information transaction space: the coordination and cost perspectives.....	24
9 Managing the information transaction space: the coordination and learning perspectives.	26
Notes	28
References.....	30

1. Introduction

The field of knowledge management lacks a comprehensive analysis from the economic perspective. While numerous benefits are claimed in literature, for instance increased productivity and the creation of innovative products and services, it is broadly acknowledged that the business or strategic value of knowledge management is hard to demonstrate (Davenport et al., 1998; Zack, 1999).

The aim of this chapter is to help develop an economic foundation for knowledge management. We view knowledge management as an organizational discipline bridging information demand and supply in support of learning processes within organizations. The fundamental task of organizing is generally to achieve purposeful, coordinated action from organizations which consist of many specialized individuals and other resources that can be deployed in different ways and for different purposes (Douma & Schreuder, 1991; Grant, 1996). To better exploit the potential productivity of these resources and to learn from the experiences, a vast network of information exchange is necessary. We call this complex and chaotic network of human interaction ‘the information transaction space’, and see it as the object of knowledge management. It represents the set of all possible information exchanges — economists say transactions — available to any actor at any time 1).

The productive possibilities of resources can be enhanced through exchange. In economics, exchange performs two roles. It can improve efficiency as it enables the continual reallocation of resources to more productive uses, and it can rearrange the bundle of resources economic actors have at their disposal which can stimulate the perception of new, productivity-enhancing combinations between these resources (Penrose, 1959; Ghoshal & Moran, 1999). Regarding knowledge, exchange allows actors to better exploit existing knowledge by reallocating it to better-known uses, and it can improve their ability to access, deploy, and develop this knowledge, that is to learn and innovate. The first role of exchange is related to ‘allocative efficiency’; the second to ‘adaptive’ or ‘dynamic’ efficiency (Williamson, 1999).

Transaction cost economics (Coase, 1937; Williamson, 1975, 1985) and agency theory (Jensen & Meckling, 1973; Fama & Jensen, 1983) address coordination as the fundamental organization problem from a cost perspective and emphasize allocative efficiency. In both economic theories of organization, competitive advantage results from capturing economic rents 2) stemming from organization-level efficiency advantages. In knowledge-based views of the firm as outgrowths of resource-based thinking, coordination is seen as a dynamic management task, which requires learning-by-doing (Grant, 1999a). In this view, managers’ coordinating and learning capabilities are the primary sources of a competitive advantage and of adaptive efficiency.

We develop a dynamic framework for managing the information transaction space which incorporates the considerations of all these economic theories, integrating the coordination, cost, and learning perspectives. It intends to help managers orient their knowledge policies, decisions, and practices as well as to advance knowledge-based views of the firm. The framework goes beyond the usual market-hierarchy dichotomy inherent in economic theories by developing four governance structures for knowledge management: The Market, the Organized Market, the Extended Organized Market, and the Firm. These alternatives are based on the three generic information problems inhibiting any process of information exchange: a) The relevant questions have to be posed unambiguously, b) reliable information sources have to be found, and c) the information acquired has to be interpreted and translated to a unique social practice. These information problems limit the organizations' rent generating potential as they restrict the free flow of knowledge and cause exchange inefficiencies. The goal of knowledge management is to help solve these problems. Its rationale is to increase the allocatively and adaptively efficient use of the information transaction space.

The essence of strategy is to maximize economic rent over time through creating and sustaining sources of competitive advantage (Boisot, 1999). For that, organizations have to be allocatively, but in particular adaptively efficient. We argue that such economic development is dependent on management's 'interpretative flexibility' (Spender, 1996) while managing the information transaction space. Managers have to continually assess and reassess the knowledge domains into which the information transaction space can be divided, decide which of the four governance structures is the most efficient for each domain, and use investment opportunities to adjust cost structures leading to productive organizational change, whilst acknowledging the organization's contingency factors and path dependencies. Organization members learn and managers have to learn how they learn best. In that sense, the dynamic ability to make the best use of the information transaction space is a defining competitive dimension of any organization.

2. Criticism of knowledge management

The way knowledge management is represented in theory and applied in practice is subject to growing criticism. Four arguments summarize this criticism. First, knowledge is frequently seen as a relatively static phenomenon not capturing the ongoing cycle of action taking and knowledge acquisition found in learning theories (Crossan, Lane & White, 1999). In today's dynamic world, however, learning processes constitute organizational learning, rather than the time-limited knowledge that is accumulated as a result of these processes (Dixon, 1997). Best practice descriptions, for instance, can

lead to learning traps when conditions change (Lant & Mezias, 1990). Knowledge from others may therefore inform people's thinking, but cannot replace it.

Second, the prevailing notion of knowledge often rests on a naïvely objectivist model of learning (Leidner & Jarvenpaa, 1995; Tenkasi & Boland, 1996; Cook & Seely Brown, 1999). Knowledge is dealt with as an 'it' or a disembodied object that is made up of discrete and transferable granules of understanding which can be added to an existing heap of knowledge (Spender, 1996; Davenport et al., 1998). Equating learning with making information available, and information and communication technology as primarily used to automate the information delivery function are typical for this kind of reasoning.

Third, many knowledge initiatives are biased towards the supply of information (Manville & Foot, 1996; Alavi & Leidner, 1999). The main problem addressed is how to structure reality into generalized representations and to 'push' that information to the users who will uncritically absorb it. This approach underestimates the active role users play in seeking and creating knowledge. It also negates that increasingly information demand, and not supply, is the scarce factor in knowledge economies (Pine, 1999). User attention is the currency of the information age (Davenport & Prusak, 1998). Hence, there is a need to rebalance the demand and supply sides in knowledge management, based on a reexamination of the notions learning, knowledge, and information.

Fourth and last, knowledge initiatives often take place within organizational boundaries or within a limited network of organizations that may run counter to the borderless learning behavior of information seekers. Presented with questions, problems, ambiguities or uncertainties, information seekers do not passively wait for ideas or experiences to be broadcast by the supply-side. Instead, they actively search for or 'pull' information and create meaning from it for themselves. They learn their way into the future. For that, they participate in all kinds of social networks constituting distinct communities socialized in unique practices (Spender, 1996; Choo, 1998; Wenger, 1998), both formal and informal, within and outside their organizations. While there can be legitimate reasons to partially seal up an organization — for instance to protect precious knowledge (Liebeskind, 1996) — the pitfall of an inward-looking perspective on knowledge management is that organizations become blind to valuable and perhaps more efficient external knowledge sources.

3. View on knowledge management

Faced with such criticism, what can knowledge management possibly mean for organizations? We view knowledge management as an organizational discipline bridging information demand and supply

in support of learning processes within organizations. Learning occurs if information is used to construct new understandings to guide actions (Berger & Lockman, 1966; Dixon, 1997) or if it changes the range of potential behavior (Huber, 1991; Anderson, 1995). Knowledge is defined as the relatively permanent record of the experience underlying learning (Anderson, 1995). This definition of knowledge is intentionally broad. It encompasses declarative (facts), procedural (know how) and conditional knowledge (knowing under what circumstances the knowledge applies), in both its implicit and explicit dimensions. Our view implies that information can contribute to people's knowledge through learning. It acknowledges that information has little meaning in and of itself and has to be interpreted in processes of construction and reconstruction to make sense out of it, and convert it into knowledge (Berger & Lockman, 1966; Weick, 1995). In that sense, knowledge can not be managed. One person's knowledge is just too subjective, fluid and context-specific to be more than another's information 3). What can be managed are the processes of information exchange between information demand and supply, which are crucial to learning. We therefore see these processes of information exchange as the basic units of analysis in knowledge management.

3.1 The dual role of exchange

In resource- and knowledge-based views of the firm, it has become conventional to distinguish knowledge from other resources (Spender, 1996). On their own, few resources — defined as all tangible and intangible means potentially contributing to the satisfaction of human needs such as skills, computer systems, and brands — are productive. Productive activity requires that heterogeneous resources are combined and coordinated to transform them into higher-value products and services. Most resources, however, can be used in different ways and for different purposes. Consequently, the value-adding processes of an organization and its products and services depend on how resources and resource combinations are viewed, which is a function of the knowledge applied to them (Tsoukas, 1996). The more an organization learns about the different ways of coordinating and leveraging resources, the greater the potential productivity of any given set of resources and the attendant prospects of successful action will be (Penrose, 1959).

Learning about deploying resources includes understanding how exchange can enhance their productive possibilities. Resources are scarce and should therefore be used and developed efficiently. In this regard, exchange performs two roles. The first role is that exchange is seen as a principal mechanism to improve efficiency as it enables the continual reallocation of resources to more productive uses. Another role of exchange is that it rearranges the set of resources that people and organizations have at their disposal, which can stimulate the perception of new, productivity-enhancing combinations between these resources (Penrose, 1959; Moran & Ghoshal, 1999). In a Schumpeterian sense, new combinations can intendedly or unintendedly lead to the creation of more

productive resources or more efficient ways of creating resources. Regarding knowledge, exchange not only allows actors to better exploit existing knowledge by reallocating it to better-known uses, it can also improve their ability to access, deploy, and develop this knowledge, that is to learn and innovate. In particular this latter role of exchange — sometimes referred to as ‘*adaptive*’ or ‘*dynamic*’ efficiency (Moran & Ghoshal, 1999, Williamson, 1999) as opposed to the ‘*allocative* efficiency’ related to the first role of exchange — is essential to value creation or rent generation.

3.2 Object of knowledge management: The information transaction space

Ideally, all possible information exchanges that could be expected to increase the organization members’ knowledge on how resources can be deployed in an allocatively and adaptively efficient manner, should take place. The more information within an actor’s reach, the more productive possibilities there will be. All knowledge resides in humanity, but no one knows everything and everyone knows something (Lévy, 1997). To fully exploit the productive possibilities of resources and resource combinations, a vast network of information exchange is needed, as unfettered as possible. We call this network of human interaction ‘*the information transaction space*’, representing the set of all possible information exchanges available to any actor at any moment in time. It can be seen as a ‘market for knowledge’ where navigating information seekers in search of explicit and tacit information, insights and understanding of others reach mutual agreements with information providers and information brokers 4). The allocatively and adaptively efficient organization of this information transaction space is the *object* of knowledge management.

To determine what is productive and affect the possibilities likely to be seen as such, organizations can delineate the information transaction space by defining a number of knowledge slices. These slices are the knowledge domains offering the most opportunities to enhance the organization’s strategic capabilities and the productive possibilities of its resources. They are the constraints shaping the human interactions that bind the organization’s resources together. The consultancy firm Ernst & Young, for instance, has twenty-two knowledge networks focused on industries, consulting approaches and key technology areas (Davenport et al., 1998). Another example is a traditional dairy food producer who had to develop knowledge of fast moving consumer goods when making the transition towards a food company focusing on brands instead of products. To help realize the new business models, it explicitly defined knowledge slices viz. marketing, logistics, distribution, and research & development business functions.

3.3 Rationale and goal of knowledge management

Whether or not knowledge slices are defined, in practice only a fraction of all possible information transactions will ever be made. Unrestricted information exchange maximizing the productive possibilities of resources and resource combinations is a fiction. As a result, there is always and everywhere a gap between what is possible and would be productive and what is realizable at any given time. The economic *rationale* for knowledge management is to narrow this gap. Its *goal* should be to help smooth the three fundamental and generic information problems contributing to the existence of the gap and causing inefficiencies in any process of information exchange: a) The relevant questions have to be posed in terms that can not be misunderstood, b) knowledgeable and trustworthy information sources have to be found (internal or external people, websites or databases), and c) the information gathered has to be interpreted to create meaning from it and applied to the context-specific practice of the information user. Whether individually or collectively, people learn through social interaction. For knowledge management to be instrumental in these learning processes, all knowledge initiatives should be related to at least one of the three information exchange issues.

4. Knowledge and strategy

Much of the current interest in knowledge management can be explained from the economic perspective. The phrase 'if we only knew what we know' implies that actors can benefit from knowledge of others, but that they have difficulty in locating, accessing, interpreting and applying it. These frictions hamper the free flow of information and cause exchange inefficiencies. As a result, they limit the potential of actors for future development and economic rent generation. The essence of strategy is to maximize economic rent over time through creating and sustaining sources of competitive advantage (Boisot, 1999). Due to competition, organizations have to continually renew their sources of competitive advantage. For that, they need to be allocatively but in particular adaptively efficient. Viewed as such, adaptation is the central problem of economic organization 5).

The prospect of efficiency gains, new resource combinations and, ultimately, competitive advantage strengthens the view that the primary role of knowledge management is to draw information demand and supply together. It also lends this view strategic importance: Insofar as economic growth is increasingly fueled by ideas and knowledge and less by traditional resources (Drucker, 1983; Tenkasi & Boland, 1996; Quinn et al., 1999), the dynamic ability to make the best use of the information transaction space is a defining competitive dimension of any organization. At the end of the chapter, we will return to this argument and relate it to resource- and knowledge-based views of the firm.

Before we do that, however, we will first explore the opportunities for knowledge management provided by transaction cost economics and agency theory.

5. Organizing exchange

Transactions cost economics (Coase, 1937; Williamson, 1975, 1985) and agency theory (Jensen & Meckling, 1973; Fama & Jensen, 1983) are economic theories of organization. Together, they permit a comparative assessment of market, organizational, and hybrid forms of organizing knowledge management, explain inefficiencies in information exchange, and show the relevant cost components to balance in knowledge decisions.

Every exchange or transaction has to be coordinated. That raises the question whether there are different ways to coordinate exchanges, and if so, what form of organization or governance structure is the most expeditious and least costly. A governance structure is a set of rules and institutions for administering exchange relationships. It is a means by which to infuse order into a relationship where potential conflict threatens to undo or upset opportunities to realize mutual gains (Williamson, 1999). Transaction cost economics claims that there are two governance modes: Transactions may take place across markets or within organizations. Markets use the price system as the coordination mechanism and organizations have an array of non-price devices available such as authority, the standardization of skills and mutual adjustment (6). This view opposes conventional neoclassical economics which states that perfect markets are maximally efficient (Hayek, 1945; Douma & Schreuder, 1991). Perfect competition means, among others, that all the information needed to make decisions is collected and communicated to all economic actors by the price system and that any piece of new information is instantaneously reflected in a price change. Hence, it is assumed that everybody is always perfectly informed. Organizations are represented as reactors responding to price changes (Rowlinson, 1997), as 'black boxes' transforming the factors of production into output with the sole objective of maximizing profits or the organization's market value (Jensen & Meckling, 1973). The costs of generating and marketing the output — the production or operations costs — is thus the only relevant cost component in the neoclassical theory.

Transaction cost economics acknowledges that markets do not function perfectly. It accounts for the fact that in the real world, information is unevenly distributed among actors. These information asymmetries indicate that nobody is perfectly informed. Two key features of human actors explain market imperfections: People are boundedly rational and sometimes also display opportunistic behavior (Williamson, 1975, 1985). *Bounded rationality* means that a human being's capacity to formulate and solve complex problems is limited. As a result, people tend to aspire to what is

acceptable rather than what is optimal. *Opportunism* implies that, just to take advantage of particular situations, information can be manipulated, concealed or distorted. Both these human characteristics cause markets to operate inefficiently, for they prevent information from flowing freely. Consequently, transaction costs occur, which are the costs associated with the inefficiencies in exchange processes 7). To put it differently, transaction costs are the costs involved in using imperfect markets to coordinate the exchange (Coase, 1937; Williamson, 1975, 1985). Examples are the costs of acquiring information from alternative knowledge brokers and negotiating a deal with them. Economic analyses should therefore not only include operations costs, as is assumed in neoclassical economics, but also transaction costs 8).

Agency theory focuses on organizational problems arising from information asymmetries between actors and on how these problems can be overcome (Jensen & Meckling, 1973; Fama & Jensen, 1983). Agency relationships exist in any situation where one actor — the principal — depends on the action of another actor — the agent. Agents (e.g. employees) are supposed to perform services on behalf of the principal (e.g. managers). However, the behavioral assumptions underlying agency theory predict that they will not always fulfill the agreements made with principals. They will rather try to maximize their own individual utility, paying little attention to the welfare of the principal or to non-pecuniary virtues such as honor and integrity. As in transaction cost economics, information asymmetries can lead to opportunism 9). The neoclassical view of the organization as a unified ‘black box’ with a single brain is therefore rejected. It does not allow for an analysis of situations in which the behavior of organization members is inconsistent with profit maximization. Instead, an organization is seen as a nexus of contracts between self-interested individuals. The costs incurred as a result of the goal divergence between these individuals, or better: the internal coordination costs to bridge these conflicts of interests, are called agency costs 10). An example is the costs to adjust the general evaluation and compensation structure in an organization to discourage the hoarding of information.

Hence, information asymmetries causing exchange inefficiencies play a pivotal role in economic theories of organization. Organizations and any organizational arrangement, including knowledge initiatives, surface as solutions to these information problems that cannot be resolved by the price system. They are seen as substitutes for the market mechanism in coordinating exchange. In practice, however, organizational and market governance structures are usually mixed (Malone et al., 1987; Douma & Schreuder, 1991), leading to a market-firm continuum of different combinations of price and non-price coordination mechanisms. The actual mix as found in any situation depends on the information requirements of that situation (Douma & Schreuder, 1991; Gurbaxani & Whang, 1991; Ciborra, 1993).

We identify four ideal type governance structures based on the three generic information problems mentioned before which also have their roots in information asymmetry. Given their bounded rationality and the hazards of opportunism, whenever information seekers enter the information transaction space, they are faced with the problems of asking the relevant questions, finding reliable information sources, and interpreting and applying the information acquired to specific contexts. These information problems inhibit the reallocation of information to more productive uses and the ability to envisage new combinations with this information. Organizations can help their members by organizing knowledge initiatives that will address one or more of the three information problems. Which information problems are tackled, determines which of the four governance structures applies. These governance structures are labeled the Market, the Organized Market, the Extended Organized Market, and the Firm. We will explore these alternative ways of coordinating information exchange and their different allocative and adaptive efficiency properties. Before turning to this subject, however, we will first specify the cost components that have to be dealt with in knowledge management.

6. Relevant cost components

It follows from the previous section that organizations and organizational endeavors are alternative governance structures for the market, created to reduce the sum of transaction costs, agency costs, and operations costs. In terms of allocative efficiency, the economic rationale for knowledge management is to minimize these costs. Note that these costs are mainly information costs, for the essence of coordination involves communicating and processing information (Malone et al., 1987).

6.1 Transaction costs

In a knowledge setting, transaction costs are the coordination costs associated with using the market mechanism to organize information exchange. Consider a company hiring a consultancy firm to help implement a groupware system. This company incurs *search costs* when collecting and interpreting information on the market, possible candidates, prices, and other terms of doing business. Further inquiries into track records, suggested consultancy approaches and so on, lead to communication processes with a selected number of candidates. This results in a variety of transaction-specific information-processing costs: *Communications costs* to better understand the situation, which include costs of miscommunications and opportunity costs due to delays in communications and poor or misinterpreted information, and *documentation costs* to record the information gathered. These costs are partly out-of-pocket expenses and partly opportunity costs, which are costs that are foregone by not

putting the organization's resources to their best uses. Reaching an agreement with a consultancy firm further entails *contracting costs* — the costs to negotiate, write, and enforce a contract.

Moreover, there are *redundancy costs*, which we define as the costs of needlessly repeating the same transactional activities as a result of not sharing information. Due to specialization, differentiation, and departmentalization, organization members frequently are unaware of the existence or whereabouts of information possessed or stored by others (Huber, 1991). This lack of information can result in costs to reinvent the wheel which could have been avoided if the information had been shared in one way or another. Parts of this are opportunity costs due to inventing square wheels, which result from someone acting upon poor or misinterpreted information while a colleague in the organization had superior yet undisclosed knowledge. Finally, not sharing information promotes the recurrence of mistakes leading to yet another kind of cost.

Table 1 includes the five types of transaction costs relevant to knowledge management. All these costs are closely related to bounded rationality and opportunism. While search is fundamental to intelligent behavior (Newell, 1990), bounded rationality limits the time and effort people spend on searching. This increases the chance for decisions to be made on the basis of inferior or incomplete information. Another example is contracting costs the main purpose of which is to prevent the other party from acting opportunistically. Yet, transaction costs do not add value to the business. They are inefficiencies in information exchange. Organizations can economize on bounded rationality and mitigate the hazards that come with opportunism by taking transactions out of the market and organizing them internally (Williamson, 1999). To proceed with the example of hiring a consultancy firm, organizations can choose from a whole array of organizational arrangements. They could for instance store knowledge in standard operating procedures or routines, collect experiences with consultancy firms into an easily accessible organizational memory, and appoint internal consultants who partly take over the external experts' job. Each of these organizational measures has the intention of significantly reducing transaction costs.

Table 1
Three cost components

<i>Cost components</i>	<i>Types of costs</i>
Transaction costs	Search costs Communications costs <ul style="list-style-type: none"> • Costs of communications and miscommunications • Opportunity costs due to delays in communications and poor or misinterpreted information Documentation costs Contracting costs <ul style="list-style-type: none"> • Costs of negotiation and writing contracts • Costs of enforcing contracts Redundancy costs <ul style="list-style-type: none"> • Costs of reinventing the wheel • Opportunity costs due to inventing square wheels • Costs of recurring mistakes
Agency costs	Monitoring costs Bonding costs Residual loss
Operations costs	Costs of information representation <ul style="list-style-type: none"> • Costs of acquiring, refining, storing, and disseminating information Protection costs

6.2 Agency costs

The second relevant cost component is agency costs. Knowledge management is replete with agency problems. One source of these problems is shareholder-management conflicts. Knowledge management often leads to the creation of a specialized business function which can consist of multiple levels of new roles such as the chief knowledge officer, knowledge reporters, and network facilitators (Davenport & Prusak, 1998). New business functions may evoke a whole range of new coordination issues. For instance, knowledge managers, like any manager, can suffer from the ‘empire-builder’ syndrome (Gurbaxani & Whang, 1991) and overconsume organization resources at the expense of the shareholders. To them, a large budget, a large staff, the finest computer equipment, and a large office, for example, can be signs of power and career success.

Other sources of agency problems are manager-employee conflicts and conflicts between peers. Information exchange is often seen as an unnatural act (Davenport et al., 1998; Quinn et al., 1999). Organization members may be reluctant to share their tacit and explicit information because they see it as crucial to maintaining their value as employees. Without any concrete compensation in return, they may be unwilling to spend precious time in helping colleagues. They may hoard information to advance their careers. A struggle to get organization members to contribute to repositories or use discussion databases and rivalry between all tasks and activities demanding attention would fit in this picture. As many organizations have experienced, rewarding and recognizing knowledge-sharing behavior to combat opportunism is a major concern of knowledge management (Hackett, 2000). Moreover, conflicting interests between the knowledge management function and other business functions may give rise to agency problems.

Agency structures have two major devices for overcoming agency problems: Monitoring and bonding (Fama & Jensen, 1983; Douma & Schreuder, 1991). The costs associated with both ways of insuring that agents act in the interests of principals are agency costs. By definition, they add bureaucratic costs (Williamson, 1999). *Monitoring costs* are costs of observing the behavior of agents and *bonding costs* are costs agents incur in reporting and documenting their activities, consuming resources that could have been spent on other, value-adding activities. Examples are investigations into information use patterns, and the introduction of performance-based compensation schemes and other motivational instruments. In addition, a *residual loss* remains which means that opportunistic behavior can not be completely banished by monitoring and bonding activities, thus leading to partial welfare losses for principals.

6.3 Operations costs

The third and last relevant cost component — operations costs — can be divided into costs of information representation and protection costs. Knowledge must be represented in some fashion to be used, told, or thought (Newell, 1990). Best practices, for instance, are representations abstracted from reality. They contain knowledge, yet they are not the knowledge itself. The *costs of information representation* are the costs of making representations involving single identifiable processes comprising linked sets of activities to acquire, refine, store, and distribute information (Gurbaxani & Whang, 1991; Meyer & Zack, 1996; Choo, 1998). These typical information management costs include costs to develop and use information systems, products, and services that add value to the represented information and assist users in asking better questions, finding better information sources, making better sense of situations and taking more effective action.

Finally, there are *protection costs* when organizations choose to protect parts of their knowledge from appropriation or imitation by their competitors (Liebeskind, 1996). Inserting confidentiality clauses into employee contracts, implementing computer protection systems, and establishing employee conduct rules are examples of adding to these costs.

7. Four governance structures for knowledge management

We distinguish four ideal type governance modes for knowledge management on the basis of the three generic information problems in information exchange: the Market, the Organized Market, the Extended Organized Market, and the Firm. As mentioned before, a governance structure is a set of rules and institutions for administering exchange relationships. In *The Market*, these rules and institutions refer to market coordination, which implies that the exchange relationships are mainly shaped by information demand and supply forces. The organizing principle is ‘self-organization’ as organizations consciously or unconsciously refrain from deliberate knowledge initiatives or outsource them. The rules and institutions in the other three governance modes increasingly relate to organizational coordination. In *The Organized Market*, the organizing principle is ‘paving the road to experts’, meaning that knowledge management is solely deployed to help solve the information problem of finding reliable information sources. The two remaining information problems are left to market governance. When organizational coordination is also focused on helping information seekers ask the relevant questions unambiguously and on ‘guiding information asking’ by clarifying and specifying information needs, we speak of *The Extended Organized Market*. Finally, in *The Firm*, the organization of the information transaction space is directed towards all three information problems. In this case, the organizing principle also includes ‘facilitating information interpretation’ in order to promote information use and feedback.

The next sections elaborate on the four governance structures for knowledge management. They are summarized in Table 2. On the basis of economic theories, coordination as the fundamental task of organization is approached from a cost and a learning perspective. We then continue to explore the different allocative and adaptive efficiency properties of the four governance modes. Finally, the strategic relevance of managing the information transaction space is addressed.

Table 2
 Framework for managing the information transaction space

	The Market	<i>The Organized Market</i>	<i>The Extended Organized Market</i>	<i>The Firm</i>
Organizing principle	Self-organizing	Paving the road to experts	Idem, and guiding information asking	Idem, and facilitating information interpretation and use
Coordination mechanisms as to: finding reliable information sources asking the relevant questions unambiguously understanding and applying information	Market mechanisms Market mechanisms Market mechanisms	Non-market mechanisms If outsourced: market mechanisms Market mechanisms	Non-market mechanisms If outsourced: market mechanisms Non-market mechanisms If outsourced: market mechanisms Market mechanisms	Non-market mechanisms If outsourced: market mechanisms Non-market mechanisms If outsourced: market mechanisms Non-market mechanisms
Examples of practices	Communities of practice, knowledge brokers	Strategic communities, expert directories, portals, agents, libraries	FAQ's, meaning-based search engines, interactive guiding systems	Feedback systems such as learning histories and storytelling
Transaction costs Agency costs Operations costs	++++ 11) + +	+++ ++ ++	++ +++ +++	+ ++++ ++++
Relationship between learning and the rent-generating potential of the organization	Performance is best served with employees shaping their own learning processes	Performance can be improved by paving the road to reliable experts	Idem, and performance can be enhanced by guiding employees in their search processes	Idem, and performance can be increased by helping employees interpret and use information
Contingency factors	Degree of bureaucratization Degree of 'politicalness' Degree of individualism Degree of knowledge fluidity Degree of dispersion of information sources			

7.1 The Market

The information transaction space can be viewed as a 'market for knowledge' where information seekers, providers, and brokers reach mutual agreements. These agreements can involve the exchange

of money, but often information is transacted freely. Free exchange, however, does not mean that the market mechanism is not at work (Douma & Schreuder, 1991; Davenport & Prusak, 1998). Maximizing one's utility can also include the exchange of intangible scarce factors such as favors, reputation, and affection. Bounded rationality and opportunism indicate that people act on the basis of perceived self-interest and expect to financially or non-financially benefit from the information transactions they engage in. These two human characteristics also explain inefficiencies in information exchange and the resulting relatively high transaction costs. They are therefore crucial in understanding how knowledge markets operate. Even if social relationships are based on trust, it is important to realize that people rarely give away valuable information without expecting something in return 12).

Given that organizations exist, market governance means that organizations follow a laissez-faire approach to knowledge management, which implies that they do not take specific knowledge actions to back their members. Organizations that have not yet considered knowledge initiatives or expect no benefits from them, fall into this category. This mode can also attract organizations that are convinced it is the best strategy to nurture individual and collective learning processes. Refraining from deliberate knowledge initiatives does not imply that organization members will not learn. In fact, they learn all the time as they constantly pull information from different sources, make sense of it by themselves and use it for purposeful actions. To satisfy their information needs, they actively contribute to formal networks and informal communities of practice, both within and across organizational boundaries. Moreover, they use existing information systems and channels, improvise, install new systems, and share the outcome of their information organization with others.

Communities of practice, in particular, have recently gained attention in management literature as the new 'organizational frontier' (Wenger, 1998; Wenger & Snyder, 2000). Such communities are self-organizing and informal groups of people sharing experiences and knowledge in free-flowing creative ways to better deal with never-ending new developments, exploring potential solutions to structured and unstructured problems, and developing and implementing new ideas. They are organic, spontaneous, and informal market places where people coordinate their information exchanges to learn from each other and build new socially constructed knowledge around knowledge slices attracting all the group members. Allegedly, the best way to learn is to engage in social practices with people sharing similar interests and goals (Wenger, 1998; Storck & Hill, 2000).

Hence, even if organizations adopt a laissez-faire market approach to knowledge management, bottom-up and self-organizing initiatives emerge which can intentionally or unintentionally result in allocative and adaptive efficiency gains. Organizations adhering to this view see their employees as professionals performing best without too much supervision, interference, and topdown structures.

They act on the belief that the professionals themselves know best how to shape their own learning processes, put the greatest trust in their abilities to deal effectively with the intricacies and subtleties of bounded rationality and opportunism, and take the relatively high transaction costs for granted.

The high transaction costs of the free market approach offer rich business opportunities for external knowledge brokers. These infomediaries have the same *raison d'être* as internal knowledge initiatives: They interfere in free market interaction and create physical and virtual market places to reduce transaction costs. These developments are spurred on by information and communication technology which facilitate the creation of new markets where none existed before or improve existing ones (Ciborra, 1993). As a result, external and internal knowledge structures increasingly compete with each other for the attention of information users, information providers and their organizations. In some cases, organizations can put resources to more productive use if they access them through outsourcing (Williamson, 1999). We will elaborate on this subject in the next sections.

7.2 The Organized Market

The relatively high transaction costs of market coordination can inspire organizations to consider internal knowledge initiatives. Information seekers often have difficulties in finding the right information sources, in reaching these sources, and in assessing their quality and reliability. In their turn, information providers are frequently not aware of whom their information could benefit, and so do not share or store it. In this governance mode, knowledge management is confined to this generic information problem which specifically causes search and redundancy costs to be high 13). Choosing this mode, implies that knowledge management is viewed as a means of keeping track not so much of the information itself, but of who possesses it and how to access them (Alavi & Leidner, 1999). Such a view fits organizations that see their members as professionals responsible for what they need to learn and how, but whose productivity can be substantially improved by helping them find their way (Moreland et al., 1996).

Paving the road to experts involves accessibility, availability, quality, and reliability issues. To address these issues, many exchange-enhancing arrangements can be applied. For instance, managers can create dedicated information transaction spaces for communities of practice or 'strategic communities' that will enhance the organization's strategic capabilities, and stimulate every employee to join them. Strategic communities are communities of practice which have a defined relationship to formal organizational objectives (Storck & Hill, 2000). The social and affective bonds in both types of communities constitute information channels that reduce not only the amount of time and investment required to gather information (Nahapiet & Ghoshal, 1998), but also uncertainties about the quality and reliability of the information and its sources 14). Identifying and cultivating communities and

defining their knowledge domains are organizational capabilities maximizing such 'economies of communication'.

Other arrangements intend to create information-transfer infrastructures leveraging human interactions. They often combine organizational, behavioral, and technological measures. Elements of such infrastructures are 'registration systems' — such as competence databases (or expert directories), document scanning and management systems, libraries, and calendaring and scheduling systems — and 'communication systems' — like corporate portals offering personalized single points of access to multiple information sources, desktop videoconferencing systems, and intra- and extranets. As mentioned before, people have to be motivated to contribute to such systems and to be available for information seeking colleagues. This governance structure therefore results in higher operations and agency costs, which should be counterbalanced with the decreasing transaction costs.

If applied, all these arrangements to some extent organize the knowledge market. They partly replace market governance with organizational coordination. In communities, 'mutual adjustment' in collegial networks is the primary coordination mechanism, agency problems suggest the use of 'authority', and 'standardization' is the effect of information-transfer infrastructures and the related motivational instruments. In the latter case, organization members are suggested to use pre-selected and tested information sources, and tailored search tools and patterns to help solve the generic problem of finding reliable information sources. The other two information problems remain the responsibility of the actors involved. That is, the problems of asking the relevant questions unambiguously and that of interpreting and applying the information to context-specific practices are left to market coordination. This option is thus a hybrid governance structure, a mix of market and organizational coordination devices.

The transparency of knowledge markets can also be increased by external infomediaries. In their role as expert, information source, or producer (Choi et al., 1997), they categorize, filter, and prune the information supply. Technological developments such as meaning-based search engines and intelligent agents and filters share this intention, and application service providers offer opportunities to outsource software and databases. Initiatives to draw information seekers and providers together abound on and off the Internet. On the Internet, there are knowledge fairs based on the idea to 'sell what you know, buy what you don't', community builders where questions asked are routed to the right expert's door, auctions to exchange any imaginable knowledge product, and interactive plaza's fostering dialogues between knowledge experts. Many of these initiatives can be seen as new market mechanisms intended to put fair market values on knowledge. An example is the Cambridge Information Network, an online community of 3,000 senior ICT-executives from around the world collaborating, sharing experiences or questions, and gleaning advice from colleagues. The

organization's staff moderates discussions, conducts surveys, and provides members with in-depth research, white papers, and columns. By facilitating the sharing of dispersed information, the Internet enables the emergence of such 'communities of knowing' (Boland & Tenkasi, 1995). Similar infomediaries emerge off the Internet. The services they provide range from simple information transactions to complex and specialized knowledge brokering.

7.3 The Extended Organized Market

Another hybrid governance structure emerges when organizations not only correct market imperfections related to finding reliable information sources, but also to asking the right knowledge questions unambiguously. In particular when people face ambiguous problems or opportunities, find themselves in highly uncertain situations or merely have some indeterminate feelings that something should be done, articulating information needs can be a difficult search process in itself. As a result of posing vague or wrong questions, people can learn something incorrectly or they can correctly learn something incorrect, even if the answers received are representative (Huber, 1991). Organizations realizing that such difficulties in information exchange may occur, can choose this option to further increase the productivity of employees and the organization's performance.

Organizational arrangements directed toward this second generic information problem focus on guiding organization members in their search processes. We call such arrangements 'interactive systems' to indicate that genuine guiding requires real-time interaction in successive questions and answers. Practices vary from search engines capable of first verifying what the information seeker means before presenting the search results and expert-system software programs for more structured searches, to enhanced library functions and experts employed for every designated knowledge slice to help with unstructured searches. In its simplest form, organizations can create databases with 'frequently asked questions' and past search results. Depending on the percentage of repetitive questions, such organizational coordination can lead to substantial *informational economies of scale*: The average costs per information transaction will be lower for high frequency transactions. In other words, the value of information increases as more people use it. In all these cases, mutual adjustment and standardization are used as the coordination mechanisms to reduce transaction costs. This reduction will be at least partly offset by the costs incurred for the necessary investments in and maintenance of the interactive systems, and for the monitoring and bonding activities.

Guiding services to help information seekers pinpoint their information needs before they are referred to the right information source are also provided by external knowledge brokers. An example is Teltech – Research and Knowledge Management Services. This broker provides a technical referral service connecting over 3,000 technical experts and thousands of online databases with clients who

occasionally have questions or problems in technical knowledge slices. When a client calls Teltech, he or she gets assistance from a knowledge analyst. They collaboratively browse appropriate databases, elicit the client's true information needs, and discuss the search results. Especially when questions are not articulated well, client and knowledge analyst together engage in such dialogues, which may extend over a couple of days. Among others, by effectively guiding the client to information, Teltech adds value to information 15). Whether the client understands the information gathered and is capable of using it in his or her context, remains the client's responsibility. It is also the realm of the last governance structure for knowledge management distinguished by us.

External infomediaries such as Teltech can be so efficient that outsourcing becomes an alternative road to travel in attempts to economize on transaction costs. It complicates the tradeoffs to be considered in knowledge decisions. The costs of internalizing information transactions not only have to be compared with the costs of transacting on the market, but also with the costs of outsourcing.

7.4 The Firm

The last governance structure is directed towards all three generic information problems. Compared to structure 3, it also includes the problem that information has to be understood to be able to formulate statements and actions that are meaningful and purposeful for the practices in which organization members collectively work. The intention is to ease information interpretation in order to support information use and feedback. It is for organizations viewing learning as essential to rent generation and future development, but that also believe it does not come about spontaneously or that it can be more efficiently coordinated internally. Here we encounter the issue of organizational learning: Individual people learn, but we cannot be sure that organizations learn as well. Individuals learn as they develop their unique knowledge bases by constantly constructing new understandings to guide actions. Whether organizations learn depends on their abilities to synergistically use and integrate these distinct knowledge bases. That requires a process of mutual perspective taking to exchange individual knowledge between organization members (Tenkasi & Boland, 1996), mutual engagement and a shared repertoire (Wenger, 1998), the construction of collective meaning (Dixon, 1997), or uniform understandings across organization members of possibly different interpretations (Huber, 1991). For any coordinated action to take place, it is essential to (partly) know what others know. The issues involved in these delicate processes constituting learning and adaptive efficiency are, among others, the stickiness of information (Szulanski, 1996), and proprietary and political concerns related to agency problems.

Most knowledge projects aim at organizational learning. As stated in the beginning of this chapter, however, these projects can often be characterized as supplier-focused, centralized approaches pushing

commodified information to users, which hardly facilitate learning at the organizational level. In terms of the coordination mechanisms applied, most initiatives strive for efficiency gains through the 'standardization of knowledge'. Inviting one expert to write a 'best practice' for all colleagues to copy is an example of such standardization. If information *could* be used in this way, it *would* greatly reduce transactions costs and lead to substantial informational economies of scale. However, as a study of the best practice databases we conducted in three large organizations has shown, 'standard solutions' contain too little information to come close to what is needed for mutual perspective taking. Typically, they lack information on historical contexts, situational factors, assumptions used, personal reflections, and on their validity and generalizability. The study has also demonstrated that sometimes sensitive yet crucial information is excluded from best practice descriptions, and that intermediary 'knowledge officers' are often focused more on the maintenance side of the information systems than on raising the value of the information stored. We argue that knowledge projects relying on standardization result in a less than expected decrease of transaction costs and higher agency costs due to 'not-invented-here-syndromes' and increased reluctance to use standard solutions.

Managers can cultivate learning, but they cannot force it. Instead of having knowledge officers trying to control for quality, organizations can give the learners themselves control of their learning processes (Leidner & Jarvenpaa, 1995) and support them in pulling the information they need. Rather than relying solely on centralized information delivery, they can create situations that help group members learn from each other (Storck & Hill, 2000) and develop practices that make use of information in new and more productive ways (Cook & Seely Brown, 1999). In particular, people learn by giving and receiving feedback information showing how actions can reinforce or counteract each other (Senge, 1990). Mutual perspective taking often boils down to knowing how others deploy resources and relate organizational actions to outcomes. To ensure the collection and analysis of such feedback and to increase its accuracy, organizations can use 'feedback systems' such as learning histories (Kleiner & Roth, 1997), storytelling (Boyce, 1996; Barry, 1997), scenarioplanning (Van der Heijden, 1996), and open discussion spaces (Tenkasi & Boland, 1996). All these recent developments in organization theory indicate that organizational learning only occurs in relatively small groups or communities sustaining close relations of mutual engagement based on trust and freely exchanging explicit and tacit information to achieve benefits for all. We therefore prefer to speak of collective instead of organizational learning. Organizations consist of many groups or collectivities, each situated in unique practices and demanding tailored learning processes.

In this governance structure, the function of the external knowledge market is largely taken over by the organization itself, for the allocation of resources and the abilities to access, deploy, and develop them are primarily seen as internal affairs. As to the cost effects, collective learning requires regular interaction and mutual interest in groups of limited size. This implies that information exchange is

mainly coordinated by mutual adjustment within and between all groups to be distinguished within the organization (Grant, 1996). Compared to standardization, mutual adjustment leads to higher governance costs as it greatly reduces the potential informational economies of scale. Mutual adjustment enhancing adaptive efficiency, therefore, may result in less allocative efficiency. That, however, is the consequence of combining push and pull strategies for knowledge management, of believing that collective learning requires intense and reciprocal social and affective bonds that facilitate mutual understanding taking a long time of sustained effort to build, which can not be bought and can be destroyed 'in a second'.

8 Managing the information transaction space: the coordination and cost perspectives

The four ideal type governance structures for knowledge management are different solutions to the information problems inherent in information exchange processes. They have different allocative and adaptive efficiency properties. Which of the four options is to be preferred under what conditions?

From a cost perspective, the answer would be that this is determined by the relative cost of transacting using these alternatives. Based on transaction cost economics and agency theory, we have argued that there are three cost components relevant to knowledge management: Transaction, agency, and operations costs. Both theories emphasize building a competitive advantage through capturing economic rents stemming from fundamental organization-level efficiency advantages. To comparatively assess the four governance structures, the costs of market imperfections (i.e., transaction costs) should be compared with the costs of internalizing knowledge transactions (i.e., agency and operations costs). Moreover, if other organizations are capable of organizing the same information transactions, the costs of outsourcing alternatives should also be considered. Such comparative assessments between governance structures should be conducted for every knowledge slice distinguished by the organization to enhance its strategic capabilities and the productive possibilities of its resources. This implies that the coordination mechanisms used can be attuned to the specific conditions met in each knowledge domain.

As Figure 1 shows, the transaction costs decrease while the agency and operations costs increase as organizations rely more heavily on internal coordination. The optimal point for any organization is located where the sum of these costs is minimized (6). In this way, the boundaries between the alternative governance structures are set by the economics of exchanging information. The exact location of this point can not be given in general, for it depends on the specific cost structure of the organization, which in itself is contingent upon factors such as the degree of bureaucratization, of

‘politicalness’, of individualism, of dispersion of information sources, and the degree of knowledge fluidity 17). If, for instance, the organization’s culture is characterized as relatively bureaucratic, political or individualistic, agency theory predicts that the agency costs will be comparatively high in that organization. This could lead to a shift toward more market coordination to avoid the high agency costs, or toward specific actions and investments to fight these costs. If the relevant information sources are geographically dispersed or if knowledge is highly fluid, the transaction costs will be relatively high which might stimulate organizations to coordinate the information transactions internally. Hence, in practice the shapes of the cost curves can deviate from those depicted in Figure 1 and should therefore be investigated if knowledge decisions are to be made from a cost perspective.

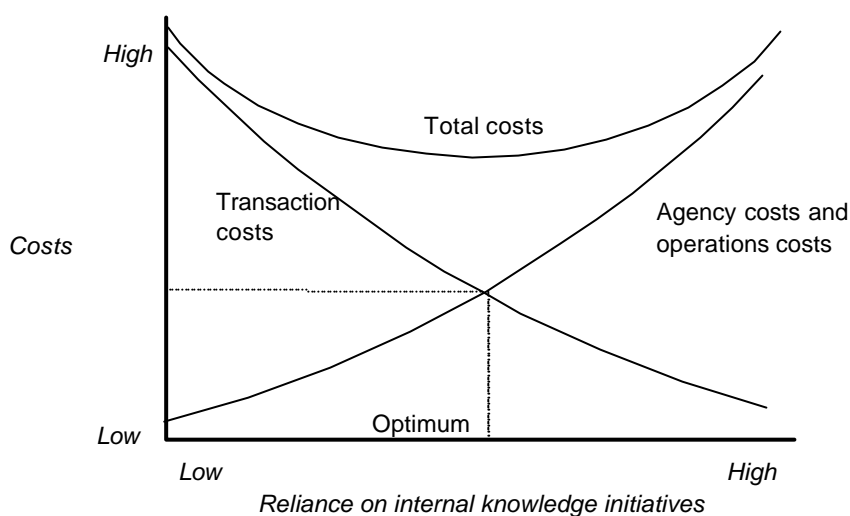


Figure 1 Minimization of total costs

So far we have used a *static* analysis to assess comparative economic organization. By incorporating three intertemporal considerations into our framework for managing the information transaction space (see Table 2), it becomes *dynamic* 18). First, investments can change the underlying cost structures of the organization and its knowledge slices. To some extent, managers can choose the cost components they want to minimize. For instance, cost-effective information and communication technology can reduce transaction costs and can lead an organization to increase its use of markets. However, it can also be deployed to decrease agency and operations costs, suggesting more organizational governance. Examples are intranets supporting information sharing, and tools to monitor the agents’ performance respectively. In all, therefore, the net effect of investments on the boundaries between the four options is not so obvious and depends upon other factors.

Second, managers have to continually assess and reassess the strategic knowledge domains they want to excel in. For instance, five years ago the Internet was not important to most organizations. Now it is.

Consequently, knowledge slices continually compete with each other for the attention of managers and employees.

Third, managers have to dynamically decide which governance structure is the most appropriate for each distinguished knowledge slice. Learning from failed knowledge projects, changing opinions and beliefs as to what is and what is not feasible with knowledge management, the emerging of innovative technologies, or new services offered by external knowledge brokers, all of these can change the relative desirability of governance structures. What was efficient yesterday may not suffice today. Hence, in each knowledge slice, the four options for knowledge management are continually involved in a dynamic process of competition. These dynamic considerations not only affect the organization's allocative efficiency, but also its adaptive efficiency.

9 Managing the information transaction space: the coordination and learning perspectives

Resource-based and knowledge-based theories of the firm follow a different logic. In the resource-based view, superior performance is based on developing competitively unique (and therefore scarce) resources and capabilities, deploying them in a well-conceived strategy, and protecting them from imitation (Grant, 1999a; Teece et al., 1999). Resources are generally seen as the source of capabilities and capabilities as the source of competitive advantage and the organization's rent generating potential. Originally, the issues of value or rent appropriation (i.e., sustaining the existing competitive edge) and its distribution (i.e., shareholder value) were emphasized (Ghoshal & Moran, 1999). More recently, the focus has been broadened to include the issue of rent creation, that is, the continual renewal of competitive advantage through learning and innovation and the development of new resource bundles and capabilities (Spender, 1996; Teece et al., 1999; Grant, 1999a). The essence of strategy then is to dynamically balance rent creation and rent appropriation. Strategy formulation should not be concerned as much with the maximization of current rents as with the maximization of rents *over time* (Boisot, 1999).

In knowledge-based theories as outgrowths of the resource-based view, performance differences between organizations are a result of their different knowledge bases and differing capabilities in developing and deploying knowledge (Bierly & Chakrabarti, 1999). Thus, differential allocative and adaptive efficiency between organizations is the key. The attention is particularly focused on the largely implicit knowledge and skills required to coordinate heterogeneous resources in distinct, organization-specific resource bundles in such a way that current capabilities are leveraged and new ones created (Tsoukas, 1996; Spender, 1999). As in transaction cost economics and agency theory,

achieving purposeful, coordinated action from organizations consisting of many specialized individuals and other resources is the fundamental problem of organizations and their management. Perfecting such coordination requires learning through repetition (Grant, 1999a). Hence, managers' coordinating and learning capabilities are seen as the principal sources of a competitive advantage and of adaptive efficiency.

The coordination and learning perspectives are reflected in our framework (see Table 2). The four options for knowledge management show that organizations can achieve equally efficient, yet differentiated approaches to coordination and learning. We expect most organizations to require a mixture or 'institutional pluralism' (Ghoshal & Moran, 1999), not just a single form. All four governance structures are needed for allocatively, but in particular adaptively efficient economic development. That is, for each distinguished knowledge slice, managers have to determine what relationship between the rent generating potential of the knowledge domain and learning will be most fruitful, and apply the corresponding (mix of) coordination mechanisms. If, for instance, intellectual property rights are an issue, strategic considerations can lead to the internalization of the associated knowledge activities and the erection of knowledge barriers as isolating mechanisms, thus improving the possibilities to protect valuable knowledge from appropriation or imitation by competitors (Liebeskind, 1999). For other knowledge slices, however, access to broader knowledge bases may be needed to keep abreast of cutting-edge developments and increase the organization's flexibility to create new competitive opportunities (Bierly & Chakrabarti, 1999). In one situation, collective learning demands specific organizational and motivational actions, while in other situations self-organizing communities of practice offer a better way to adopt this role (19). In the market option, transaction costs can be pervasive, distorting perceptions of the nature of available resources and their accessibility, quality, and usability. On the other hand, in the firm option, any disregard of market incentives can be inefficient, leading to, for example, relatively high agency costs to increase the efficiency of information exchange. Therefore, from the perspective of the total organization, both 'spontaneous adaptation' through markets and 'cooperative adaptation' through internal coordination are needed. In this regard, it is essential to realize that learning can not be mandated, implying that whatever option for knowledge management is applied, command-and-control structures are highly inefficient means to foster learning processes (Grant, 1999b; Spender, 1996). To create a climate of openness and trust, more can be expected from actions enhancing unencumbered communication and free information exchange between information demand and supply (Smith et al., 1996), which we have mentioned before as the goal of knowledge management.

Differentiating knowledge approaches according to the knowledge slice under consideration, however, is just one facet of managing the information transaction space. Organization members learn and managers have to learn how members learn best. Management's dynamic capabilities to manage the

information transaction space relate to their 'interpretative flexibility' (Spender, 1996) to define and redefine strategic knowledge slices, explore and exploit institutional pluralism, and use investment opportunities to adjust cost structures leading to productive organizational changes, while acknowledging the organization's contingency factors and path dependencies. The ability to manage the information transaction space is to configure and reconfigure the total mix of governance structures to better fit the organization's competitive context. This open-ended process of coordinating and learning from the experiences gained may be more important in creating and sustaining a competitive advantage and economic rent than the specific knowledge acquired. In that sense, management's dynamic ability to make the best use of the information transaction space is a defining competitive dimension of any organization.

Notes

- 1) Although they focus on exchange in general and not on information transaction as we do, we are indebted to the work of Moran & Ghoshal (1999) for this line of argument.
- 2) The term 'rent' is used in the academic literature due to the ambiguity associated with accounting definitions of profit. 'Rent' is the abnormal return to resources, which is the surplus of revenue over the 'real' or 'opportunity cost' of the resources used in generating that revenue (Grant, 1999a).
- 3) Although we adhere to this distinction between information and knowledge as much as possible, the term 'knowledge' is so ingrained in the business parlance that we will use both concepts interchangeably in this paper.
- 4) A resource is exchanged whenever the right to use it is transferred.
- 5) Transaction cost economics has been criticized for being a static theory that needs to be made dynamic (Douma & Schreuder, 1991; Liebeskind, 1996; Moran & Ghoshal, 1999). We agree with Williamson (1999) who argues that there are no fundamental impediments to the inclusion of dynamic, intertemporal considerations into the transaction cost economics project. While he acknowledges that intertemporal issues have not been worked out in a satisfactory way yet, they are considered to be central to this project.
- 6) Originally, coordination mechanisms in transaction cost economics were confined to the 'hierarchy', that is to vertical coordination based on authority (Williamson, 1975). We follow Douma & Schreuder (1991), who argue that Williamson and other proponents of transaction cost economics took too narrow a view on non-market coordination and adopt the six organizational mechanisms proposed by Mintzberg (1989). Authority or direct supervision is but one of the

- organizational coordination devices. Therefore, we prefer speaking about ‘organizations’ or ‘firms’ instead of ‘hierarchies’. See also Grant (1996).
- 7) Nobel Prize winners D. North and J. Wallis have estimated the magnitude of transaction costs to be 45 percent of total costs (Carroll, 1998).
 - 8) Transaction cost economics has been criticized for focusing on transaction costs and ignoring production costs. Later, however, this ‘bias’ has been corrected (Riordan & Williamson, 1985).
 - 9) Transaction cost economics and agency theory have been criticized for excluding trust as a basis for lasting social relations (Douma & Schreuder, 1991; Davenport & Prusak, 1998; Liebeskind, 1999). Without trust it would be difficult to understand how people can cooperate within and across organizational boundaries. However, to concede opportunism is not to celebrate it (Williamson, 1999). In other words, transaction cost economics and agency theory are positive theories describing ‘what is’. Publications on trust, on the other hand, are always normative, advancing ‘what should be’. If trust is seen as the absence of opportunism, both views are not mutually exclusive.
 - 10) Researchers of transaction cost economics and agency theory do not fully agree on the definitions of ‘operations costs’, ‘transaction costs’ and ‘agency costs’ (Gurbaxani & Whang, 1991). Even economists complain that if you cannot understand it, it must be transaction costs (Rowlinson, 1997). Our use of the three terms is based on the opposite directions these cost components take if information transactions are taken out of the external market and are organized internally; see the next sections.
 - 11) In the Table the designations ‘++++’ and so on, refer only to relative comparisons between columns, not to absolute values.
 - 12) We agree with the idea that trust can positively affect the allocative and adaptive efficiency of knowledge markets, which should therefore be cultivated. However, we do not agree with researchers who criticize transaction cost economics and agency theory for not paying attention to the issue of trust. Fighting opportunism is to build trust. See also note 9.
 - 13) Search entails both ‘scanning’ and ‘focused search’. Scanning is the sensing of the organization’s external environment, while focused search occurs in a narrow segment of the organization’s internal or external environment, often in reaction to actual or suspected problems or opportunities (Huber, 1991).
 - 14) Uncertainty about the quality of information stems from information asymmetry between actors. It can result in the withdrawal of high-quality information from the market, leaving it with low-quality information. This so-called ‘lemons problem’ arises in markets when it is difficult to assess the quality of products, services, or information prior to their use or purchase (Choi et al., 1997).
 - 15) For more information on Teltech, see <http://www.teltech.com> or www.bus.utexas.edu/kman/telcase.htm

- 16) Economists say that the optimal point is located where the marginal cost of organizing an additional transaction internally equals the marginal cost of executing the same transaction on the market, and equals the marginal cost of organizing the same transaction in another organization.
- 17) Except for the degree of knowledge fluidity, these contingency factors closely relate to the notion of path dependency. This notion expresses that the organization's previous investments and its repertoire of routines constrain its future behavior (Teece et al., 1999).
- 18) See note 5.
- 19) Resource- and knowledge-based theorists commonly state that knowledge and capabilities are generally inappropriable by means of market transactions (Grant, 1996, Teece et al., 1999), that market contracts are unlikely to achieve the stability of long-term relationships needed for learning and are likely to cause all the problems of opportunism that transaction cost economics and agency theory predict (Grant, 1996; Hodgson, 1998), and that organizations exist because they can more efficiently coordinate collective learning processes than market organization is able to (Foss, 1996; Grant, 1996). We agree with these arguments if only 'markets' and 'firms' are allowed as alternative governance structures, if the price is the only market coordination mechanism, and 'authority' the only organizational coordination mechanism. However, when these assumptions are relaxed, a richer framework emerges in which more autonomously governed structures (like a market) can be compared with more purposely governed ones (like a 'hierarchy'). Moreover, as illustrated before, problems of opportunism also occur within organizations. It is not opportunism in the outside world versus altruism inside organizations.

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