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Abstract

This paper reports preliminary results from a study that examines factors influencing knowledge sharing among members of business clusters. Business clusters are local concentrations of competitive firms in related industries that do business with each other. Earthquake Engineering, Natural Hazards, Optics and Software are examples of clusters studied in this paper. Some of the companies in these clusters are direct competitors in the local arena and they are often expected to co-operate and share business knowledge with each other when they are considering bidding for international projects or contracts. This knowledge may be considered to have provided each company with a competitive advantage. Therefore, trying to successfully operate in this mixed environment of 'co-operation' and 'competition' can pose a dilemma for many members of business clusters. Focus group and individual interviews were held with representatives from seven business clusters based in Wellington, New Zealand. Analysis of the data revealed that the following factors do influence knowledge sharing in business clusters: having strong, charismatic cluster champions/leaders; developing respect and trust between cluster members; and participants believe in collaboration. These factors will be explored and the implications for practice and research will also be discussed.

Keywords

Knowledge sharing, business clusters, co-opetition

Introduction

One way of surviving in today's turbulent business environment is for business organisations to form strategic alliances or joint ventures with other similar or complementary business companies (BarNir & Smith, 2002). For example, big companies like General Motors and Ford created a joint venture company to explore the potential that e-commerce has to offer for their businesses. However, for small and medium sized enterprises (SMEs) the need to

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survive is even more critical, as they are often very susceptible to unexpected economic fluctuations in the business environment. In New Zealand, where over 90% of businesses are considered as SMEs (MED, 2002b), it is very important that strategies are formulated to ensure the survival of these businesses. Fortunately, the central government and many local authorities recognise this dilemma and encourage the formation of a special form of regional strategic alliances called 'business clusters' (The Office of the Prime Minister, 2002; MED, 2002a).

Business clusters are "geographical concentrations of competitive firms in related industries that do business with each other and that share needs for common talent, technology, and infrastructure" Waits (2000, p.37). An example is the 'software' cluster based in Wellington, New Zealand. This cluster consists of a number of local software development companies who collaborate in order to compete with other global organisations for software development projects sourced in other countries. Even though some of the companies in this cluster may be direct competitors in their local business areas, they are willing to collaborate and co-ordinate for some particular projects in the international arena. In order to achieve effective collaboration, many of these companies are often expected to share business knowledge with other members of the cluster, knowledge which may be considered to have provided that company with a competitive advantage.

Trying to successfully operate in this mixed environment of 'co-operation' and 'competition' can pose a dilemma for many SMEs who are members of business clusters. Nalebuff & Brandenburger (1996) coined this paradox as 'co-opetition' and a critical aspect of co-opetition is the fact that it involves some level of knowledge sharing. For many companies, having to face the reality of sharing their business knowledge with other competitors is a difficult task as they need to balance between giving up their competitive advantage with a need to satisfy common cluster goals. However, little is known about how members of a business cluster produce, diffuse and share knowledge for the benefit of the cluster as a whole. While conducting this study, we are guided by the following research question:

What are the factors that facilitate knowledge sharing in business clusters?

Literature Review

In this section, we will provide a summary of literature on two aspects relevant to this study: (a) business clusters and (b) knowledge sharing and co-opetition.

Business clusters

In his book *The Competitive Advantage of Nations*, Porter (1990) proposes that competitive advantage not only lies within companies or even inside industries, but also is found in the location of the business unit. For him a firm increases its competitive advantage when it is surrounded by a strong cluster of world-class buyers, suppliers and related industries. Based on its observations of the cluster, a firm can learn about market trends and needs, what are the technological developments currently taking place, and even find suitable partners and allies for innovative initiatives. Clusters are defined by Porter (1998, p. 197) as:

> *"…geographical concentrations of interconnected companies, specialized suppliers, service providers, firms in related industries, and associated institutions (for example, universities, standard agencies, and trade associations) in particular fields that compete but also cooperate".*

Waits (2000) described six activities that are enhanced collaboration among cluster members: 1) co-inform, which identifies cluster members and their competencies, promotes the cluster, and improves member's communication; 2) co-learn, where educational and training programmes are sponsored by the cluster for their members; 3) co-market, which are activities collectively organised to promote the cluster's services or products; 4) co-purchase, where equipment or other resources are jointly acquired that individual organisations could not afford on their own; 5) co-produce, which involves alliances to manufacture a product; and 6) co-build economic foundations, where the cluster lobbies for legislation, policies or programmes to provide the right economic environment for their economic growth. All these activities demand a flow of knowledge among the cluster members in order to succeed.

Clusters emerge organically, as interdependent firms in a particular geographic location who perceive potential benefits by linking with each other (Porter, 1998; Gray, Harvey & Brimblecombe, 2001). Based on case studies, Porter (1998) estimates that a cluster may require at least 10 years to develop and become an effective source of competitive advantage.

Knowledge Sharing and Co-opetition

Kluge, Stein and Licht (2001) argue that knowledge should be considered the fourth factor of production along with labour, land, and capital. Knowledge is not a new idea (Davenport & Prusak, 1998; Kluge et al., 2001), as philosophers and scholars had been studying it for centuries. However, due to the fact that the other three factors of production were abundant, accessible and were considered the reason of economic advantage in the past, knowledge did not get much attention. As tangible productive factors are currently no longer enough to sustain a firm's competitive advantage, knowledge is being called on to play a key role (Romer, 1986; Spender & Grant, 1996; Appleyard, 1996; Loebecke, Van Fenema & Powell, 1999).

Some research studies have indicated that technical change and innovation in a wide range of industries, such as electronic telecommunications, semi-conductors, and bio-medicine, can only be achieved if firms have access to external sources of knowledge and interactive learning (Appleyard, 1996; Chaminade, 1999). For Appleyard (1996, p.3), knowledge sharing is "the transfer of useful know-how or information across company lines". She compared inter-firm knowledge flows in the semiconductor and steel industries in both Japan and USA. One of her hypotheses was that knowledge sharing will be less likely in fast paced and fiercely competitive industries (e.g. semiconductors) than in slow paced industries (e.g. steel). The results of the study showed little evidence that knowledge sharing is less common in the semiconductor industry than in the steel industry. She also concluded that firms engaged in knowledge sharing activities enjoy the following benefits: the ability to refine strategic plans, inclusion in professional networks, and coordination on industry standards. Appleyard acknowledged that her sample was not random – thus biased towards knowledge sharing – however, she believed that her conclusions are still valid.

According to Lee and Al-Hawamdeh (2002), knowledge sharing is an "unnatural act" for a firm, thus some kind of compensation must take place. Companies decide whether to share knowledge or not with other firms depending on the costs and benefits anticipated for doing so (Appleyard 1996; Loebecke, Van Fenema & Powell, 1999; Lee & Al-Hawamdeh, 2002). Issues on how to manage this process, such as how much, what knowledge, when, with whom and under what circumstances, must be taken into account by all parties (Loebecke, Van Fenema & Powell, 1999).

Nevertheless, some organisations have opted to collaborate with firms that are at the same time their competitors to tackle new business opportunities (Loebecke, Van Fenema & Powell, 1999; Kluge et al., 2001). The literature has coined this phenomenon as 'co-opetition' (Nalebuff & Brandenburger, 1996).

In their study on knowledge sharing and co-opetition, Loebecke et al. suggest two things are crucial to the firm's decision as to whether to share knowledge or not: first, the extent of three dimensions known as synergy, leverageability and negative reverse-impact; and second, the ability of the firm to manage the process of knowledge sharing.

Synergy is defined by the authors as "the extent to which cooperation yields additional value from interdependent knowledge sharing beyond the sum of the parties' individual knowledge" (Loebecke, Van Fenema & Powell, 1999:18). Leverageability, is the increase of knowledge value by one of the parties after exploiting the shared knowledge "on its own" beyond the cooperation agreement. Negative reverse-impact, is defined as the value of the company's individual knowledge lost after sharing it with the other party.

The analysis by Loebecke et al. suggests that even in the best scenario, firms are not sure whether to share knowledge or not. Nevertheless firms overcome this uncertainty if they have developed an effective control strategy to manage the dynamics of the knowledge sharing process –such as installing gatekeepers and instructing employees to maintain awareness in social situations in any task force– as well as implementing measurements to manage explicit and tacit knowledge.

Data collection and analysis

A two-stage data collection strategy was used: a focus group and individual interviews. For the purpose of this study, the term focus group is defined as a group of four to 10 people, moderated by a facilitator(s), that are organized to discuss a topic or set of topics of special interest to the participants (Plax & Cecchi, 1989; Lichtenstein & Swatman, 2002). The participants selected to participate in a focus group normally have some common characteristics that relate to the topic(s) being considered by the group. The goals of the focus group are to (a) elicit a preliminary list of inhibitors and facilitators of knowledge sharing in business clusters and (b) to promote knowledge sharing among the participating business clusters.

We invited representatives from seven Wellington-based business clusters to take part in this focus group[2]. The two researchers facilitated the focus groups session in an electronic meeting facility using the GroupSystems software (Nunamaker, Dennis, Valacich, Vogel & George; 1991). The participants were first asked to think and write in their computers those factors that they believed influence knowledge sharing within their respective clusters. There was a space for discussion and clarification of the factors identified after the brainstorming activity.

An initial coding of the data took place immediately after the focus group. Basically, we reduced redundancy by combining similar ideas into a statement that represents a factor of knowledge sharing. We then send the initial results to the participants for checking and incorporated some of the suggested changes into a revised list.

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[2] We acknowledge the support of the Wellington Regional Economic Development Agency (WREDA) in facilitating our contacts with numerous business clusters in the Wellington region including the Natural Hazards, Creative Capital, Earthquake Engineering, Software, Mobile Internet, E-Business, and Optics clusters.

The second stage of the study involved a one-hour unstructured interview with two participants as well as two other representatives who did not take part in the earlier focus group. The focus of the interviews was to elaborate and build on the list of factors identified earlier. During these interviews, the participants provided additional information and suggested the integration of some of the factors together as they expressed similar issues.

Results

For the purpose of this paper, we have decided to describe the following three key 'knowledge sharing' factors: (1) having strong, charismatic cluster champions/leaders; (2) developing respect and trust between cluster members; and (3) participants believe in collaboration.

Factor 1: Having strong, charismatic cluster champions/leaders

This factor was considered one of the most critical for the success of the cluster and the process of knowledge sharing. Leaders encouraged knowledge sharing by being the first ones to do so, and by setting the ground rules to establish the trust that gave cluster members the confidence to share their knowledge:

> "Leaders inspire. They lead by example. They create the desire and drive for others to follow".

Participants agreed unanimously that lack of leadership inhibited knowledge sharing because leaders create the necessary environment.

For instance, one participant who was a leader of his cluster had been working for a big company when he joined the cluster. However, once he stopped working for that company, it lost interest in clustering. Another cluster was challenged to keep its momentum going for a little while when two of its initial leaders started to take less active roles.

Usually natural leaders would assume a Chair or Co-chair position in the early stages of the cluster. They would be actively involved in developing the cluster by doing different tasks such as sharing ideas, clarifying misunderstandings, promoting the cluster, organising and co-ordinating meetings and typing agendas. Several of the participants were leaders in their respective clusters. They admitted it was hard-work and time-consuming, but at the same time it was a very rewarding experience to see members working together towards the goal of winning international contracts.

A particular issue was the need to identify the next round of cluster leaders or champions. As cluster membership was voluntary, leaders tended to get over-used and over-worked. Eventually leaders reached a point where they requested time out. Unfortunately, as one interviewee explained, those leaders were the ones who got other cluster members to see the benefits of membership. When those leaders were no longer actively involved, the cluster risked losing its momentum:

> "…in our cluster, we really only had one leader. And when that person was unavailable we had no leader. So the cluster went round and round in circles".

One of the interviewees also indicated that sometimes it is not that there is a lack of charismatic leaders in a cluster, but it is whether or not these leaders are given the time and support from their organisations to put effort into the cluster idea. This is particularly true, as it is likely that a cluster will not produce any form of economic return in the short term, and

companies may resent their staff spending time on something that is not generating any income for them.

Cluster leaders understand the longer-term benefits of clustering and they are the ones who constantly remind the rest of the members to focus on their goal:

> *"...So one does have to be patient. I think with the profile that this cluster is building, it takes a while for that to sort of sink in and to register. You've just got to be patient and keep plugging away. I'm convinced that its actually a good idea itself, especially at the modest cost, because its not costing a lot of money to do it and yet the potential for bringing new work, and also in building our knowledge economy – all those reasons".*

Factor 2: Developing respect and trust between cluster members

Focus group members proposed and accepted the need for a level of mutual respect. This included not only how each organisation treated the others, but also respect for the capabilities and abilities of each organisation and the individuals that represented them.

It appears that respect is an essential factor to setting up a cluster, as it is the starting point from which trust will grow. That initial degree of respect made participants more comfortable when working with their competitors and thus a willingness to share knowledge. In contrast, when a lack of respect was perceived, conflict arose:

> *"There are some competitors that I probably wouldn't sit in a room with and share knowledge with, because I wouldn't necessarily think that they've got the integrity to equally participate, they'll take information but not give".*

Respect came from previous experiences of working with competitors, or from how individuals regarded what each other was doing in the industry. It was accepted that cluster members might not like each other or the organisations they belonged to, but as long as there was respect they could work together.

"Show and Tell" meetings provide an opportunity for members to learn about what they do, what they are good at and how they could use one another instead of looking overseas to get a partner. They are useful vehicles for people to learn about the interests, capabilities and ideas of other members, as well as how they contribute from a cluster perspective. They help members to become familiar with one another and enable them to work together on prospects and jobs. As one of the interviewees put it, "it is a sharing thing".

One interviewee indicated that this type of meetings increases the level of respect among members, which will develop into trust. When a participant's capacities and capabilities are not clear, cluster members do not understand what this individual and his/her company is bringing to the table, and therefore they do not feel comfortable opening up. In addition, she indicated that hearing what others are doing or their capabilities is much better than receiving a document listing them:

> *"... anybody can say what they do on paper, but its the show and tell aspect that really helped us go "Wow!".*

All the participants mentioned that during the initial stages of the cluster development, these meetings are critical to get to know each other. As the cluster evolves, "Show and Tell" meetings start to diminish. Usually it is when a new member is joining the cluster, that a mature cluster will organise a session of "Show and Tell" to introduce the newcomer to the rest of the community.

Participants also expressed the initial concern that other members of the cluster might steal ideas. They believed their concerns were based on doubt about others' work ethics, and on lack of trust and respect between participants in a cluster. These concerns undermined knowledge sharing.

In this context one participant spoke of a cluster in another region that she belonged to. Someone had put a project on the table before the cluster had learned to trust each other. Another member had taken the idea and without making it a cluster project, had delivered a result. After that incident, it had been very difficult for the rest of the cluster members to be comfortable opening up and sharing. To make sure that this impasse would not happen again, the participant suggested the discussion and acceptance of a code of behaviour, as well as focusing the clustering concept on export potential. She believed that if the cluster focused only on local projects, the companies would attempt to undercut each other and discourage collaboration.

Another issue that may discourage individuals from sharing ideas was the fear of losing control over them. Once an idea was brought to the cluster's attention, it was changed by the group's observations and contributions. The result was that people felt as if their idea has been "stolen".

Once inter-personal trust had been established, cluster members were willing to risk sharing their knowledge and talk about opportunities, ideas and even weaknesses. For one participant, suspicions were only overcome when the cluster champions or leaders made the first move by sharing their knowledge, and ideas. In other words, these leaders were risk takers and first movers; they had two of the attributes that participants considered essential to good leadership.

The participants reported that undertaking a project also tested cluster members' trust in each other. If a cluster member put forward someone from their organisation for a project team, which was then successful, this consolidated trust between members for the next time they worked together.

Factor 3: Participants believe in collaboration

Participants agreed they needed to believe in collaboration in order to share knowledge. One interviewee said that collaboration per se is not the aim, as "collaboration has to deliver". People expected that through collaboration they would gain something, usually access to an international contract or a project.

Cluster members claimed to believe in collaboration, but from their comments it was clear that each held reservations, as this goes back to the issue of trust. However, when it came to the crunch, cluster members realised that, to complete a project or an order from overseas they needed to contact their local competitors and collaborate with them:

> "The paper is saying: it is better to have 50% of something, than 100% of nothing, because then you'll be missing out. But you build teams to match the majority and that is what this is about".

Participants commented that successfully completing the first contract or project motivated them to keep working together and sharing knowledge. Even the process of bidding for a contract was a good opportunity for them to test both the procedures they had put in place and the group dynamics in the cluster.

For instance, the Earthquake Engineering industry cluster's first opportunity to work together was for the Marmara Earthquake Emergency Reconstruction Project (MEER) in Turkey. After the 1999 earthquake, the Turkish government sought tenders for the design and building supervision of 40,000 new apartments. The magnitude of the project was such that even the biggest engineering companies in Wellington could not individually commit staff and resources, let alone incur the cost of placing a bid. The cluster was therefore invited to bid. It did very well technically but not as well on price – they were undercut. Despite not winning the contract, the experience of collaborating to place a bid demonstrated to the members that the cluster concept works, and is useful for large-scale projects.

Two participants mentioned several logistical issues which had to be overcome while their cluster was bidding for a contract, such as which companies should be involved in the project?, who should lead the project?, how much trickles down? At this stage there was still a degree of mistrust. However working together on a project required cluster members who were also competitors to work closely together, and therefore to put on the table some of their companies' internal processes, such as cost structures that they might not otherwise have contemplated sharing.

Collaboration does not just involve joining forces to tackle a market opportunity in the international arena; members can also collaborate in defining their own cluster identity. By working together on tangible tasks, such as developing a marketing plan, the cluster strategy or a Website, the members gained a sense of belonging and identified with the cluster. In addition, through assigning tasks to individuals, exchange of ideas takes place and also the work of the cluster does not fall on only one or two members.

Implications and discussion

The results of this study have implications for the research and practice of business clusters engaged in knowledge sharing. Three of those implications are now considered.

First, there is a need to conduct a national survey of all business clusters in New Zealand. This survey would increase the validity of the factors we have identified in this study.

Second, one of the key factors identified in this study is the role of the leaders, known as chairpersons, in enhancing knowledge sharing in business clusters. As discussed earlier, a chairperson encourages knowledge sharing by being the first to do so and by developing an environment of trust and respect. How these conditions for knowledge sharing are developed, when the chairpersons are also considered as competitors by other cluster members, will be an interesting question for investigation.

Finally, we believe the results from this study could be used as learning material in the training of business cluster facilitators and chairpersons. For example, an inventory of factors influencing knowledge sharing could be used as an instrument for examining where their clusters stand in relation to promoting knowledge sharing and as a benchmark for future reference.

Conclusion

This has been an exploratory study focusing on the factors influencing knowledge sharing in business clusters. We believe that a deeper understanding of the nature of these factors will remain a primary concern of researchers, practitioners and those regional development

agencies which promote business clusters. For example, the achievement of regional development benefits through business clusters depends heavily on the ability of the facilitators and chairpersons to promote effective collaboration and partnering through knowledge sharing. The extended study will also assist development agencies to better target the type and level of support provided to clusters.

If we assume that one way of surviving in today's turbulent business environment is for business organisations to form strategic alliances or mergers with other similar or complementary business companies, then a greater awareness of the relationship between knowledge sharing and co-opetition will enhance the developments of these alliances.

For these reasons, research into the nature of knowledge sharing in a co-opetitive environment is both important and constructive and should be conducted on a continuing basis.

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