KNOWLEDGE TRANSFER AND SMALL BUSINESSES

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ABSTRACT

Co-opetition, simultaneous co-operation and competition, entails sharing knowledge that may be a key source of competitive advantage. However, sharing is dangerous when the knowledge might be used for competition. Levy et al (1999) show how a game-theoretic framework can help analyse inter-organisational knowledge sharing under conditions of co-opetition. This research extends this work into the small and medium-sized enterprise (SMEs) domain. The paper presents data on knowledge sharing activities and consequences from a set of West Midlands-based SMEs.

1. BACKGROUND

Knowledge is recognised as a source of competitive advantage. Co-opetition (Brandenburger and Nalebuff 1996), or simultaneous co-operation and competition, is a dual edged sword in that knowledge gained by one party via co-operation may be used competitively. Firms need, therefore, to manage 'knowledge sharing' under co-opetition. Levy et al (1999) present the first study of knowledge sharing in small and medium sized enterprises (SMEs). It identified three forces in knowledge sharing - synergy, leverage and negative reverse impact. This research takes the analysis further by focusing on the drivers of these three forces using the experiences of 42 West Midlands SMEs

Knowledge may be a core competence, especially for professional firms such as consultants, architects and medical practitioners. For other firms managing knowledge flows may be a source of competitive advantage but only if they can simultaneously prevent exploitation of the knowledge by their 'partners'. SMEs are likely to be poor at preventing such exploitation. They are often dominated by a few major customers, have few resources and may not recognise the value in the knowledge they possess. However, SMEs are likely to be knowledge generators as non-bureaucratic

organisations excel at knowledge generation (Spender, 1996). Collaboration among SMEs and with large firms, such as partnerships and alliances, is an emerging approach to industrial competitiveness. Many SMEs wish to share knowledge as they see co-operation with customers as a route to survival. For example, SMEs are frequently involved in product design for larger customers.

2. Method

This paper draws on experiences from case studies on 42 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 many 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.

Loebbecke and van Fenema (1998) identify three dimensions of knowledge sharing:

Synergy - 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.

Leverage - the potential of the 'knowledge receiver' to increase its value by exploiting the shared knowledge on its own beyond the co-operation.

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 weak leverage and weak synergy, there is not much to gain or lose from knowledge sharing. Where there is weak synergy but a high risk the receiving side may leverage the knowledge, propensity to share knowledge is low. Strong synergy and weak leverage implies that there is more to gain from synergy than to lose from leverage. However, with strong synergy and strong leverage, the expected synergy is offset by the potential losses. *Negative reverse-impact* lowers the interest in sharing knowledge.

3. APPLICATION TO SMEs

In general, SMEs are poor at reaping *synergies,* but large firms may do this for them by engaging them in co-operative design, for instance. In other instances, SMEs are forced to become inter-dependent as systems are a precondition of trade.

SMEs are poor at *leverage* as they have limited resources and focus on survival. Large customers require SMEs to focus on a narrow product range at minimum prices. Some SMEs enter open-book arrangements where both sides have full access to product data; but this is usually viewed as a form of control. 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 useful knowledge to competitors (and customers).

Synergy, leverage and negative reverse-impact are independent but they may operate together. Clearly, any of these variables may operate with a stronger or weaker effect. That is, synergy may be complete, as in the case of co-design of a new product, or leverage may be weak, as in the case of a completed good delivered to a customer. This paper takes a broad-brush approach characterising each of the variables as being either weak or strong. Combining the three variables gives eight possible outcomes ranging from weak synergy, weak leverage and weak negative reverse impact to all

three variables being strong. Table 1 gives an over-view of the data. Tables 2,3, and 4 break the data into 2x2 cross-tabulation matrices.

Synergy	Leverage	Negative Reverse Impact	Case Firms
Weak	Weak	Weak	14
Weak	Weak	Strong	1
Strong	Strong	Strong	10
Strong	Strong	Weak	3
Strong	Weak	Weak	3
Strong	Weak	Strong	9
Weak	Strong	Weak	2
Weak	Strong	Strong	0

Table 1: Data Overview

The data shows that synergy is weak in 17 case firms and strong in 25. Leverage is weak in 27 firms and strong in 15. Negative reverse-impact is strong in 20 firms and weak in 22. However, the firms are clustered in the categories where all variables are strong (10 firms) or weak (14 firms). Weak synergy is not associated with strong leverage. Synergy and negative reverse impact are related, in that weak synergy is associated with weak negative reverse impact (16 firms) and strong synergy is associated with strong negative reverse impact (19 firms). Weak synergy rarely occurs with strong negative reverse impact. Strong leverage is seldom associated with weak negative reverse impact.

		Synergy		
		Weak	Strong	
	Weak	15	12	27
Leverage	Strong	2	13	15
		27	25	42

Table 2: cross-tabulation: Synergy and Leverage

		Leverage		
		Weak	Strong	
	Weak	17	5	22
Neg. Rev. Impact	Strong	10	10	15
		27	15	42

Table 3: cross-tabulation: Leverage and Negative Reverse Impact

		Synergy		
		Weak	Strong	
Neg. Rev. Impact	Weak	16	6	22
	Strong	1	19	20
		17	25	42

Table 4: cross-tabulation: Negative Reverse Impact and Synergy

The key concern now is what gives rise to this distribution of data. In an attempt to understand these groupings, the next section looks at the characteristics of the firms and their environments in each category.

1) Weak Synergy Weak Leverage Weak Negative Reverse Impact

	Synergy Weak	Leverage Weak	Negative Reverse Impact Weak
Crow Recycling & Training Co	Many Customers	Little Use Of Information	
Chemical Analysis & Co	*Many Customers*	No Co-Operation	
Landrover Repair Co	*Many Customers*	No Shared Information	
Family Solicitors	*Many Customers*	No Shared Information	
Queensway Photographic	*Many Customers*	*No Co-Operation*	
Model Car Import Co	*Many Customers*	*No Co-Operation*	
Regional Travel Service	*Many Customers*	*Little Use Of Information*	
Seven Stars Printer	*Many Customers*	*No Co-Operation*	
Tritek	*Many Customers*	*No Co-Operation*	
Alchemie Limited	*Many Customers*	*No Co-Operation*	
John Marshall Engineers	*Many Customers*	*No Co-Operation*	
Harrison Beale	*Many Customers*	*No Co-Operation*	
Birley Servicing	*Many Customers*	*No Co-Operation*	
Johnson Coaches	*Many Customers*	*No Co-Operation*	

Table 5: Weak Synergy Weak Leverage Weak Negative Reverse Impact

All these firms have many customers and a focus on the day-to-day operations of the business. There is limited strategic thinking. There is limited use of IS beyond the operation. The main movement of IS is from efficiency to co-ordination. There is poor use of management information. The general business strategy is one of survival.

2) Weak Synergy, Weak Leverage, Strong Negative Reverse Impact

	Synergy Weak	Leverage Weak	Negative Reverse Impact Strong
Bird Designs	Many Customers	No Co-Operation With Retail Trade	*Retail Trade Neg Exploit Ideas For Designs*

Table 6: Weak Synergy, Weak Leverage, Strong Negative Reverse Impact

Bird Design has many customers but does not gain much useful knowledge from them. However, it is clear that it is difficult to hold onto design concepts. This is of great concern to the firm as it is the concept that sells the product. The firm has no clear strategy to deal with this problem.

3) Strong Synergy, Strong Leverage, Strong Negative Reverse Impact

	Synergy Strong	Leverage Strong	Negative Reverse Impact strong
Garden Health	Info Shared By Health Authority	Expansion Based On Understanding Of Needs	Forced To Reduce Prices By Competitor Info
Tree House	Info Shared By Health Authority	Expansion Based On Understanding Of Needs	Forced To Reduce Prices By Competitor Info

	Synergy Strong	Leverage Strong	Negative Reverse Impact strong
Warwick Training Brokerage	Close Relationship With University	Exploit Relationship To Get Info On Education Requirements	University Could Run Its Own Show
Landfill Gas Extraction	Relationship With Local Authorities	Possible To Understand Global Opportunities	Others Use Info To Enter Market
Coventry Training Co	Work Closely With Other Agencies	Opportunities For Course Development	Others May Set Up Training Programmes
Radio Mast Surveyors	Relationship With Customers	Exploitation Of Info To Grow Business	Phone Companies Could Take Surveying 'In-house'
Cov Designs	Close Relationships With Customers On Marketing Campaigns	Use Of Info To Look At Design Trends	Customers Could Use Expertise To Build Up 'In House' Knowledge
Warwick Insurers	Links With Financial Services Companies Essential	Knowledge Will Assist In Developing Other Insurance Products	Other Financial Services Companies Could Take Ideas &Use Term
Electric Tick Co.	Accreditation Depends On Exchange	Builds Knowledge Base Of Consultants	Easy To Set Up A New Agency From Acquired Knowledge
NCET	Close Interface With Government	Use Of Info For Strategy Product Planning	Government Could Use Info To Go 'In-house'

Table 7: Strong Synergy, Strong Leverage, Strong Negative Reverse Impact

This grouping contains two distinct groups. The key here is the use of information to build the firm by the owner-manager. However, the danger is that in setting up relationships with suppliers and customers the SMEs pass on too much information. This has occurred in the Landfill Gas Extraction case where suppliers have became competitors. The dominant characteristic of these firms is that they have a close relationship with customers and/or suppliers.

The other type of negative reverse impact that is seen here is when information is used to restrict the way SMEs can compete. For example, Garden Health and Tree House have been asked to reduce prices as a result of knowledge shared with their dominant customer, the local government authority.

4) Strong Synergy, Strong Leverage, Weak Negative Reverse Impact

	Synergy Strong	Leverage Strong	Negative Reverse Impact weak
Energy Waste Mgt Service	Positive Relationship With Electricity Generator To Provide Info	Exploits Info To Provide Energy Reports	Generator Not Interested In Providing Service
Biotech Co	Software Development On Going With Customers	Incorporate New Designs In Later Versions Of Software	Unlikely That Clients Will Develop Own Software
John Crane Marine	Close Relationship With Customers On Cable Delivery Design	Input Into Design Process	Too Specialist An Industry To Get Into

Table 8: Strong Synergy, Strong Leverage, Weak Negative Reverse Impact

This grouping is characterised by specialist firms working in very individual market niches such that there are no or few competitors. The owners are entrepreneurial and the firms have grown fast. These firms use shared information to enable

product/service provision to 'fit' within niche. However, the weak negative reverse impact arises as customers/suppliers cannot easily use the information themselves. The strategies of these firms are not clearly articulated.

The expectation for these firms is that the other party might get additional value from the information exchanged. That is the firms should be in group 5 (SSS) but there is no evidence for this.

5) Strong Synergy, Weak Leverage, Strong Negative Reverse Impact

	Synergy Strong	Leverage Weak	Negative Reverse Impact strong
Car Tubes	Co-Design Of Tubes With Car Manufacturers	Locked Into Relationship With Customers	PMS Provides Info About Product And Processes
Precision Tools Manufacturers	Co-Design Of Tubes With Car Manufacturers	Locked Into Relationship With Customers	PMS Provides Info About Product And Processes
Coventry Events Management	Good Relationships With Conference Centres	Cooperation Is Critical To Success	Conference Centres Could Adopt "Diy" Approach
Birmingham Clutches	Co-Design Of Tubes With Car Manufacturers	Locked Into Relationship With Customers	PMS Provides Info About Product And Processes
Heath Springs	Co-Design Of Precision Tools With Car Manufacturers	Locked Into Relationship With Customers	PMS Provides Info About Product And Processes
Box Co	Close Relationship With Motor Industry On Pallet Design	Co-Design Of Pallets With Car Manufacturers	Information From Customers Only To Enhance Design And Build
Stratford Designs	Co-Design Of Signage For Motor Manufacturers	Focused On One Type Of Product	Car Companies Could Take Design Ideas In House
Car Paint Co	Co-Design Of Tubes With Car Manufacturers	Locked Into Relationship With Customers	PMS Provides Info About Product And Processes
Solihull Lighting	Through Edi Man. Of Forecasting/Order Processing	Locked Into Relationship With Customers	Sales And Order Info Used By Customer

Table 9: Strong Synergy, Weak Leverage, Strong Negative Reverse Impact

All the firms here are manufacturing companies who are in close supply chain links with customers. These customers have locked the SMEs in to a narrow product range as preferred suppliers. The connection is close in terms of involvement with design, but the consequences are potentially damaging. Performance measurement is important and most have performance measurement systems imposed on them by their customers. However, this information may be used by the customer to increase pressure on SMEs to reduce costs. Leverage is low because of the product niche, which is pushed by the customers – it is difficult for SMEs to move outside.

These firms have collaborative IS linked to their customers. Their strategy not is entrepreneurial being about growth but not about empire building.

6) Strong Synergy, Weak Leverage, Weak Negative Reverse Impact

	Synergy Strong	Leverage Weak	Negative Reverse Impact strong
Bilston & Battersea	With Regard To Relationship With Designer Weak For Customers	No Co-Operation	Weak
John Marshall	Knowledge Of Design Customers Influence	Not Able To Extend Ideas Niche Market	Weak Not Locked Into Customer Relationship

Table 10: Strong Synergy, Weak Leverage, Weak Negative Reverse Impact

All these firms occupy niche markets in which it is not easy to copy products or to build expertise. However, both require a close relationship between customers in Car Paints case or suppliers in Bilston & Battersea. Neither of these firms makes any attempt to lever the information nor do their customers/suppliers take advantage of the knowledge they acquire. Both firms have limited strategy, but might be said to be successful almost without trying. They need to reduce costs, but no strategy to deliver this is manifest. The firms are manufacturers but the contrast is with those firms in the SWS group is low negative reverse impact. This seems to arise because these firms are not so strongly locked into the supply chain relationship by their customers as the others.

7) Weak Synergy, strong Leverage, weak Negative Reverse Impact

	Synergy Weak	Leverage Strong	Negative Reverse Impact weak
Efx	Many Customers	Corporate Marketing Helps Understand Trends	Unlikely To Use Info In House
Anthony Collins	Manufacturers	Provide Case Law Build Up	Unlikely That Info Could Be Used To Compete

Table 11: Weak Synergy, strong Leverage, weak Negative Reverse Impact

A large customer base is common in this group.

4. Discussion, Conclusions and Research Agenda

The on-going research tries to understand what drives the co-opetition forces. It uses Levy et al's (1998) 'focus-dominance' model. This model recognises that IS adopted by SMEs tend to be simple. Most SMEs view IS as a cost, and are reluctant to invest after start-up. However, some SMEs recognise the potential of IS to change their business - primarily to grow. The customer is important in decisions on investing in IS. Customer influence is high at start-up when SMEs need to attract and keep customers and when the SME is established as a preferred supplier to a major customer. Otherwise, customer dominance is lower.

Levy et al's (1998) empirical work identifies four different approaches to the adoption of IS in SMEs in a 'focus-dominance' model based on the extent of customer dominance and strategic focus – either cost or value-added. The model gives rise to four quadrants – 'efficiency', 'co-ordination', 'collaboration' and 'innovation'. Co-opetition is unlikely to be an issue for those SMEs with a cost-focus strategy. Their systems are internally-focused. Levy et al (1999) show that the primary growth path for SMEs is from *Efficiency* to *Co-ordination*. Information is used to manage the business. In the *Efficiency* quadrant the tendency is to provide sufficient information to satisfy basic record-keeping only. *Co-ordination* is an extension of this with firm size making it necessary to develop databases that provide ready information access.

In contrast, the value-added focus suggests co-opetition may provide benefit to SMEs that are either required to share information with their customers (*collaboration* quadrant) or that use IS as a means of changing and developing the business. Information exchange may become core to the business strategy. Integrating the co-opetition forces into the focus-dominance model allows investigation of SMEs as knowledge receivers (Figure 1).

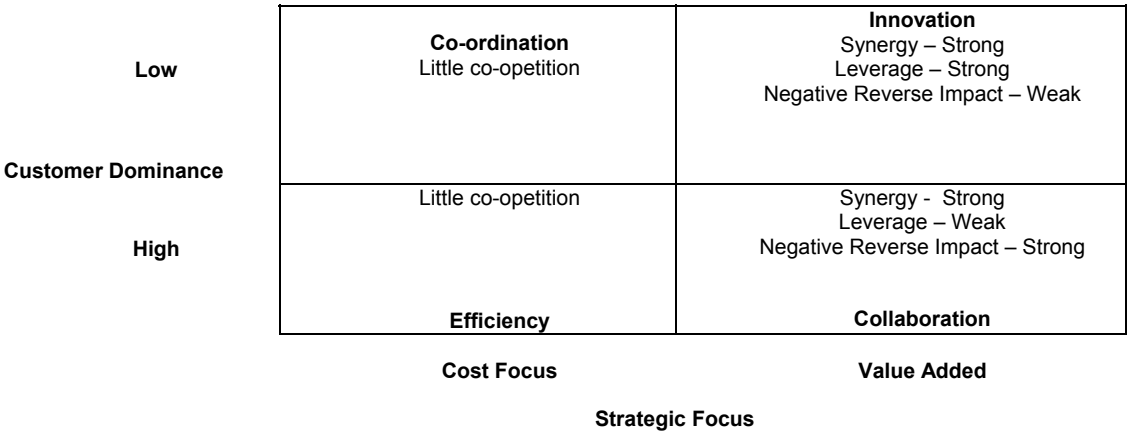

Figure 1: Co-opetition in SMEs

SMEs in the collaboration quadrant have a few key customers who expect information on product and process quality. This exchange is critical to the relationship, hence synergy is strong. Few SMEs use information to exploit knowledge on their own - leverage is weak. However, SMEs do use knowledge to reduce customer power. Hence, NRI is likely to be strong.

The innovation quadrant contains dynamic SMEs that recognise the value of information and knowledge as a strategic resource to enable change. The businesses are often about exchange of information, and there is an expectation of strong synergy. The SMEs use information to improve, grow and attract other customers, indicating strong leverage. However, it is unlikely that the use of knowledge by the SME will lower the sender's original value, hence NRI is likely to be weak.

The next stage of this research is to test this model and to understand better the drivers of the co-opetition forces. This work is on-going.

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