

The Dynamics of Motivation in New Organizational Forms

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ABSTRACT *This paper discusses the impact of the dynamics of motivation on new organizational forms that are suited to forge value-creating knowledge transfers in teams and between organizational units and functions. Our aim is to develop the management of motivation as a source of distinctive firm competences. We argue that motivation is an endogenous variable and introduce it as a crucial link into the theory of the firm. Balancing intrinsic and extrinsic motivation helps to overcome social dilemmas in firms that are not solvable by hierarchical authority. Integrating the dynamics of motivation is a step to a more comprehensive theory of organization. It links organizational economics to the knowledge-based perspective.*

Key words: Motivation; Organizational forms; Knowledge transfer; Firm-specific pool resources.

JEL classifications: A12, D23, H41, L22.

1. Introduction

During the last 20 years, the infusion of market elements – prices, internal competition, high powered incentives – into hierarchies and the disaggregation of large corporations into autonomous molecular units has been the dominant recommendation for the restructuring of organizational forms to motivate firm members and coordinate their activities (e.g. Cowen and Parker, 1997; Day and Wendler, 1998; Halal, 1994; Williamson, 1985, 1991, 1996; Zenger and Hesterly,

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1997). Recently, more and more firms replace the strong emphasis on market-like governance arrangements in favour of a stronger centralization and joint decision-making. For example, the multinational company ABB is now changing their 'philosophy of radical decentralization' (Ghoshal *et al.*, 1995:751), represented by a large number of small profit centres, towards larger customer oriented entities relying on a rich set of integration mechanisms. The results are different forms of internal hybrids that facilitate the lateral sharing and integration of organizational and individual knowledge to achieve economies of scale and scope. These empirical observations are supported by the growing academic interest in the knowledge-based theory of the firm (e.g. Kogut and Zander, 1992, 1996; Grant, 1996a, 1996b; Nonaka and Takeuchi, 1995; Spender, 1996). This literature assumes that the firm's ability to make the best use of dispersed and often tacit knowledge relies on organizational capabilities, routines and firm-specific pool resources (e.g. Nelson and Winter, 1982; Teece and Pisano, 1994). However, although the importance of organizational forms in influencing how a firm generates, transfers and integrates knowledge has been widely acknowledged, the way firms motivate their members and coordinate their activities is still largely unexplained.

In this paper, we discuss the impact of the dynamics of motivation on new organizational forms that are suited to forge value-creating linkages between organizational units and functions. Our aim is to develop the management of motivation as a source of distinctive firm competences. We argue that motivation is an endogenous variable and introduce it as a crucial link into the theory of the firm. Integrating the dynamics of motivation is a step to a more comprehensive theory of organization. It links organizational economics to the knowledge-based perspective.

The paper is structured as follows. In the second section, we discuss the different motivational assumptions of transaction cost economics and the knowledge-based view. We argue that certain motivation is assumed to be exogenously given in the two approaches. In section three, we show that these motivational assumptions have consequences when it comes to finding a solution for social dilemmas. Social dilemmas in firms refer to public choice theory (e.g. Miller, 1992; Ostrom, 1990) and arise whenever firm-specific pool resources have to be supplied. We ask what kind of motivation is needed to invest in those firm-specific pool resources. In section four, we argue that motivation is an endogenous variable of management in firms. The analysis is based on the crowding theory of human motivation (Frey, 1997) which suggests that extrinsic and intrinsic motivation are not merely additive but systematically depend on each other under identifiable conditions. Subsequently, in section five we show how the need for intrinsic or extrinsic motivation to produce firm-specific pool resources determines efficient organizational forms. Combining motivational and knowledge requirements leads to a typology that guides the design of efficient organizational forms.

2. Motivational Aspects within Transaction Cost Economics and the Knowledge-Based View

For many years, the theory of the firm was dominated by *organizational economics*. It seeks to answer the following two questions (Holmström and Tirole, 1989:65): (1) 'What is the purpose of firms?' and (2) 'what determines their scale and scope?'. The *knowledge-based view of the firm* adds an additional question (Grant, 1996b;

Nelson and Winter, 1982; Penrose, 1959) (3): 'Why do firms differ and how does it matter?' (Nelson, 1991:61). By now, a major stream of research has investigated in detail the partially contradictory assumptions between the two approaches (e.g. Connor and Prahalad, 1996; Dosi and Marengo, 2000; Foss, 1993; Fransman, 1994; Hodgson, 1998; Langlois and Foss, 1999; Liebeskind, 1996; Montgomery, 1995; Poppo and Zenger, 1998; Williamson, 1999). In this paper we concentrate on the impact of motivational assumptions of transaction cost economics and the knowledge-based view on organizational forms. Although the property rights approach (e.g. Hart and Moore, 1990) is also an important perspective in organizational economics, we focus on transaction cost economics. There are two reasons. Firstly, the property rights approach is less interested than transaction cost economics in different internal governance structures. Secondly, by emphasizing incomplete contracting and residual decision rights, the strength of the property rights approach is that it clearly articulates the role of market incentives and how they can be altered by shifts in asset ownership. But the weakness is that it overlooks the great variety of incentive designs firms can use (Holmström, 1999: 89). Extending research in that direction is the main objective of this article.

Why do Firms Exist? The View of Transaction Cost Economics

Transaction cost economics traces the existence of the firm to the thinking, planning and contracting cost that accompany any transaction. The existence of hierarchical firms results from a failure in market efficiency. Reasons for market failure involve the different transaction cost of negotiating, monitoring, and enforcing contracts (Coase, 1937). They include team production externalities (Alchian and Demsetz, 1972), market power (Klein, Crawford and Alchian, 1978), and information asymmetry (Williamson, 1975).

In Williamson's view (1975, 1985), the greater the level of uncertainty and of transaction specific investment in a transaction, the greater the threat that people act opportunistically. Fear of post-contractual hold-ups and ex post bargaining costs determine the ex ante investment decisions. Bringing a transaction from the market into the firm mitigates the hazards that accrue from opportunistic behaviour and improves investment incentives. The reason is that hierarchical forms of governance bring parties to an exchange under the direct control of a third party. This authoritative party monitors the behaviour of all parties involved. In transaction cost economics, the existence of firms is explained as resulting from incentive problems, especially opportunism.¹ Williamson (1996) does not claim that all members of an organization act opportunistically, but it is prudent to consider the worst type of behaviour. Thus, opportunistic behaviour is introduced as an exogenously given assumption.

Another important aspect of transaction cost economics concerns the distinction between production costs and transaction costs. By focusing on transactions as the basis unit of analysis, transaction cost economics regards economic exchange decisions as primary. The production functions of firms are assumed to be more or less identical,² which allows scholars to focus on the allocation and exchange of goods and services. A shift from static to dynamic efficiency is not encompassed, as Williamson (1985: 144) rightly concedes. Thinking in given choice sets, however, neglects the ability of a firm to foster innovation, learning and knowledge creating processes for new products. This is the central theme of the knowledge-based view.

Why do Firms Exist? The Knowledge-Based View

The knowledge-based view changes the perspective 'from the historically dominant theme of value appropriation to the one of value creation' (Nahapiet and Ghoshal, 1998: 242) and focuses on the problem-solving dimensions of organizations. The notion of the firm is not seen as a bundle of transactions but as a firm-specific bundle of resources and the underlying processes therein (Madhok, 1996: 578). Those firms that control hard-to-imitate resources earn rents and gain a sustained competitive advantage that other firms find too costly to imitate. Distinctive skills, routines and knowledge are treated as the most important resources that establish a dynamic capability or a competence (e.g. Nelson and Winter, 1982, Prahalad and Hamel, 1990; Teece and Pisano, 1994). Emphasis is thus placed on the firm's internal processes and production arrangements.

The knowledge-based view tends to neglect incentive issues (Langlois and Foss, 1999; Williamson, 1999). Although it does not deal with the assumption of opportunism and potentially conflicting interests (Conner and Prahalad, 1996), why firm members should be willing to share and integrate their knowledge is not examined. Implicitly, this view implies a utopian view of 'benevolent co-operators' (Dosi and Marengo, 2000: 82) who give up personal knowledge without adequate compensation. As a consequence, the knowledge-based view contradicts the transaction cost view concerning the content of motivation. But in accordance with transaction costs economics, it introduces a given kind of motivation, in the one case benevolence, in the other case opportunism. Benevolence is a kind of intrinsic motivation in contrast to opportunism, which is a strong form of extrinsic motivation, where individuals are not constrained by any rules.

Extrinsic and Intrinsic Motivation

Extrinsic motivation occurs when employees are able to satisfy their needs indirectly, most importantly through monetary compensation. Money as such does not provide direct utility but serves to acquire desired goods and services, an assumption which is basic to all economic analysis. Extrinsically motivated coordination in firms is achieved by linking employees' monetary motives to the goals of the firm. The preferred incentive system in economic theory is strict pay for performance (e.g. Gibbons, 1998; Prendergast, 1999).

Motivation is *intrinsic* if an activity is undertaken for the immediate satisfaction of one's needs. Intrinsic motivation 'is valued for its own sake and appears to be self sustained' (de Charms, 1968; Calder and Staw, 1975: 599; Deci, 1975). Intrinsic motivation can be directed (1) to the activity's flow – for example reading a novel (Csikszentmihalyi, 1975), (2) to a self-defined goal – for example climbing a mountain (Loewenstein, 1999), or (3) to the obligations of personal and social norms for their own sake (March, 1999: 377), e.g. benevolence, identity (Akerlof and Kranton, 2000), norms of distributive fairness (Fehr and Gächter, 2000) and procedural fairness (Cropanzano and Folger, 1996; Tyler, 1994). Intrinsic motivation is fostered by commitment to the work itself, which must be both satisfactory and fulfilling for the employees. It follows that 'if you want people motivated to do a good job, give them a good job to do' (Hertzberg, quoted by Kohn, 1993: 49).

The existence of extrinsic and intrinsic motivation has important consequences for the problems created by social dilemmas and the incentive to invest in

firm-specific pool resources. We will argue that firm-specific pool resources determine the main characteristics of firms in contrast to markets.

3. Firm-specific Pool Resources within Transaction Cost Economics and the Knowledge-based View

What are Firm-Specific Pool Resources?

We use the term 'firm-specific pool resources' to characterize goods (1) whose access is restricted to members of the firm in question, and (2) firm members have open access. This leads to the problem that firm members may free ride on such resources of the firm. These resources are club goods in the sense of Buchanan (1965). We use the term firm-specific pool resources instead of club goods because we want to link the public choice analysis of common pool resources (Ostrom, 1990) with the analysis of dependence relations (Thompson, 1967) and complementarities (Grandori, 2000; Milgrom and Roberts, 1995) in organization theory. We emphasize the motivational aspects involved and use Ostrom's (1990, 2000) empirically based insights into how to overcome the free-riding problems arising.³

While Ostrom focuses on *tangible* common pool resources like fishing grounds and pastures with its concomitant problems of overuse, in firms *intangible* goods invite free riding resulting in undersupply of these firm specific resources. Examples are corporate culture, mutual commitment, common organizational rules and routines and accumulated firm specific knowledge, or absorptive capacity, as widely discussed within the knowledge-based theories of the firm. Intangible firm-specific are hard to codify in an easily verifiable and observable way whenever they are based to a large extent on tacit knowledge. Today, organizational knowledge is seen to be the most important intangible firm-specific pool resource. It can be thought of as the 'feed stock' of competences and capabilities. Most scholars agree that common tacit knowledge is the resource most difficult to imitate. Therefore, this is the most important source of sustainable competitive advantage. Tacit knowledge is partly idiosyncratic and therefore necessarily creates a situation of asymmetric information. The output of individuals' tacit knowledge, e.g. of an individual salesperson, can be measured. In contrast, a specialist's contribution of tacit knowledge to a good or service produced by a team can hardly be evaluated either by looking at outputs or inputs. This holds both for a principal outside the team and for team members. An example is the Benetton's fashion designing team (Grant, 1996a). If a mainly extrinsically motivated person cannot be excluded from obtaining the benefits of a collective product or service once it is produced, he or she has little incentive to contribute voluntarily to the joint effort, but free-rides on the efforts of others (Osterloh and Frey, 2000). If all firm members choose to free-ride, the firm-specific pool resources will not be produced. Thus, there is an immediate danger that intangible firm-specific pool resources are *undersupplied*.⁴ A social dilemma arises.

The Problem of Social Dilemmas

The advantage of hierarchies over markets derives from obtaining joint benefits if firm members are motivated to invest in firm-specific pool resources. The accumulation of this pool cannot be brought about by external incentives or a particular property rights allocation.⁵ In this situation, a *social dilemma* is

imminent.⁶ Miller (1992:35) even claims it to be at the heart of the managerial problem. Social dilemmas arise in situations in which individuals are interdependent with respect to valuable but potentially intangible firm-specific pool resources. In response to such interdependence, firm members have to choose whether they follow a competitive course of action that furthers their own interests at the expense of others, or contribute to a cooperative solution that furthers joint interests. If firm members realize that their own efforts to invest in pool resources will have little impact if others do not do likewise, they have little incentive to cooperate themselves. There is a trade-off between self-interest – where each firm member receives a larger individual ‘pay-off’ by not contributing – and social efficiency – where all firm members are better off if everyone decides to cooperate.

The traditional solutions to the prisoners’ dilemma are hierarchical authority (Alchian and Demsetz, 1972; Williamson, 1975), the ‘visible hand’ (Chandler, 1977), and in political economy, the Leviathan (Hobbes, 1952).⁷ Although these solutions provide the unity and coherence needed in a firm, they seem to fail whenever there is high information asymmetry (Miller, 1992: 74). This is especially true whenever tacit knowledge is highly important. It follows that firms not only exist because of transaction cost reasons. They exist because ‘they provide a social community of voluntaristic action structured by organizing principles that are not reducible to individuals’ (Kogut and Zander, 1992: 384). This supports the creation of value when individual inputs or outputs are not observable and measurable.

How do the two approaches, the knowledge-based view and transaction cost economics, deal with the problem of social dilemmas and the incentives to invest in firm-specific pool resources?

Firm-Specific Pool Resources and Social Dilemmas within the Knowledge-Based View

Within the knowledge-based view, the major theme is the generation of dynamic capabilities as the most important intangible firm-specific pool resources. Firms function on the basis of organizational and cultural rules, informal relations and tacit norms. These are knowledge assets that are based on firm-specificity, social complexity and causal ambiguity, which cannot be reduced to individual skills. They are assembled in integrated clusters spanning firm members so that cooperation and coordination is achieved. This approach, however, does not realize social dilemmas as a problem. It is implicitly assumed that no conflicts of interest exist.⁸ Firm members engage voluntarily in a course of collective action and contribute to firm-specific pool resources that can only be generated in the body of an organized group of individuals. But the assumption of no interest conflicts is problematic: selfish individuals want to maintain their monopolistic position as holders of idiosyncratic knowledge. Because tacit knowledge is not contractible, they would not share it with others voluntarily. Thus, the knowledge-based view takes non-self-interested intra-firm commitment to cooperate implicitly for granted, while (external) incentive issues do not really matter.⁹

Firm-Specific Pool Resources and Social Dilemmas within Transaction Cost Economics

In contrast, transaction cost economics acknowledges the existence of social dilemmas. It is presumed that those dilemmas can be solved through monitoring and sanctioning arrangements (Williamson, 1985:205). Without monitoring, selfish employees do not contribute to the generation of firm-specific assets which include

firm-specific pool resources. According to this view, organizations can solve problems of opportunism in a manner that is more efficient than market mechanisms. In transaction cost economics, the main attributes that describe a mode of governance are incentive intensity, administrative control and the legal regime (Williamson, 1991, 1993). The burden of investing in the arrangements necessary to organize collective action is undertaken by one individual (the entrepreneur), whose returns are directly related to the surplus generated. Consequently, the entrepreneur's threats to punish are credible (Williamson, 1983).

Still, it is highly questionable whether social dilemmas can be solved in this way. In transaction cost economics, the solution of social dilemmas does not pose a problem because the exchange of goods and services, including the transfer of knowledge, are regarded as potentially contractible.¹⁰ This means in principle that they can be measured in isolation and can clearly be controlled. However, this is not possible for intangible pool resources, like tacit knowledge in teams. Investing in those resources is not observable and not verifiable. Free-riding can take place. Innovations in measurement, stemming from improvements in information technology, cost accounting, or benchmarking, do not solve the dilemma.¹¹

Some authors, who recognize these problems, try to offer another solution: they argue that repeated games of 'relational contracts' may provide a cooperative outcome to social dilemma situations, that is agreements enforced by the firm members' concern for their reputations (e.g. Baker, Gibbons and Murphy, 1994). If a firm member's contribution to firm-specific pool resources is too complex and subtle to be verified by a monitor, subjective performance assessments can be used by managers who are well placed to observe these subtleties (e.g. excessive overtime or punctuality) of the firm members' behaviour and opportunities. However, this tends to induce inefficient behavioural responses. The non-verifying nature of these measures gives rise to the possibility that their true values will be manipulated or distorted (Prendergast, 1999).

For these reasons, we go along with Hardin (1968: 1243): the social dilemma has no technical solution. In this sense, social dilemmas are a problem of *managing motivation* and not a problem of precise measuring and monitoring. Conceptualizing a firm as a commons draws attention to the question of how firms can induce the right kind of cooperation – the motivation of their members to share their knowledge and to deviate from self-interested behaviour.

4. The Dynamics of Motivation in the Firm

Introducing the dynamics between extrinsic and intrinsic motivation helps to determine which factors influence the intensity and quality of the production of intangible firm-specific pool resources, especially tacit knowledge. How can firms induce an efficient kind of cooperation – the motivation of their members to share their knowledge and deviate from self-interested behaviour – when the price system and monitoring fail? An important part of the answer to this question relates to motivational factors concerning crowding effects.

Crowding Effects

Overwhelming theoretical and empirical evidence exists that intrinsic and extrinsic motivation are not additive as standard economics assume (e.g. Milgrom and

Roberts, 1992). Rather, there is a systematic dynamic relationship between the two. This dependence has been shown to exist in a large number of careful experiments undertaken in psychology by Deci and his group (e.g. Deci, 1975; Deci and Flaste, 1995; Deci, Koestner and Ryan, 1999a, 1999b; Deci and Ryan, 1985), as well as in field research in economics (e.g. Barkema, 1995; Frey and Oberholzer, 1997).¹² The relationships between intrinsic and extrinsic motivation are called crowding effects (Frey, 1997).¹³ These effects make both kinds of motivation endogenous variables. Crowding effects can be subdivided into a crowding-out- and a crowding-in-effect.

The crowding-out-effect posits a negative relationship between intrinsic and extrinsic motivation. When external incentives – rewards or commands – are perceived to be controlling by the firm member affected, intrinsic motivation tends to be undermined. In particular, firm members' work morale may be reduced when they receive monetary incentives that are contingent on their performance ('pay for performance'). Crowding-out can take place only if there was a significant amount of intrinsic motivation in the first place.¹⁴

The crowding-in-effect posits a positive relationship between intrinsic and extrinsic motivation. Outside intervention in the form of rewards or commands may strengthen intrinsic motivation if it is perceived to be supportive of intrinsic motivation. Thus, a pay rise or another external incentive may in certain circumstances be considered to reflect an appreciation of one's work by superiors and therefore tends to increase work morale.

Theoretical foundations for the crowding effects are based on cognitive evaluation theory (Deci, 1975) and on psychological contract theory (Rousseau, 1995; Schein, 1965). According to cognitive evaluation theory, external intervention may reduce self-determination. When people perceive external intervention as a restriction to acting autonomously, intrinsic motivation is substituted by these external interventions. The locus of control shifts from inside to outside the person (Rotter, 1966). According to psychological contract theory, reciprocity can be violated. The implicit contract based on mutual acknowledgement of one's engagement is violated when a task undertaken by intrinsic motivation is rewarded extrinsically (Gouldner, 1960; Rousseau, 1995). Conversely, maintaining norms of reciprocity causes a higher willingness to perform and reduces shirking work.

Balancing Intrinsic and Extrinsic Motivation

Motivation has to be managed so that the required intrinsic motivation is not crowded out. In particular, strong monitoring, pressure of sanctions, high-powered incentives such as piece rates, bonuses, or other forms of variable pay for performance undermine firm members' work ethic. This holds in particular for complex jobs, where intrinsic motivation is necessary to contribute to intangible firm-specific pool resources. We focus on four aspects that firms have at their disposal for enabling motivation and regulating conflict.

Participation is directed to an agreement on common goals. If this agreement primarily serves as self-control and self-obligation, participation raises the perceived self-determination of employees (Schwartz, 1990) and strengthens intrinsic motivation.

Self organizing principles enable willingness to conform to social norms for their own sake. In this sense, they can foster the coordination for cooperative interactions of the divergent interests of different firm members.

Personal relationships are a precondition for establishing psychological contracts based on emotional loyalties, often called team spirit. Team-based structures enable such personal relationships. As experimental research shows, personal relationships strongly raise the intrinsic motivation to cooperate (e.g. Dawes, van de Kragt and Orbell, 1988; Frey and Bohnet, 1995).

Contingency of reward on performance can crowd out intrinsic motivation. This holds provided the perceived controlling effect of reward is stronger than the perceived informing effect and the price effect is overruled. Thus, the crowding-out-effect provides a possible explanation for the empirical evidence suggesting that there is generally no significant connection between pay and performance, except for simple jobs (Gibbons, 1998; Prendergast, 1999; Tosi *et al.*, 2000).

Managing motivation thus means balancing the tension between intrinsic and extrinsic motivation. Firms can enable intrinsic motivation better than markets, e.g. by organizational forms and mechanisms, which foster personal relationships among firm members as well as participation. These factors may play a role in the markets but they are not a necessary condition for their efficiency. Often they are unwarranted.¹⁵

5. New Organizational Forms and the Dynamics of Motivation

Much of the economic literature on new organizational forms focuses on hybrid arrangements between hierarchical commands and internal price systems (e.g. Hennart, 1993). But this literature only considers extrinsic motivation, often opportunism, as a worst case assumption. However, this assumption comes at a high price in that it may *firstly* make firms over invest in safeguards (Madhok, 2000). *Secondly*, it may further the intent of the partners to behave opportunistically, due to the crowding-out effect. This can lead to a spiral of distrust (Ghoshal and Moran, 1996; Osterloh and Frey, 2000). *Thirdly*, an important opportunity is missed for managing motivation as an important source of distinctive firm-specific competences. Balancing intrinsic and extrinsic motivation makes both kinds of motivation *endogenous* variables. In this sense, motivation is treated as varying, depending on organizational measures.

In this section, we complement the economic literature on new organizational forms (e.g. Hennart, 1993; Zenger and Hesterly, 1997) by introducing the dynamics of motivation as crucial determinants linking this kind of research with the

Knowledge Production and Transfer		
	Explicit Knowledge	Tacit Knowledge
Extrinsic Motivation	1 - Profit Centres - Molecular Units (Internal Contractual Solution)	2 - Independent Knowledge Worker (Internal Contractual Solution)
Intrinsic Motivation	4 - Knowledge Producing Teams, e.g. - Task Forces and - Quality Circles - (Non Contractable Tasks)	3 - Knowledge-based Production Teams, e.g. - Cross Functional Teams, - Linking Pin Organization - (Non Contractable Tasks)

Figure 1. Combining motivational and knowledge requirements with organizational forms.

knowledge-based view. We show how the need for intrinsic or extrinsic motivation to produce firm-specific pool resources determines efficient organizational forms. In our context, the most important firm-specific pool resources are (1) contributing to the collective tacit knowledge and (2) contributing to collective explicit knowledge. Combining motivational and knowledge requirements leads to a typology of organizational forms (Osterloh and Frey, 2000; Osterloh, Frey and Frost, 1999). It is presented in Figure 1 and contains organizational forms that best enable contributions to knowledge production and transfer with respect to the required extrinsic or intrinsic motivation.

Cell 1: Profit Centers and Molecular Units

Cell 1 contains organizational forms that are as autonomous as possible. Examples are profit centres or molecular units. Coordination efforts are mainly done by disaggregation through infusing market elements, e.g. contracts and transfer prices (Zenger and Hesterly, 1997). These market-like internal governance structures can be connected with high-powered extrinsic incentives. This works well if the necessary knowledge to be transferred to the decentralized units is either encapsulated in a marketable product or is otherwise explicit and attributable. Only explicit tasks are communicable by means of contracts and can be measured easily. Where there is a marketable product or a contract, monetary rewards and extrinsic motivation fulfill their task.¹⁶ However, extrinsically motivated competition between decentralized units hinders sharing knowledge with one another and prevents the flow of tacit knowledge across unit boundaries to where it is needed (Foss, 2000). The members of a unit have no incentive to give up their individual competitive knowledge advantage as long as they are compensated according to the unit's profitability.

Cell 2: Independent Knowledge Worker

Cell 2 concerns independent knowledge workers in a firm. They are independent in the sense that they are not working in a team with co-specialized workers with whom they share knowledge. Rather they coordinate their co-workers by commands and monitoring. Examples are salespersons, lawyers or experts in computing or finance. These workers rely strongly on their specific tacit knowledge. This knowledge raises their value (Nonaka *et al.*, 2000). The production of tacit knowledge itself cannot be measured, but its output can be compensated according to its contribution to the firm's performance. This output can be attributed to the independent knowledge worker. In this case, no intrinsic motivation is needed. But such independent knowledge workers neither contribute to firm-specific pool resources nor to a sustainable competitive advantage, the reason being that the tacit knowledge produced resides in that individual. Individuals are transferable between firms (Grant, 1996a). Other firms can easily woo the independent worker away and profit from his or her tacit knowledge (Leonard and Sensiper, 1998).

Cell 3: Knowledge-Based Production Teams

Cell 3 considers the case of 'knowledge-based production teams'. Examples of this kind of team are cross-functional teams (Clark and Fujimoto, 1991) and teams within the linking pin organization (Likert, 1961). To perform a productive task, the

specialist knowledge of a number of firm members has to be integrated. The firm members are reciprocally interdependent (Thompson, 1967).¹⁷ An important form of reciprocal interdependence is integrating tacit knowledge. The tacit knowledge is embodied in the product itself or in the firm-specific routinized processes leading to the product. Because of the tacitness of this knowledge, it can neither be made explicit via reverse engineering nor can it be encapsulated in an expert-system software. Because of the non-codifiable nature of tacit knowledge as part of the multiple task problem, the transfer of tacit knowledge cannot be assured by a complete contract (e.g. Madhok, 1997), nor be measured by (even non-financial) performance measures. This is the main difference from the profit centres or molecular units in cell 1. It is not possible to identify and sanction individual team members if they hold back their tacit knowledge. Therefore, intrinsic motivation is needed.

Cell 4: Knowledge Producing Teams

Cell 4 deals with 'knowledge producing teams'. Examples are quality circles or task forces. The two are widely used to enhance total quality and continuous improvement in many industries, e.g. in car manufacturing (e.g. Berggren, 1994). Participants contribute their mostly tacit knowledge about the production process by using e.g. narratives. The tacit knowledge of the team members is made partly explicit.¹⁸ The aim is to produce collective explicit knowledge, which serves as a basis for common rules. These rules become part of the firm-specific pool resources.

In contrast to cell 1, no market price exists for the outcomes of knowledge producing teams. The results of those teams only expand their value within the firm specific context. Compared to cell 3, the knowledge transfer itself also cannot be observed and measured. However, its outcome can be observed. But this outcome cannot be attributed to an individual working member of a team. Hence, the conversion from tacit to explicit knowledge requires intrinsically motivated team members, committed to the team. For this reason, these teams are formed, in most cases, voluntarily and their tasks are defined by themselves to support self-determination.

'Avoiding the Negative' Versus 'Creating The Positive'

The *first row* (cell 1 and cell 2) refers to what Foss (1997) calls the 'negative view'.¹⁹ The coordination task of the firm is reduced to design effective incentive schemes and to provide monitoring arrangements so that opportunistic behaviour as morally hazardous sub-goal pursuit can be controlled. Focusing solely on extrinsic motivation by injecting high-powered incentives may well be destructive of cooperative activity. There is a great danger that intrinsic motivation will be crowded out. This suppresses the voluntarily contribution to firm-specific pool resources as the main source of competitive advantage. The 'negative view' is sufficient for the production of standardized goods and services which are not knowledge-intensive.

The *second row* (cell 3 and cell 4) refers to what Foss (1997) calls the 'positive view'. Enabling intrinsic motivation supports the production of knowledge-intensive goods and services that cannot be accomplished by the markets or by command: the capability of enabling and integrating firm members' contribution to intangible firm-specific pool resources, especially tacit knowledge.

6. Conclusion

We have argued in a conceptual way that managing motivation or balancing intrinsic and extrinsic motivation is an important source of distinctive competences which neither transaction cost economics nor the knowledge-based view has taken into account. Firms exist because they profit from firm-specific pool resources which are not provided by the market. Social-dilemmas arise if firm members behave either in a mainly extrinsically motivated or even more so in an opportunistic way. Whenever the contributions to these firm-specific resources are not observable and contractable – like team-based tacit knowledge – social dilemmas cannot be solved by hierarchical authority, but by enabling intrinsic motivation. However, extrinsic motivation is often indispensable. It is sufficient if performance is measurable and contractable, for example when jobs are simple. Introducing the dynamics of extrinsic and intrinsic motivation proposed in this paper makes motivation endogenous and therefore manageable.

These insights must be tested against other views empirically. Empirical evidence on the dynamics of extrinsic and intrinsic motivation on the supply of collective goods has been well established for certain areas in public choice and political economy such as locally unwanted external environmental effects like NIMBY (Not-In-My-Back-Yard, Frey and Oberholzer-Gee, 1997) or tax evasion and other forms of public governance (Ostrom, 1990, 2000). This empirical evidence is primarily based on econometric cross-section, time-series analysis and experiments. For the case of the transfer of tacit knowledge in firms these approaches should be amended by carefully designed comparative case studies, surveys and experiments. The ongoing changes in the governance structures and organizational forms in companies like ABB and Swissair mentioned above will give us opportunities to conduct this kind of research.

Notes

1. For a detailed critique see Ghoshal and Moran (1996).
2. This assumption has been criticized by Demsetz (1991), Madhok (1996) and Teece (1986).
3. Ostrom *et al.* (1999: 278) characterize common pool resources as resource systems in which '(1) exclusion of beneficiaries through physical and institutional means is especially costly, and (2) exploitation by one user reduces resource availability for others'. In economics these characteristics are named (1) 'non-excludability' and (2) 'rivalry in consumption'. Ostrom (1990: 32) argues that the appropriation and use of common pool resources are more closely related to the theory of private goods than to the theory of public goods. On the other hand, the process of designing, implementing, and enforcing a set of rules to coordinate provision activities is equivalent to the provision of a local collective good.
4. Following the evolutionary perspective, some firm-specific pool resources may possibly be produced unintentionally. They are a byproduct of other activities because 'it is difficult to say exactly where one aspect ends and another one begins' (Nelson and Winter, 1982: 104). This does not mean that intention does not play a role. An example is 'working by the book' when firm members intentionally reduce their work effort.
5. Milgrom and Roberts (1992) mention this problem. But they do not discuss any consequences for the theory of the firm.
6. The situation of a social dilemma (Dawes, 1973, 1980; Tullock, 1974) is also discussed as the tragedy of the commons in public choice (Hardin, 1968), the public good- or collective good-problem (Brennan and Buchanan, 1985; Olson, 1965; Samuelson, 1954), shirking (Alchian and Demsetz, 1972), and the free-rider problem (Grossman and Hart, 1986).
7. Prisoner dilemma problems also arise in inter-firm networks, where traditional hierarchical solutions fail. Inter-firm governance mechanisms to overcome this problem are discussed in Osterloh and Weibel (2001).

8. It is argued that even in the absence of goal conflict, the coordination necessary for integrating the specialist knowledge existing in individuals is not a trivial issue, e.g. Grant (1996b:120).
9. Exceptions are discussed by Hamel and Doz (1989).
10. For a more detailed critique, see Foss (1993), Hodgson (1998) and Langlois and Foss (1999).
11. Zenger and Hesterly (1997) discuss innovations in measurement in detail. They argue that these innovations support infusing market elements in hierarchy. But they do not consider the transfer of tacit knowledge.
12. For a comprehensive discussion of the empirical evidence, see Frey and Jegen (forthcoming) and Osterloh and Frey (2000).
13. In psychology, a more partial effect is known as 'hidden costs of reward'; see Lepper and Greene (1978).
14. If there is no intrinsic motivation in the first place – as is true for simple jobs – empirical evidence shows that relying on the price-effect (extrinsic motivation) increases performance, see e.g. the case studied by Lazear (1996).
15. For a discussion how to overcome the conflict between price mechanisms and personal communication and relationships in inter-firm networks, see e.g. Osterloh and Weibel (2001).
16. This is also true in situations where coordination is effected by commands inside the firm, as envisaged by the authority-based view of the firm, e.g. Conner and Prahalad (1996) and Williamson (1975). But commands can only transfer explicit knowledge.
17. Thompson (1967: 54) defines three categorizations on dependence relations in organization. Reciprocal interdependence is the strongest form of interdependence. Reciprocal interdependence exists when firm members must work together, interacting during task performance in order to complete their work and fulfill their tasks. When interdependence is of serial form with outputs of one unit becoming inputs of another unit, then it is called sequential interdependence. The weakest form is pooled interdependence, which is the collective dependence of employees on the continued success of the organization: 'each part renders a discrete contribution to the whole and each is supported by the whole'.
18. This process of externalization is described by Nonaka and Takeuchi (1995) within the SECI knowledge spiral.
19. Foss (1997) addresses the rationales of corporate headquarters (CHQ). They have a role in influencing the performance implications of diversification through decisions on organizational structure. Foss (1997: 316) views this role as a matter of both 'avoiding the negative', e.g. CHQ as a solver of agency problems (designing structure so that loss is reduced), and 'creating the positive', e.g. CHQ as an entrepreneurial value creator (building cross-functional teams for product innovation).

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