GOVERNANCE CHOICE FOR KNOWLEDGE CREATION AND SHARING

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Summary: *A conceptual approach to the governance choice at the micro-level, relevant to the specific type of knowledge, is presented. It is based on the idea that the more basic is the type of knowledge the less available it is for the consumer and hence the less are opportunities for its transfer by the market mechanism. Each type of knowledge requires its adequate governance. The more this accordance, the less is the friction for knowledge creation and sharing mechanism operation, hence the less is the transaction cost, minimizing of which can be served as one of the possible criteria for choosing adequate governance.*

1. Introduction

Different types of knowledge require different mechanisms for their creation and sharing. It is widely known that the governance form and structure are the crucial part of any socioeconomic mechanism. This paper presents a conceptual approach to the governance choice at the micro-level, relevant to the specific type of knowledge. The approach is based on the idea that the *more basic (pure)* is the type of knowledge, the *less available (more closed)* it is for the consumer and hence the *less* are the *opportunities* for its transfer by the market mechanism. In other words, pure knowledge is closed knowledge. It is not available for consumer who can buy information, but not knowledge. It means that pure knowledge is not able be exchanged. This statement contradicts with the conventional rationalistic view of knowledge as an object for market exchange. It seems to share the radical statement: people are self-organizing systems that are open to information but closed to knowledge. However, there is a fundamental difference between the radical statement and ours: we believe the pureness of knowledge to be the reason of impossibility of market exchange.

In this paper, we try to reach both conventional and radical approaches regarding different types of knowledge. These two controversial approaches are the two poles of a wide range of combined spectrum between them. The most realistic consumers are government (society) for pure/closed knowledge and enterprises (individuals) for realized/open knowledge. The type of consumers dictates the choice of the type of institutional arrangement for knowledge sharing. The choice is between contracting with the government (society) from one side, and classic market contracting – from the other. Fuzzy (combined) types of consumers may dictate the choice of fuzzy (combined) types of institutional arrangements known as relational contracting. In its turn, the choice of institutional arrangement dictates the choice of the governance for knowledge creation. Its realization is available by the following means: 1) nonprofit organizations, 2) profit firms (business units) and 3) hybrids.

We take the approach that each type of knowledge requires its adequate governance. The more this accordance, the less is the friction for knowledge creation and sharing mechanism operation. Hence, the less is the transaction cost. Minimizing the transaction cost can serve as one of the possible criteria for choosing the adequate governance. A pattern of governance choice for creation of scientific knowledge and its sharing through adequate institutional arrangement in this paper suggest that the proposed conceptual approach is relevant and

reliable enough to explain the real-world problems of knowledge management.

The paper is organized as follows. In section 2 we discuss the relationship between knowledge and information. The problems of transaction cost and governance choice we consider in section 3. Then we put some notions on possibilities of R&D restructuring in Russia (section 4) and represent a simple pattern of governance choice (section 5). In section 6 we give some concluding remarks.

2. Knowledge and Information

We start investigating the problem of governance choice from the brief consideration of some traditions differing form each other by the answer to the question *'How can several agents in an interactive environment simultaneously form beliefs about each other's decisions in a rational and conscious way?'* [te Velde, 1999]. The approaches considered are the so-called rationalistic (Cartesian), mainstream economics, and self-organization traditions.

The rationalistic tradition of knowledge explanation is on the Cartesian split between subject (mind) and object (matter). According to Descartes, there are two separate domains of phenomena – the objective world of physical reality, and the subjective mental world of an individual's thoughts and feelings [Ryle, 1949, Hodgson, 1988]. As for knowledge, it is factually seen as a storehouse of representations, which can be called upon for use in reasoning and which can be translated into language. This tradition considers *knowledge* and *information* as representing regions on a continuum. The difference between them lies in individualization of knowledge [Meadow and Yuan, 1995]. As te Velde [te Velde, 1999] succinctly puts it, 'Strictly speaking, then, only information can be transferred and knowledge cannot'. However, 'under the rationalistic tradition this is merely a matter of definition since the correspondence theorem states that in principle all knowledge can be translated into information. Knowledge, once attained, can be passed on intact to other agents. It is therefore fully cumulative – the accretion of past individual researches' (see also [Mirowski, 1988]).

The mainstream economic theory of knowledge (see e.g. [Romer, 1986, 1990]) assumes that the level of productivity in an economy depends directly or indirectly on an accumulated stock of knowledge that is increasing by every act of production. With this type of technology, every individual's decision to produce has effects on the productivity of every other individual's resources. Since knowledge is a stock, these positive external effects last forever.

Two elements of knowledge are important: the rival component – human capital and the non-rival component – technology *that has an existence separated from that of any individual.* The larger the total stock of designs and knowledge is, the higher the productivity of a 'knowledge producer' (an engineer working in the research sector). As te Velde [te Velde, 1999] writes with reference to Romer, 'The knowledge worker today is more productive because he can take advantage of all additional knowledge accumulated as design problems were solved during the last 100 years'. One should add that within this framework the understanding of knowledge is much like in rationalistic tradition. Technology is then nothing more than codified knowledge, i.e. information, and communication between agents is simply the transmission of information *sec.*

The self-organization tradition is based *inter alia* on the idea that 'the nervous system acts as a generator of phenomena, rather than a filter on the mapping of reality' [Maturana, Uribe and Frenk, 1968; Maturana and Varela, 1980] and on the Heideggerian phenomenological theorem according to which the interpreted and the interpreter exist not without each other but just dependently. It is common knowledge that Maturana has introduced the term *autopoiesis* ('self-creation') to convey the central feature of a living system – its autonomy. Such a system is able to reproduce itself through its own network of structures. Autopoiesis implies that agents are open to data but closed to knowledge – new data is only *potential* knowledge. It furthermore implies that all new knowledge development depends on *previous* knowledge [Oliver and Roos, 1997]. Consequently, the knowledge of an agent is deeply rooted in its personal history and experience and the meanings he attributes to perturbations from outside are highly subjective. Such knowledge is by definition tacit. As for having just one world and living in different ones, arises a question concerning the possibility of agents' meaningful interactions. Dealing with it, Heidegger focuses his attention on the human condition of *throwness* ('Geworfenheit') – the condition of understanding in which our actions find some resonance or effectiveness in ordinary and daily life. In our interactions with other people we are always caught 'in the middle of the action', i.e. 'we cannot – like some detached rationalistic scientist – step back and reflect on our actions' [te Velde, 1999]. Instead, we have to deal with whatever comes up, without having a stable representation of the actions and the effects they will have [Winograd & Flores, 1986; Spinosa, Flores, & Dreyfus, 1997].

3. Transaction Costs and Governance Choice

Problems connected with the governance choice are the issue of consideration in particularly [Masten, 1993]. Here is the brief summary of the Mastenian treatment of relationship between governance choice, strategy, transaction cost, and performance. Let it be two alternative government arrangements and two different sets of transaction attributes. In this case four variants for representing organization are possible. Formally, the choice between alternative government arrangements, G^1 and G^2, would be

$$G^* = G^1, \text{ if } C^1 < C^2,$$
$$\text{and } G^* = G^2, \text{ if } C^1 \geq C^2, \qquad (1)$$

where G^1 and G^2 with asterisks (G^*) are the governance arrangement actually adopted, C^1 and C^2 – the decision makers' beliefs about the costs of organizing the corresponding alternatives. Since the governance costs for arrangements not chosen are not observable, one cannot base a theory on direct comparison of mentioned costs. To formalize the theory, there is necessary to relate expected costs of governing exchange to observable attributes of the transaction. Allowing for managerial errors in assessing governance costs, we can represent the relation between perceptions of the sides involved in transactions and the true costs of their governing as

$$C^1 = \alpha X + e \text{ and } C^2 = bX + u,$$

where X denotes a vector of attributes, a and b are coefficients, and e and u represent managerial mistakes or misperceptions. More generally, the error terms will capture failures of the researchers to identify or indicate relevant variables [Madalla, 1983, p. 68]. By substituting these two equations into (1), one can test governance-choice hypotheses using information on only observable attributes and organizational forms adopted. Specifically, the probability that a particular organizational alternative, say, G^1, is chosen becomes

$$\Pr(C^1 < C^2) = \Pr(e - u < (b - a)X).$$

Predictions of governance arrangement can then be based on the sign of $(b - a)$, which is to say, on the differential effect of attributes of the transaction of the costs of organizing. The greater the effect of attributes on costs of organization, the more important organizational form (governance arrangement) is to performance in the sense that the cost of failing to choose the right organizational form for a particular transaction (the difference between C^1 and C^2 given X) will be grater. However, whether or not economic models of organizational choice are good predictors of actual behavior, tells us little about the implications for firm performance of failing to choose the correct governance arrangement. Though the empirical research supports the theory's predictive value, its contribution to the knowledge of the governance choices importance and its prescriptive value are limited.

The standard approach that can be used includes the regression of some measure of performance, P, on an organizational form, G and a set of exogenous varaibles, X, thought to influence performance, or

$$P = \alpha X + \beta G + \varepsilon. \qquad (2)$$

The interest is focused on the coefficient β, which is intended to capture the contribution of governance choice to performance. If the best organizational form varies with the nature of the transaction, governance choices will involve tradeoffs and the coefficient on governance from estimations of equation (2) will be meaningless. Figure 1 illustrates the point.

	G^1	G^2
X_h	P_h*	P_h'
X_l	P_l'	P_l*

$$P_i* > P_i'$$

Figure 1. Matrix of input and governance features

Let X_h and X_l represent high and low values of variable believed to influence performance. As drawn, performance is higher for X_h transactions if G^1 is adopted and for X_l transactions if G^2 is adopted. Hence, for X_h transactions, the influence of G^1 will be positive but for X_l transactions negative. If the sample includes both high and low X transactions, the coefficient β cannot capture both the positive influence of G^1 on X_h trans-

actions and its negative influence on X_l transactions. What it will capture is extraneous correlation between X_l governance form and average performance values, which will be influenced, in an immaterial way, by such factors as the distribution of observations between each of the four cells.

An alternative way of dealing conceptually with the problem of governance tradeoffs would be to divide the sample by governance choices. Having divided the sample by organizational mode, one could then estimate performance as a function of the attributes for each mode separately, that is

$$P = \alpha_i + \varepsilon_i, \qquad (3)$$

where i indexes the set of relevant governance alternatives. The effects on performance of adopting one alternative rather than another for a transaction of a particular type could then be made by comparing the estimated values of P for corresponding arrangements, or $(\alpha_2 - \alpha_1)X$. An equivalent formulation of this model (except for assumptions about the distribution of error terms) is to estimate a single equation of the form

$$P = \alpha X + \beta G + \gamma(GX) + \varepsilon, \quad (4)$$

for the full sample of observations. Under this formulation, the difference in performance between two organizational alternatives becomes simply $\beta + \gamma X$.

There is sense to provide an analogy between 'safeguards' used to protect transactions from opportunism [Williamson, 1975, 1985, 1993] and safeguards used to protect houses from break-ins. Suppose high-income neighborhoods attract more attention from burglars, and that locks and alarm systems (the safeguards) deter burglaries. It would be an obvious blunder to conclude from an observed correlation between burglaries and the use of locks that locks increase burglaries. By the same token, it would be a mistake to conclude from a correlation between, say, internal organization and opportunistic behavior within firms that internal organization increased opportunism, if, for instance, higher levels of opportunism were associated with higher levels of asset specificity. The fact of controlling the income or asset specificity in the estimation of the last two equations will not eliminate the discussed problem.

To understand the main problem, one can compare the 'wrong' and the 'right' questions. The first is 'How does the performance of firms that adopt a particular governance arrangement compare to that of firms that adopt alternatives to that arrangement?' while the second 'How does the performance of a firm that adopted a particular arrangement compare with how *that same firm* would have performed had it adopted an alternative?' The results of the extensive research in the field of analyzing the effects of governance on performance will be valid only if managers choose governance arrangements indiscriminately. In the case of systematic estimation of the effects of governance on performance, two ways of overcoming this problem are possible. The first is to defeat the selection process somehow, and second is to control it. To defeat the selection process, one could, for instance, conduct controlled experiments in which organizational forms are randomly assigned to transactions. The cost of organizational form variation in real-world experiments is likely to be prohibitive. There is reason to add that an alternative approach would be to examine situations in which the selection process has been defeated by the interference of some external authority such as a court or regulator.

4. Possibilities for R&D Restructuring

R&D organization in pre-reform Russia (and any centrally planned economy in general) was set forth by its basic institutions, where administrative control ruled over economic activity. Three sectors of Russian R&D – industrial, academy and higher education science – mainly differed from each other by the type of supervising organization [Glaziev, 1993]. The mechanism for R&D self-organization and innovation diffusion was different from the functioning in a market economy. Hence, transition from a centrally planned to a market economy includes the complete restructuring of R&D organization. Institutions involved in R&D lose administrative and financial protection with the destruction of ministries and state bodies responsible for them. The adaptation of research organizations to the radical changes having occurred in former socialist countries is not easy and involves the collapse of a large number of institutes and scientific schools. At the same time, commercialization of R&D is taking place and new structures of R&D activity emerge.

There seems to be general agreement, as underlines for example [Schneider, 1993], that basic, fundamental R&D will need support during the transition to a market economy in Russia. Countries with much better situation in their economies, even they

cannot rely entirely on private funding in this area. It is the nature of basic research that it investigates not directly profit-making areas, in which firms (profit oriented in a market economy) tend to under-invest. Applied research should be primarily funded by the private sector with the exception of private R&D that are aimed at or tailored to specific national preferences and in areas where goods are not really traded in the market.

A diversity of governance arrangements (organizational forms) is desirable. The same organizational form is not necessarily appropriate for all types of knowledge creation and sharing activities. Many western experts are strong advocates of the view that the market should select appropriate organizational forms, but the market can only achieve such a solution with a decentralized style of laboratories and institutions with a variety of alternatives. Therefore, some science and/or industry might be quickly integrated into a new system, while others may do this later. But even if one believes that R&D done within the manufacturing enterprise will become the dominant organizational form, engaging the existing laboratories in contract with R&D activities is likely to be a viable route during the transitional period if market forces are allowed to operate in full. It may prove to be tough for laboratories to be absorbed into firms, because they may want to enter manufacturing directly. The latter is just another route the market provides. For market purposes, it is irrelevant whether the laboratories buy enterprises or vice versa [Schneider, 1993].

It appears that the applied field will face more difficulties than the basic area, though both will need some forms of support. As for applied research, assistance will be required in the interim, but if it is too generous, it can deter and defer the development of competition, innovation, and the benefits thereof. Transitional subsidies may make sense, but a new tax might accomplish the same results. The operation of the tax should be studied more closely to determine whether rules that govern the tax distort, in any way, the laboratories/enterprises' choice of organizational structure. Experience has shown that it is preferable to avoid taxes that create an incentive to promote stand alone to be neutral, while providing adequate funds for investment and development.

There is also a significant dependence of scientific and technological reform on legal and economic reform. In the legal sphere, the central issue is the establishment of property rights of all forms (intellectual and material). The more quickly an appropriate legal framework is in place, the more rapidly the transitional problems will disappear. As for economic sphere, it is necessary to say that for rational technological assessment at the micro- and macro-levels one needs the right prices (those that reflect the market determined supply and demand). Demonopolization is essential to allow competition to drive R&D investment. There are two separate benefits to demonopolization:

❑ Some competition will turn out to be better than no competition.
❑ In terms of increased size of total private resources invested in R&D, demonopolization and consequent competition will facilitate the improvement of the functioning of the selection process (the moving toward the more desirable organizational forms).

5. A Pattern of Governance Choice

Different research organizations and business unites with different legal status, forms of ownership, consumer orientation and so on are involved in the R&D sphere. One can present the organization involved in scientific knowledge creation as producing unit (modeled by the production function) with its system of governance (modeled by governance structure function). In other words, we distinguish two components in organization – productive and institutional. They are relatively autonomous: one can imagine one production unit with different governance structures fitted to different production unites. The main problem is how to find the optimal combination of both these components in the frame of one unit involved in R&D creation. The choice of such an optimum is connected with a notion of transaction costs or, what is the same, the costs of governance. The full costs of knowledge (R&D) creation then consist of production, or transformation in terms of Douglass North [North, 1981, 1990], costs and the transaction costs. However, our accent is on the transaction or governance costs.

To illustrate the proposed conceptual approach let us consider the following pattern of governance choice for creating the scientific knowledge and sharing it through adequate institutional arrangement.

Various classifications of governance and institutional arrangement harmonizing or minimizing the gap between the knowledge to be created and shared and the organizations involved in this process are possible. In the sake of simplicity let us range organizations alongside to the following stages of innovation cycle:

- ❑ Fundamental research.
- ❑ Applied research.
- ❑ Development.
- ❑ Marketing.
- ❑ Market forecasting.
- ❑ Experimental production.
- ❑ Commercial production.

Such a classification is convenient to illustrate our proposed approach based on the possibility of measuring the adequacy of governance choice. In practice, one should perhaps reconsider the mentioned ranging of organizations specialized in creating and sharing knowledge. Our point is that different scientific organizations have different degree of market-orientation: the minimal have organizations involved in fundamental investigations, the maximal those involved in commercial production.

Table 2. "Innovation cycle (S) – governance structure (G)" matrix

	G^1	G^2	G^3	G^4	G^5	G^6	G^7
S^1	1	2	3	4	5	6	7
S^2	2	1	2	3	4	5	6
S^3	3	2	1	2	3	4	5
S^4	4	3	2	1	2	3	4
S^5	5	4	3	2	1	2	3
S^6	6	5	4	3	2	1	2
S^7	7	6	5	4	3	2	1

Table 3. Minimal and maximal transaction costs according to the R&D innovation cycle stages

	Min	Max
S^1	1	7
S^2	1	6
S^3	1	5
S^4	1	4
S^5	1	5
S^6	1	6
S^7	1	7

If 1 is interpreted as, for example, 10% costs of transaction (the other 90% are production, or in other terminology, technological, transformational costs), then 7 might mean 70% transaction costs. In the case of the right (correct) governance choice we have 10% transaction costs in each direction and hence 10% average transaction costs in a direction. In the case of the most wrong choice we will receive 70% transaction costs in the first direction, 60% in the second, 50% in the third, 40% in the forth, 50% in the fifth, 60% in the sixth, and 70% in the seventh direction. In a result we have 57% average transaction costs on a direction (7+6+5+4+5+6+7 = 40, then 40:7 = 5.7). Hence, the share of production costs is 43% (100% − 53% = 43%).

6. Conclusion

We have introduced the notion of governance choice for creation and sharing knowledge by means of an adequate institutional arrangement to suggest the very possibility of reaching the two controversial approaches to knowledge management, that is – conventional and radical. Both of them regarded to be as the two poles of our conceptual approach that seems to be able to explain the real-world problems of knowledge management. The choice is between contracting with the government or society in appropriate institutional form from one side, and classic market contracting – from the other. Hybrid types of consumers may dictate the choice of hybrid types of institutional arrangements known as relational contracting. In its turn, the choice of institutional arrangement dictates the choice of the governance for knowledge created by nonprofit research organizations, business units, and their hybrids. The approach proposed in the paper is based on the idea that the more is accordance of knowledge created and its governance, the less are transaction costs minimizing of which can be served as one of the possible criteria for choosing the adequate governance.

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