INTERORGANIZATIONAL KNOWLEDGE SHARING DURING COOPETITION

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ABSTRACT

Recent business trends have given rise to coopetition: the occurrence of cooperation and competition between firms at the same time. Coopetition comprises the sharing of knowledge, which is conceived as one of the key sources of competitive advantage. In this context, coopetition poses a paradox: the knowledge shared for cooperation may backfire during competition. Based on economic theories, the paper introduces a model to analyze different situations of knowledge sharing during coopetition. The model offers an initial contribution to a theory of interorganizational knowledge sharing (KS).

INTRODUCTION

Recent developments in information and communication technologies and the according development of network organizations and virtual organizations have led companies increasingly to cooperate and compete with other businesses simultaneously. Brandenburger and Nalebuff (1996) refer to this phenomenon as 'coopetition'.

Furthermore, in today's business world knowledge/information/expertise are valued as premium source of gaining and sustaining competitive advantage (Simon 1992; Drucker 1992). Cooperation -i.e., KS- has the potential to increase each partner's level of knowledge and thus. However, even if cooperation increases the summed value, i.e. - contributes to profit - for both companies and thus enlarges the 'overall pie', from an individual company's perspective what ultimately counts is its share of the new pie. In other words:

companies would rather *not* share knowledge if they know that what they gain from cooperation may be outweighed by potential losses from giving up their monopoly over the knowledge.

RESEARCH OBJECTIVE

Considering the above phenomenon, the problem is how to manage 'KS' between organizations 'during' coopetition. From this we derive our overall research objective which is *to develop a theory of interorganizational KS*, i.e. to determine *under what conditions*, *how much* and *what* knowledge should be shared *when* and *with whom* during coopetition.

Literature on organizational KS has mainly been concerned with the transfer, integration and creation of knowledge within organizational boundaries (Nonaka, Takeuchi 1995; Grant 1996). Some work exists on the strategic problems of sharing knowledge between organizations (e.g. Hamel, Doz et al. 1989).

The paper seeks to build on and extend the strategic and interorganizational perspective on KS by introducing a research framework based on economic theories of cooperation and competition. In the next section, these economic theories will be described in brief, followed by an outline of the research framework. Finally, the paper will indicate future research activities.

THEORETICAL FOUNDATION

Two economic theories have guided the development of the framework: *New Institutional Economics* and *Game Theory*.

New Institutional Economics (NIE)

NIE consist of several, methodologically connected approaches, which are partially overlapping, complementary, and related. Within New Institutional Economics, Picot, Reichwald and Wigand (1996) distinguish (1) Property-Rights-Theory, (2) Transaction Cost Economics, (3) Principal-Agent Theory, and (4) Economic Contract Theory. Aware of the existing overlaps, our research mainly builds on Transaction Cost Economics and Economic Contract Theory.

In *Transaction Cost Economics (TCE)*, the notion of asset specificity is one of the principal dimensions of governing exchanges (Williamson 1985). Asset specificity is the extent to which partners involved in exchange (must) invest in assets which have limited value beyond the exchange. TCE argues that if transactions are accompanied by investments in transaction-specific assets, opportunistic behavior might be triggered (Williamson 1975).

Economic Contract Theory differentiates between complete and incomplete contracts. In many instances, cooperation between organizations is considered to comprise more contingencies than can be fully captured in a contract

(Williamson 1975). While its traditional focus is on non-human assets like machines, factories, etc. which are 'alienable', i.e. can change ownership (Grossman, Hart, 1986; Hart, Moore, 1989), recent literature (e.g. Brynolfsson 1994) extends the analysis to knowledge as an asset which is basically considered to be not (completely) contractable.

Game theory

Van Hippel (1988) and Schrader (1990) analyze the exchange of knowledge among competitors following the prisoners' dilemma paradigm (Axelrod 1984). Schrader assumes two players who both have a piece of knowledge that the other one does not have (with both pieces carrying equivalent value). The value consists of two parts, the basic value 'r' and the 'value-added' ('va'). This 'value-added' reflects the advantage that results from having knowledge that the other one is not aware of. It is lost in case of KS.

Applying these assumptions to the basic structure of the prisoner's dilemma (see Figure 1), it becomes obvious that KS is beneficial if that knowledge has a high basic value and a low 'value-added', i.e. when $2r > (r+va)$. Competitive behavior raises in case of low basic values and high 'values-added', i.e. when $2r < (r+va)$. Schrader concludes that cooperation only takes place based on a long term perspective and an appropriate level of trust among players.

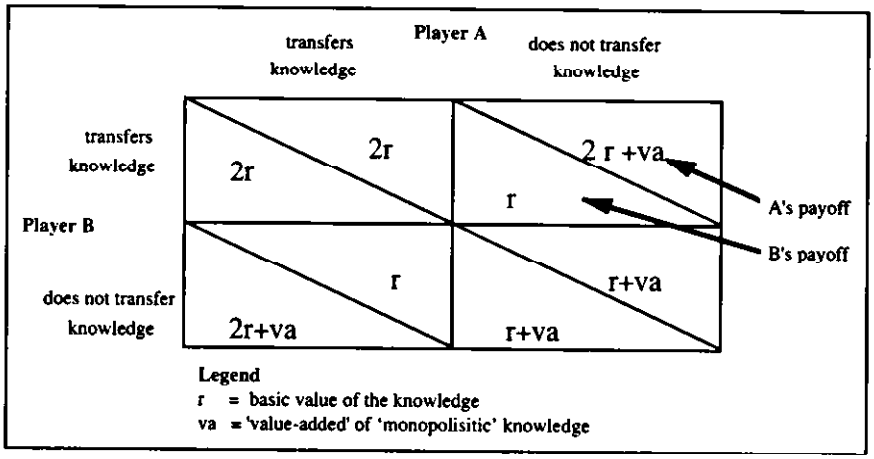

Figure 1. Game-theoretical framework of knowledge transfer (after Schrader, 1990)

RESEARCH METHODOLOGY AND DESIGN

Given the lack of previous research and literature on interorganizational KS, the our research is explorative (Yin 1994). It intends to perform case studies

aimed at close empirical investigation (Walsham 1995) and the development of new theoretical insights. So far, it has resulted in the following framework.

RESEARCH FRAMEWORK

Three dimensions of knowledge sharing during coopetition

The research framework extends the analysis of the game theoretical model by introducing three additional dimensions of interorganizational KS: 'synergy', 'leverageability', 'negative cross-impact'. The dimensions will be elaborated subsequently.

Synergy (or more precisely 'synergetic value') of KS is defined as the extent to which cooperation yields additional value from interdependent KS beyond the sum of party's individual knowledge. In other words, joint cooperation yields knowledge which surpasses the exchange of party's individual knowledge.

The introduction of synergy stresses the potential of companies improving their competitive positions by entering cooperation. This synergetic value only exists if both players exchange knowledge. The concept of synergy is closely related to the types of interdependencies identified by Thompson (1967).

The concept of *leverageability* of knowledge gained from cooperation is closely related to the concept of asset specificity as it captures the inverse situation. Leverageability refers to the potential of 'knowledge receiving parties' to increase their value gained from KS by exploiting the shared knowledge 'on their own' beyond the cooperation. Hence, additional value may result from leverageability whenever one party 'receives' knowledge.

A particular situation arises if a party's use of 'received' knowledge may have *'negative cross-impact'* on the 'sending' party. Negative cross-impact describes the extent to which a receiver's use of knowledge acquired during cooperation may lower the sender's original value of the knowledge. In case of companies operating in highly overlapping markets, for instance, employment of knowledge to improve competing products and processes is likely. During coopetition, companies should not be blamed for aiming at the larger piece of the enlarged 'overall pie', as long as they operate within the context of the (incomplete) contract that governs the cooperation.

Applying the game-theoretical framework of knowledge sharing to coopetition

Integrating the three dimensions to the basic game theoretical framework of knowledge transfer (see Figure 2), one can logically deduct that mutual KS is beneficial under the conditions of coopetition if 2r+s+l-nci > (r+va). Secretive behavior, on the other hand, is appropriate when 2r+s+l-nci > (r+va).

Introducing additional dimensions also widens the value gap between the two players if only one player actually transfers knowledge.

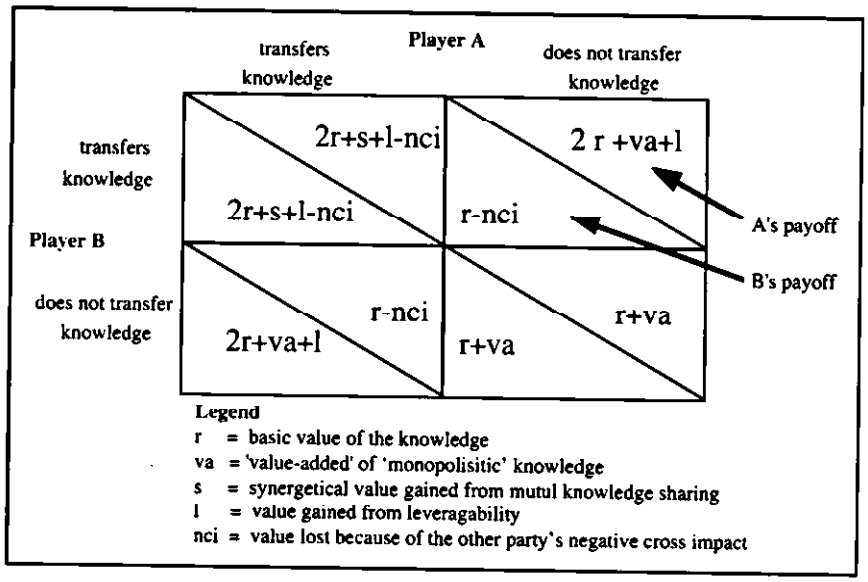

Figure 2. Game-theoretical framework of knowledge transfer during coopetition

In the following, we will briefly elaborate on the situation in which both A and B share knowledge (upper left cell) by analyzing different settings on the basis of simplified 'high/low' values for the three dimensions introduced. We begin by looking at synergy and leverageability (see Figure 3).

Analyzing knowledge sharing during coopetition: Synergy and leverageability

In the case of low leverageability and low synergy (cell I), from the sender's perspective there is neither much to gain nor much to lose. An example of such a situation may be cooperation between organizations which involves simply exchanging information that is rather specific to the transaction between them; use of the party's knowledge beyond the cooperation does not yield additional value. A conceptually similar situation arises if high synergy and high leverageability come together (cell IV). The expected synergy which offers an incentive to cooperate, is (partly) offset by the fact that the other party may gain additional value. In both situations companies may be rather ambiguous in their decision whether to enter KS activities or not.

		Leverageability by receiving party	
		Low	*High*
Synergy of cooperation	*Low*	Cell 1. Ambiguous Attitude towards Knowledge Sharing	Cell 2. Negative Attitude towards Knowledge Sharing
	High	Cell 3. Positive Attitude towards Knowledge Sharing	Cell 4. Ambiguous Attitude towards Knowledge Sharing

Figure 3. Effects of synergy and leverageability on knowledge sharing

In case of a low chance for synergy but a high risk that the receiving side may leverage the obtained knowledge (cell II), a party's interest to join KS activities are supposedly quite low. In addition to the absence of synergetic value, the other organization can use the knowledge for additional gains. Finally, cell III describes a situation in which a company would be eager to enter KS activities in spite of the overall 'coopetitive' business environment. Simply speaking, there is more to gain from synergy than the other party might derive from leverageability.

Extending the analysis: The effects of negative cross-impact

The paper assumes that only (the risk of) *high* negative cross-impact may change a company's decision derived from just analyzing synergy and leverageability. Figure 4 investigates the effect of negative cross-impact on the attitude towards KS. From a sender's perspective, high negative cross-impact lowers his interest in sharing knowledge.

		Leverageability by receiving party	
		Low	*High*
Synergy of cooperation	*Low*	***Effect of Negative Cross-Impact:*** **Negative Attitude towards Knowledge Sharing**	***Effect of Negative Cross-Impact:*** **Reinforced Negative Attitude towards Knowledge Sharing**
	High	***Effect of Negative Cross-Impact:*** **Ambiguous Attitude towards Knowledge Sharing**	***Effect of Negative Cross-Impact:*** **Negative Attitude towards Knowledge Sharing**

Figure 4. Effects of negative cross-impact on knowledge transfer

In cell II the decision against sharing is simply reinforced. In situations I and IV the previous ambivalent attitude will turn negative as the risk of value loss increases. The previously positive attitude in favor of sharing (cell III) becomes ambivalent, as the organization must take into account the risk of negative cross-impact.

FUTURE RESEARCH

The extended game theoretic analysis provides a rich structure for modeling complex arrangements in which players' fortunes are interdependent, e.g. KS during coopetition. Our framework comprises preliminary conceptual results of an ongoing research project, which is intended to pursue empirical and theoretical trajectories.

Regarding the empirical research several companies - such as a world-wide operating network integrator and a car manufacturing R&D consortium - have been expressing a need for developing an explicit KS strategy in order to cope with an increasing widespread of inter-organizational systems. Those companies provide the authors with an opportunity to work towards two goals: (1) to testify and fine-tune the framework, and (2) to support the companies in their efforts to develop a KS strategy. However, the research effort has been affected by the issue of confidentiality, especially as far as the 'knowledge *not* to be shared' and the 'value assessment of knowledge' are concerned.

Future theoretical extensions of the framework comprise the following three routes: (1) to introduce 'time' as additional dimension (simulations with more than one decision point per party, impact delays); (2) to design and analyze the impact of adequate incentive structures for mutually beneficial KS during coopetition; and (3) to develop and evaluate appropriate knowledge management mechanisms.

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