

## **SMEs, CO-OPETITION AND KNOWLEDGE TRANSFER**

**C. Loebbecke**

*Copenhagen Business School  
Howitzvej 60,  
Dk-2000 Frederiksberg  
Copenhagen, Denmark  
Tel: +45 3815 2455  
Claudia.Loebbecke@uni-koeln.de*

**P. Powell**

*Maths and Computing Sciences,  
Goldsmiths College,  
University of London,  
New Cross, London, UK  
Tel: +44 (0)171 919 7959  
mas01pp@gold.ac.uk*

**P. C. van Fenema**

*Erasmus University Rotterdam  
Rotterdam School of Management  
P.O. Box 1738, NL-3000 DR  
Rotterdam, The Netherlands  
Tel: + 31 10-4081757  
Pfenema@fac.fbk.eur.nl*

**M. Levy**

*Information Systems Research Unit,  
Warwick Business School, University of Warwick,  
Coventry CV4 7AL, UK.  
Phone: +44 1203 524658  
orsml@wbs.warwick.ac.uk*

### **ABSTRACT**

*Co-opetition, simultaneous co-operation and competition, is a recent phenomenon. Co-opetition entails sharing knowledge that may be a key source of competitive advantage, but the knowledge gained by co-operation may also be used for competition. There is little investiga-*

*tion of how this problem may be modeled and, thus, managed. Loebbecke and van Fenema (1998) introduce a game-theoretic framework for analysing inter-organisational knowledge sharing under of co-opetition. Based on the framework, they offer guidelines for the management of explicit and tacit knowledge predicated on co-ordination and control theory. This research in progress extends this into a new domain by investigating the issues in the context of small and medium-sized enterprises (SMEs). SMEs provide an interesting setting as they are innovators (and hence knowledge generators) but are poor at knowledge exploitation.*

## 1. RESEARCH OBJECTIVES

Knowledge is a source of competitive advantage. Co-opetition (Brandenburger and Nalebuff 1996), simultaneous co-operation and competition, may aid competitiveness by knowledge sharing but use of the knowledge for competition cannot be ruled out. Firms, thus, have to manage 'knowledge sharing' under co-opetition. Currently most research on knowledge sharing is focused internally and none considers the context of small and medium sized enterprises (SMEs). This research in progress focuses on managing knowledge transfer and introduces a game-theoretic framework to analyse knowledge sharing under co-opetition. It uses the experiences of a set of SMEs to investigate the resultant management issues.

## 2. THEORETICAL FOUNDATIONS

Skills in managing inter-organisational knowledge flows may be a source of competitive advantage (Dunning 1988) and managing co-operative relationships is frequently a process of managing knowledge flows. Badaracco (1991) argues that knowledge management capabilities make firms 'repositories of embedded knowledge'. Birnberg (1998) points to the paramount role played by IS and IT in co-ordinating and controlling joint ventures and in learning from them. Osborn (1998) highlights the use of IS as an enabler of new organisational designs.

The literature suggests that SMEs are likely to be knowledge generators. Spender (1996) identifies that non-bureaucratic organisations excel at knowledge generation, yet Liebeskind (1996) cautions that only those firms that are able to protect their knowledge have incentives to innovate and that a major problem is knowing what knowledge is valuable. Thus, the organic structure and culture of SMEs fosters knowledge innovation, but conversely their features do not suggest they are able to obtain sustainable competitive advantage. Grant (1996) points to knowledge issues indicating that single product firms predominate while economies of scope pull in the opposite direction resulting in multi-product firms. He feels that this will be resolved by the development of firm clusters. Cohen (1998) goes further by suggesting that SMEs have an edge as people are only able to cope with social networks no larger than 150.

SMEs appear to be in a curious position with regard to knowledge management. Mahesh and Garret (1996) note that SMEs, like larger firms, face a changing environment encompassing the emergence of world markets and the need for quality, fast delivery and close business partnerships. Collaboration among SMEs and with large firms, such as partnerships and alliances, is an emerging approach to industrial competitiveness. The ability to share resources is especially important to SMEs that lack the resources to participate in global markets. Strategic alliances encourage innovation, bring stability to cyclical businesses, expand product portfolios, and forge new supplier relationships (Maynard 1996). However, scarce entrepreneurial resources restrict the range of activities that are practical in SMEs (Dyer 1996).

SMEs wish to share knowledge as they see co-operation with customers as a route to survival. For example, many SMEs are involved in product design for larger customers, though they see this as operational rather than strategic. This involves innovation and understanding customer needs; yet this knowledge is not integrated into a wider strategic perspective due to preoccupation with day-to-day viability. SMEs are in co-opetition with other SMEs and with major firms. Some SMEs are knowledge intensive (consultancies etc.), and these are often employed as part of larger project teams (e.g. construction). Even non-knowledge intensive SMEs compete on knowledge - often specific to the local market or product. SMEs can gain from knowledge sharing (collaborative design, cost reductions strategies, guaranteed orders) but they also have lots to lose. Empirically, Mowbray et al (1996) point to the success of equity joint ventures over other types and identify the obstacles to knowledge transfer created, *inter alia*, by distance and culture. While some SMEs reported here expect new technology such as the Internet to open up global markets, their collaborations are essentially local.

Under co-opetition, *what to share with whom, when and under what conditions* is paramount in achieving competitive advantage. SMEs are in a curious position. On one hand they must co-operate due to market circumstances. However, it is unclear if they can be substantial beneficiaries. The game theoretic model below is a lens through which to analyse the impact of co-opetition on SMEs and proposes management strategies for knowledge sharing.

### 3. RESEARCH METHOD

One element of this work is development and use of the game theoretic model. The other draws experiences from case studies on 27 SMEs. Analysis of the case material is based on Levy et al's (1997) work on the transferability of IS planning frameworks. As part of the process of developing an IS strategy, the extent to which each firm was involved in collaboration with customers and suppliers was investigated and the role of IS as an enabler analysed. Each case was conducted over a one-week period during which the senior management team and employees took part in semi-structured interviews. The outcomes, background and market material were analysed and reported back to provoke further discussion. Often, large customers dictated to the SME the extent of knowledge sharing between the two. In most instances, knowledge flow was uni-directional, either because the SME was precluded from 'sharing' or it did not have the resources or insight to derive benefit from the relationship. Yet, for many SMEs there was substantial potential value in the available knowledge and in developing the relationships. Most, though, viewed knowledge sharing as a form of control. The game theoretic model allows the insights from the cases to be structured and allows a first cut at formalising management responses.

### 4. A GAME-THEORETIC APPROACH

Van Hippel (1988) and Schrader (1990) analyse the exchange of knowledge using the prisoners' dilemma paradigm. Loebbecke and van Fenema (1998) extend this by introducing three additional dimensions.

- (1) *Synergy* is the extent to which co-operation yields additional value beyond the sum of the parties' individual knowledge. Synergistic value only exists if both players exchange knowledge.
- (2) *Leverage* is the potential of the 'knowledge receiver' to increase its value by exploiting the shared knowledge by itself beyond the co-operation.

- (3) Use of 'received' knowledge may have a 'negative reverse-impact' on the 'sending' party. Negative reverse-impact is the extent to which a receiver's use of knowledge acquired during co-operation lowers the sender's original value.

With low leverage and low synergy, from the sender's perspective there is not much to gain or lose. Where there is low synergy but a high risk the receiving side may leverage the knowledge, interest in knowledge sharing is low. High synergy and low leverage describes a situation in which a firm would be eager to share knowledge in a 'co-opetitive' environment since there is more to gain from synergy than the other party might derive from leverage. However, with high synergy and high leverage, the expected synergy is offset by the expectation that the other party may gain additional value. From a sender's perspective, high *negative reverse-impact* lowers interest in sharing knowledge.

If *both* parties can translate the knowledge into adjacent business capabilities, they can exploit additional opportunities beyond the co-operation. This suggests partially diverging interests, typical for co-opetition, and requires the management of knowledge sharing. Given these theoretical positions, the paper now uses the model to shed light on knowledge management strategies for SMEs.

## 5. APPLICATION TO SMEs

In general, SMEs are poor at reaping *synergies* but large firms may do this for them by engaging in co-operative design, for instance. In other instances, SMEs are forced to become inter-dependent. This is particularly marked where a condition of being a supplier to a major firm is that EDI is implemented.

SMEs are poor at *leverage* - they have limited resources and their main focus is survival. This manifests itself as 'fire-fighting' with operational matters. Large customers encourage SMEs to focus on a narrow product range, to hone their skills on this and reduce costs progressively. SMEs are encouraged to enter open-book arrangements where both sides have full access to product data; but this usually end up as a form of control not exchange. In general, SMEs possess low leverage due to their poor ability to manage both the knowledge exchange process and the outcome, while larger firms are more able to lever the knowledge gained. This implies SMEs will have a negative attitude to knowledge sharing but they may have high potential for synergy. However, negative reverse impact makes synergy potential less exciting.

There is a high probability of *negative reverse impact* as SMEs will (indirectly) give knowledge to competitors (and customers).

Table 1 outlines the effects of these three forces on the set of 27 SMEs. From this data it appears that low synergy, low leverage and low negative reverse impact is a function of SMEs with a large customer base; there are no co-operative arrangements between SMEs and their customers or suppliers. High synergy, high leverage and high negative reverse impact is a function of SMEs with few major customers; the owner recognises the opportunity to exploit information for growth. High-high-low SMEs have information exploited by entrepreneurs for their benefit; data is received from suppliers and transformed. High-low-high is mainly a function of SMEs with few customers and a close relationship; customers use information to reduce costs and lock in the SMEs further. For high-low-low SMEs collaboration with a major customer provides close insights for SME to benefit from the relationship; also a lack of alternatives makes it difficult for customers to exploit. Finally, low-low-high SMEs have many customers so will not benefit, but retailers can take advantage of the information.

## 6. MANAGING KNOWLEDGE TRANSFERS

Distinction is made between the transfers of explicit and tacit knowledge. Spender (1996) identifies explicit knowledge as 'knowledge about' while tacit knowledge is associated with experience. Measures can be developed for managing the transfer of explicit and tacit knowledge. Management of explicit knowledge sharing requires; contractually defined quid pro quo knowledge exchange contents and procedure, inter-organisational co-ordination, planning and control procedures. Transfer management of tacit knowledge includes; close interaction in inter-organisational teams, managing dual commitment by rotating team members, structuring knowledge flows. Measures for inter-organisational knowledge transfer need to include intra-organisational co-ordination and control procedures to prepare a firm for co-opetition. The focus in the literature is on problems of tacit knowledge transfer, control and use. Yet, for many SMEs, theirs is explicit knowledge of markets and customers and the problems are those of guarding quite easily transferable information. This is what Cohen (1998) terms small incremental knowledge that can distinguish an organisation. On the other hand, the knowledge that most SMEs acquire from exchange is tacit which is difficult to assimilate and use. These issues are now explored for SMEs.

### 6.1. Managing Explicit Knowledge Transfer

SMEs are in a poor power position vis-à-vis their larger counterparts. In terms of explicit knowledge, SMEs are poor at recognising the value of their knowledge but are forced to 'exchange' it, while their lack of strategic or external focus coupled with poor IS makes them poor at monitoring large organisations' or competitors' performance.

SMEs are poor at contractual aspects and, in any case, large organisations are disinclined to negotiate. Presence in, and knowledge of, local markets often differs between otherwise similar firms and is a source of advantage. SMEs are claimed to be adaptable. Explicit knowledge allows comprehensive contracts to be developed that specify the contents and procedures for knowledge transfer.

*Inter-organisational co-ordination by mutual adjustment.* Successful SMEs cultivate their customers closely, both socially and operationally, monitoring requirements to maintain loyalty. SMEs are driven primarily by customer needs as their power is high. In the automotive sector customer influence extends to ensuring that the SME can demonstrate quality of process and product (Reid and Jacobsen 1988) by the introduction of formal, computer-based performance monitoring systems. SMEs try to gain leverage by using the performance information to limit the price reductions demanded, but success is limited. Further, information on operations and design are expected electronically which may bring collaborative advantage.

Operationally, firms need to screen their partner's performance and adjust accordingly. Formal planning is not common in SMEs, and McKiernan and Morris (1994) argue that its absence or inadequacy is directly linked to failure. The lack of planning leads to outdated management practices and autocratic management which may limit the SMEs ability to take advantage of knowledge from its customers.

*Intra-organisational planning and control procedures.* SMEs' management structures are flatter with little middle management and they do not have bureaucratic, cumbersome organisational systems (Lefebvre and Lefebvre 1992). SMEs encourage team and cross-functional orientations - every small business starts as an empowered team. A lack of bureaucracy makes

for efficient and informal internal communications. However, this may militate against the use of formal planning and control procedures.

**Table 1. SMEs and Knowledge Sharing**

Firm	Synergy	Leverage	Negative Reverse Impact
Recycling And Training Co.	LOW - many customers	LOW little use of information	LOW
Chemical Analysis Co.	LOW many customers	LOW no co-operation	LOW
Landrover Repair Co.	LOW many customers	LOW no shared information	LOW
Family Solicitors	LOW many customers	LOW no shared information	LOW
Queensway Photo Designers	LOW many customers	LOW no co-operation	LOW
Model Car Importers	LOW many customers	LOW no co-operation	LOW
University Arts Centre	LOW many customers	LOW no co-operation	LOW
Regional Travel Services	LOW many customers	LOW no co-operation	LOW
Seven Stars Printers	LOW many customers	LOW no co-operation	LOW
Flower and Samios	LOW as many customers	LOW as no co-operation	LOW
Garden Health Care	HIGH info shared by health authority	HIGH expansion based on understanding gained from LA	HIGH - forced to lower prices due to competitor info
Tree House Health Care	HIGH information shared by health authority	HIGH expansion based on understanding gained from LA	HIGH forced to lower prices due to competitor info
Warwick Training Brokerage	HIGH close relationship with university	HIGH exploit relationship to get info on education req's	HIGH possible for University to run its own show
Landfill Gas Extraction Co.	HIGH relationship with partners and LA	HIGH possible to understand global opportunities	HIGH as others use information to enter market
Coventry Training Co.	HIGH working with agencies on training	HIGH opportunities for developing courses	HIGH others may set up own training programmes
Radio Mast Surveyors	HIGH strong relationship with customers	HIGH exploitation of information to grow business	HIGH as phone companies could take surveying in house
Electrical Accreditation Institute	HIGH as companies want accreditation for products	HIGH considerable amount of data on standards	LOW may use info to improve products they still have to be accredited
Energy Waste Management Services	HIGH relationship with generator to provide info	HIGH exploits info to provide energy reports	LOW no added value from info given to generator
Car Tubes Co.	HIGH co-design of tubes with car manufacturers	LOW locked into relationship with customers	HIGH as PMS provides info about product and process
Precision Tool Manufacturers	HIGH co-design of tools with car manufacturers	LOW locked into relationship with customers	HIGH as PMS provides info about product and process
Coventry Events Management	HIGH good relationships with conference centres	LOW the co-operation is critical to success	HIGH conference centres could adopt "DIY" approach
Birmingham Clutches	HIGH co-design of tubes with car manufacturers	LOW locked into relationship with customers	HIGH as PMS provides info about product and process
Stratford Designers	HIGH co-design of signage for motor manufacturers	LOW as focused on one type of product	HIGH as car companies could take design ideas in house
Heath Springs	HIGH co-design of precision tools with car manufacturers	LOW locked into relationship with customers	HIGH as PMS provides info about product and process
Solihull Lighting Co.	HIGH through EDI man. of forecasting/order processing	LOW locked into relationship with customers	HIGH as sales and order info used by customer to
Car Paint Co.	HIGH staff and paint in customer warehouse	LOW locked into relationships with customers	LOW due to expertise of paint co.
Bird Designs	LOW many customers	LOW no co-operation with retail trade	HIGH as retail trade may exploit ideas for designs

## 6.2 Managing implicit knowledge transfer

SMEs have always worked on a niche basis, often based on tacit knowledge of product, process, market or people, though, as explained, this may also be explicit knowledge. The strategic dynamics of tacit knowledge sharing concern the equality of knowledge flows. However, leverage of shared knowledge and conflicting interests may tempt organisations to deviate from initial agreements. Tacitness and reciprocity hamper managing these. The former impedes ex ante specification of the content and procedure for transferring. Implications of the latter are more complicated.

*Close interaction in inter-organisational collaborative teams.* SMEs lack of management allows employees to make decisions, enhancing internal problem solving and adaptability. This enhances 'ownership', and SMEs are 'organic', allowing rapid exchange of ideas. However, decision-making in SMEs is dominated by the CEO which may hinder top-down communication, while making it easier to implement forced change.

*Managing dual commitment by rotating members of teams.* SMEs have difficulty finding workers with knowledge, skills, experience, attitude, and habits. Ferrell (1996) notes that SMEs are at a disadvantage to larger firms because they have few in-house technical experts. SMEs lack the sophisticated management support that knowledge workers often find in larger organisations (Mackinnon 1996).

*Structuring intra-organisational knowledge flows.* SMEs are poor at structuring inter-organisational knowledge flows and have very poor IS to support management. Capaldo et al (1995) suggest IS has most benefit in 'knowledge intensive' organisations. In SMEs, there is greater emphasis on using IS/IT to automate rather than informate. IS is directed at supporting operations as opposed to providing management information. In selecting IS, SMEs are dependent on external consultants. This impacts the ability of IS to incorporate tacit and explicit knowledge. Third party developers will not be able to extract and encode tacit knowledge from SME management. This is hindered, too, by SMEs not having business or IS/IT strategies. However, whilst no explicit strategy exists, an implicit one, survival leading to a focus on efficiency and cost reduction, often does.

## 7. CONCLUSIONS AND RESEARCH AGENDA

Firms need to provide members of inter-organisational teams with corporate knowledge. Organisational knowledge expands during teamwork, yet project members spend less time in their organisation to absorb this. However, even if project members had access to the latest corporate knowledge, the organisation would be reluctant to share it: the tacit character and team commitment of project members limits the firm's capacity to control knowledge sharing. In contrast, firms need to tap the knowledge available in the project team and disseminate it.

Managing inter-organisational knowledge processes will play a prominent role in sustainable competitive advantage. A game theoretic analysis provides a structure for modeling knowledge sharing under co-opetition. The model investigates how SMEs will fare. SMEs need to consider how to make themselves receptive to exchanged knowledge and flexible and responsive enough to gain competitive advantage if this is ephemeral. It may be that knowledge is bundled with other physical assets and that there are pre-requisites for using the knowledge fully. SMEs are in a curious position. They are knowledge creators, but are poor at knowledge retention. Part of the resolution of this lies in the SMEs' own hands. They need to be proactive in knowledge sharing agreements, to recognise what knowledge has value and what value added may be derived from knowledge exchange.

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