

Formal and Informal Venture Capital and Networking: The Effect of Clusters

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of the requirement for the degree of Master of Business Administration.

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Abstract

This thesis reports on the findings of qualitative telephone interviews and on the analysis of a secondary database. This study compares firms located in clusters with firms that are not located in clusters in order to determine differences in networking, differences in equity financing, and the interactions between networking, financing, and location. In particular, the objective is to determine whether there is an advantage to clustered firms in terms of access to risk capital, and whether this advantage is solely due to the increased networking within clusters or whether there is an additional effect. The results show that clustered firms may have an advantage related to the increased likelihood that firms within a cluster will apply for risk capital. It is unclear what role networking plays in this, other than the observation that clustered firms are characterized by more weak ties in their networks. Further research is called for.

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1. Introduction

1.1 Summary

The literature disagrees on whether or not clustered technology or knowledge-based industry (KBI) firms have a net advantage over un-clustered technology or KBI firms in terms of access to formal and informal venture capital. If an advantage does exist, then the reasons for the advantage must be explored. Combining the existing research on venture capital, clusters, networking, and social capital may help to answer these questions.

A review of the literature in these four areas leads to questions surrounding not only whether access to venture capital is easier within clusters, but also whether networking makes access to venture capital easier. If networking and social capital are important when obtaining venture capital, as research suggests, then they must be taken into account when examining the effects of clusters. If clustered firms are able to obtain venture capital more easily than un-clustered firms, then the reason may lie in the facilitated networking opportunities that clusters provide. This implies that un-clustered firms could obtain similar advantages by increasing their social capital. Conversely, if facilitated networking is not the sole reason for the cluster advantage, then further exploration would be warranted.

This thesis examines some of the questions surrounding networking and access to venture capital for KBI firms within clusters through both quantitative and qualitative research. A questionnaire was distributed to four groups of firms: venture-funded clustered firms; venture-funded un-clustered firms; clustered firms which have sought but failed to obtain

venture funding; and un-clustered firms which have sought but failed to obtain venture funding. This questionnaire compared clustered and un-clustered KBI firms with respect to networking. It looked at whether firms within clusters that seek formal or informal venture capital are more likely to receive financing than firms outside of clusters that seek venture financing. It also examined whether firms with more weak ties and greater trust within their ties are more likely to receive financing. However, the questionnaire had a very low response rate and was thus not able to be used for empirical analysis. Subsequently, a secondary database was analysed quantitatively to answer questions surrounding financing within and outside of clusters.

Lastly, qualitative research was done to further explore the effects of networking on access to venture capital, via telephone interviews. In this stage, the questions asked focussed on the networking attributes of the firm at the time that they received venture capital. The interviews also explored whether, given similar firms with similar networks of social ties from within and outside of clusters, the clustered firms will be more likely to have received financing.

This research compares clustered and un-clustered firms to answer questions concerning the advantages of clusters and access to risk capital. It is a study of Canadian KBI firms and their networking and financing behaviour. Practical implications of this research exist, as its results may suggest strategic actions that Canadian entrepreneurs should take with respect to access to capital.

1.2. Initial Research questions

Do clustered KBI firms have a net advantage over un-clustered KBI firms in terms of access to formal and informal venture capital? What role do clusters play, if any, in the receipt of risk financing, and how is this affected by networking?

1.3. Focus of the research

To determine:

- (a) Networking differences between clustered and un-clustered KBI firms, including strength of ties and level of trust;
- (b) Risk financing differences between clustered and un-clustered KBI firms, including propensity to seek risk capital and the likelihood of receipt; and
- (c) The interactions between these two factors.

The goal was, in the end, to have a broader idea of what, if any, advantages a KBI firm gains by cluster location when attempting to access external equity capital.

1.4. Importance of the topic

There is most definitely a need for additional research with regard to the role of clusters in risk financing. As will be shown in the literature review to follow, conflicting views exist on this issue and there is a lack of research that directly compares clustered and un-clustered firms.

Firstly, there is a debate as to whether networking does or does not improve access to venture capital and whether cluster location facilitates networking or not. If both of these were found in the affirmative, it would imply that location in a cluster makes it easier for a firm to obtain venture capital. Secondly, there is a question as to whether a firm with a diverse network has the same ability to access capital regardless of location; in other words does cluster location confer advantages to firms accessing capital, other than a networking advantage. These questions arising from the literature review below are mentioned here in order to highlight the importance of additional research in this area, and of research that will combine the social capital, networking, cluster and venture capital literatures to clarify the interactions between these important areas.

In general, the topic of clusters is still relatively new in research literature. Cooper and Folta (2000) note that, “while the generalities of cluster locations have been established, many research questions need to be addressed to add to the understanding of clusters and their importance.” It is expected that this study will be useful to academics, to build on the existing literature; to policy-makers, as they consider the encouragement of growth in small and medium enterprises (SMEs), which usually involves some type of risk capital; and especially to the organizations themselves, which will be interested in how their location may affect their ability to obtain financing. However, it is fully to be expected that further questions will arise in this study that can only be answered by continuing research.

1.5. Key Assumptions

One of the key assumptions for both the questionnaire and the interviews is that the frequencies and level of trust within the clustered and un-clustered firms' networks can be accurately measured, and that the firms themselves are able to do so. It is assumed also that the memories of those individuals interviewed were fairly accurate when asked to provide this information about the past.

2. Literature Review

The literature review will begin with a discussion of the definition of "venture capital" and its characteristics (section 2.1). The relationship between informal venture capital, or angel investors, and formal venture capital will be discussed in section 2.2. These concepts provide context for the rest of the literature review, as they define the main areas of interest.

Next, the importance of networking to entrepreneurs, as it has been described in past literature, is outlined in section 2.3. This is followed by a discussion in section 2.4 about the importance of social ties within networks, the types of social ties that exist, and their roles. Section 2.5 describes what is said about the social ties of technology firms. Section 2.6 brings the review back to venture capital, with a discussion of the relationship between networking and venture capital financing.

Clusters are defined and described (section 2.7); technology clusters are examined in more detail (section 2.8). Some of the particular effects of clusters on networking are examined (section 2.9). Comments are made as to how this might affect venture capital in section 2.10. In section 2.11, the debate surrounding the importance of ties that are external to the cluster versus ties that are internal to the cluster is reviewed. Finally, the summary, implications and limitations of the literature review will be presented in section 2.12.

2.1. Venture Capital

The goal of this section is to define venture capital in general terms, and to describe the characteristics of businesses in which it is invested. The two main sources of early stage venture capital revealed in literature are business angels and venture capital firms (Van Osnabrugge and Robinson, 2000). Business angels are high net worth individuals that invest a small proportion of their own wealth in SMEs; venture capital firms create fixed life investment vehicles (venture capital funds), raising capital in order to invest in specified investment situations (Mason & Harrison, 2004). The informal venture capital investor provides capital directly to new businesses with which they may have no previous relationship (Madill et al., 2005b). Formal venture capitalists tend to fund high-growth ventures, generally older than the ventures funded by angels, but without access to - or too risky for - most other sources of funding (Zacharakis and Meyer, 1995 in Van Osnabrugge and Robinson, 2000). Venture capital investments finance businesses that may not otherwise have been able to obtain equity capital. Venture capital may also increase the business' ability to obtain more financing in the future. For instance, more

venture capital involvement has been shown to improve IPO performance (Florin, 2003); although there is some disagreement on this point (Brau et al., 2004).

Many of the businesses that seek venture capital are not investment ready, although they may have the potential to become 'investable' (Mason and Harrison, 2004). Furthermore, some types of businesses may be less likely to obtain venture capital funding. For instance, the proportion of women receiving venture funding is disproportionate to the number of women owning their own ventures (Brush et al., 2002), but the reasons for this are still unclear (Greene et al., 2001). In addition, knowledge based and other risky groups often face difficulties accessing start-up capital and working capital (Davis, 2003). This may be because technologically sophisticated firms are perceived to have a greater degree of risk, an increased likelihood that founders lack managerial skills, and higher uncertainty as to whether internal research will actually lead to a product or service (Westhead and Storey, 1997). This could make it more difficult for them to get venture financing. Westhead and Storey (1997) report that this type of firm is more likely to say that a continual financial constraint has impeded growth.

For those businesses that receive some type of external equity, private individuals (business angels) are the most common source in terms of frequency of investment; formal venture capital is the second most common source (Freear and Wetzel, 1990). Angels have been found to be the primary source of external equity financing during the earlier stages (seed and start-up) of a venture's existence (Freear et al., 2002). Venture capital funds invest in larger ventures and make little impact on the early stage financing

of entrepreneurial ventures (Freear et al., 2002). In a study taking place between 1991 and 1996, Davis (2003) found that less than 2% of formal venture capital went to seed stage deals. The 'lower limit' for a normal venture capital deal is probably at least two million dollars (Freear et al, 2000; Sohl, 1999).

The two types of venture capital financing are described above, along with the characteristics of the firms they are generally invested in. It is clear from these descriptions that the two types have some fundamental differences; however, they are also related.

2.2. Angel Investors and Institutional Venture Capital

This section describes how the different characteristics of angels and venture capitalists make them complementary. One of the differences between business angels and formal venture capital is the investment stage at which they typically invest (Van Osnabrugge and Robinson, 2000). Generally, business angels invest in companies at different stages in the life of the company than do formal venture capitalists. Angels have been found to be the primary source of external equity financing at the high-risk, early stages (seed and start-up) of an entrepreneurial venture's existence; whereas venture capital funds invest in larger ventures and make little impact on the early stage financing of entrepreneurial ventures (Freear et al., 2002; Freear and Wetzel, 1990; Sohl, 1999). There is a trend in the venture capital industry towards investing in larger and later-stage deals to the detriment of early-stage investments, which has increased the role of angel investors (Harrison and Mason, 2000). Thus, rather than competing, the two types of venture

capital may be complementary (Sohl, 1999; Harrison and Mason, 2000; Freear and Wetzel, 1990).

Some ways in which they are directly complementary are: through sequential investing; co-investing in deals; provision of financing by angels to venture capital funds; and deal referring, where angels refer deals that are too large to venture capital firms, and vice versa (Harrison and Mason, 2000). Deal referring is also mentioned by Sohl (1999) who noticed that funds will refer investments deemed “too small” to angel investors with whom they have a relationship; and later the angel may refer the firm back to the venture capitalists, as the appropriate stage is reached. Firms that have been financed by angels are significantly more likely to be financed by institutional venture capitalists (Madill et al., 2005a, Madill et al., 2005b). Angels provide good quality, pre-screened investment opportunities to venture capitalists, and venture capitalists provide the follow-on financing for angel-financed ventures (Harrison and Mason, 2000).

Before returning to the venture capital concept, the following sections explain some of the other concepts from literature that will be used in this study.

2.3. The Importance of Networking for the Entrepreneur

Both within and outside of clusters, networking and relationships are important for the entrepreneur. It is widely agreed that networking provides at least some benefits to entrepreneurs and to businesses in general.

Entrepreneurial networks have been described as either all of the relationships in which an entrepreneur participates (Dodd and Patra, 2002), or as the relationships or businesses that influence the functioning of the firm (Schutjens and Stam, 2003). Whether the network should consist of everyone the entrepreneur knows, or just of those that specifically influence the business, it is clear that many different types of people are present within it. Commercial contacts like suppliers, distributors and customers are part of the network; but so are social contacts like friends and family (Dodd and Patra, 2002; Schutjens and Stam, 2003). In fact, in a study by Schutjens and Stam (2003), one-third of all young firms, regardless of type, characterized the source of their business relationships as social. Chell and Baines (2000, p. 196) note that “networking comprises social processes over and above the normal economic trading relationship.”

Networking provides many benefits to the entrepreneur. This includes increased innovativeness (Freel, 2000); the management of ambiguity (Johannisson, 1992); a positive impact on venture growth (Lee and Tsang, 2001); better survivability (Westhead and Storey, 1995) and recycling of resources (Johannisson, 1992). More concretely, it can provide them with contacts to venture capital (Shane and Cable, 2002; Mason et al., 2005a), and commercial linkages like suppliers and customers (Chell and Baines, 2000; Freel, 2000.) Due to these benefits, some regions promote networking. Organizations which promote networking at the local level have been shown to increase the volume and variety of regional interconnectivity (Collinson and Gregson, 2003).

Studies on networking have been done in many different countries. Whether or not the studies can be universally applied is somewhat contentious, however. Some researchers suggest that the way that entrepreneurs network is essentially universal (Greve and Salaff, 2003) while others emphasize the importance of cultural divergence (Dodd and Patra, 2002).

Clusters of enterprises both cooperate and compete (Freel, 2000; Johannisson, 1992). This explains networking between rival firms. This type of networking may be more common among innovative firms, as it has been shown that innovative firms have more diverse networks (Freel 2000). Innovative firm behaviour has been linked to increased cooperation between firms (Schutjens and Stam, 2003). Chell and Baines (2000) noted that knowledge workers are more likely to engage in networking activities. Vanhaverbeke (2001) states that, within the logic of value creation, networking and inter-organizational relationships become central pieces of corporate strategy design.

Networking appears to be an important part of being an entrepreneur. It provides benefits for the business throughout its lifetime; however, these benefits may vary with time. Establishing a business requires different contacts and resources in different phases; network size and time spent developing and maintaining relationships depends on the establishment phase of the business (Greve and Salaff, 2003).

Steier and Greenwood (1999) created a four-stage model of new enterprise networking in terms of financial relationships:

- **Initial Navigation/Kissing Frogs:** a network is built from a potential universe of contacts, where the entrepreneur both approaches previously existing ties and makes new contacts;
- **Consolidation:** ties are strengthened and new ties are built to create a consolidated financial network;
- **Enrichment:** the entrepreneur begins to access more than just financial capital from some ties;
- **Reconfiguration:** Growth of network; others within the firm assume responsibility for managing some relationships; communication becomes more formalized; and relationship patterns becomes reconfigured as some are 'culled' from the network

The contacts within a network, or the relationships themselves, are often called *social capital*. The literature on social capital helps to describe the different types of relationships that can be formed within an entrepreneurial network, and how these relationships are beneficial.

2.4. Social Capital

This section defines social capital, and describes the types of ties that can occur within networks. Social capital is “the set of tangible or virtual resources that accrue to actors through the social structure, facilitating the attainment of the actors’ goals” (Gabby &

Leenders, 1999 in Greve and Saliff, 2003, p. 2). It is through networking that entrepreneurs acquire social capital.

Social capital within networks can be measured both on the strength of the ties within them and on the density of the network. Sometimes a third, cognitive, dimension is added, which refers to the norms and shared values between parties (Liao and Welsch, 2003).

The strength of the ties within the network is the relational aspect of social capital, which concerns the types of relationships that have developed (Liao and Welsch, 2003). Strong and weak ties have been defined in a few different ways. Dodd and Patra (2002) define strong ties as those with whom the entrepreneur interacts at least twice a week; whereas weak ties are enacted at least once a year, but fewer than two times per week. Granovetter (1973) is less specific with respect to time, and includes other factors such as emotional intensity, intimacy and reciprocal services; he suggests that one can generally intuitively characterize a tie as being weak, strong, or absent. Liu and Duff (1972) further characterize strong tie groupings as being comprised of homophilous members (i.e. they share similar attributes); whereas weak tie groupings are more likely to contain heterophilous members.

Ties have also been characterized as being direct or indirect. A direct tie is defined as a personal relationship between a decision maker and the party about whom the decision is being made (Larson, 1992 in Shane and Cable, 2002). An indirect tie is a relationship

between two individuals who are not directly connected, but through whom a connection can be made through a social network of each party's direct ties (Burt, 1987 in Shane and Cable, 2002). A network of social ties allows people to obtain information about others with whom they do not have a direct contact (Shane and Cable, 2002.) A direct tie could be strong or weak since the only criteria is that they be known personally. Hence, the idea of direct and indirect ties describes the location of an individual in the network; whereas the concept of strong and weak ties describes the type of relationship between direct ties.

Network density measures the proportion of network contacts who know each other (Dodd and Patra, 2002). A network with high density implies that there are fewer strangers within the network, because a higher proportion of network contacts know one another.

Network density and strength of ties may be related, however. The degree of overlap of two individuals' friendship networks varies directly with the strength of their tie to one another (Granovetter, 1973). Therefore, strong ties within a network will lead to network density. The stronger the ties between two members of a set, the larger the proportion of individuals in the set with whom they will both be tied or connected by a weak or strong tie (Granovetter, 1973). Because of this, homophilous (strong tie) communication limits diffusion, so that information tends to re-circulate among those who already possess the same information (Liu and Duff, 1972).

Granovetter (1973) argues that bridges (or links) between groups can only be formed by weak ties (although not all weak ties form bridges). This suggests that removing the average weak tie would do more damage to transmission probabilities than would the removal of the average strong tie. Weak ties produce a “social-structural framework that permits an enlarged diffusion of information” as compared to information networks that are tightly integrated by highly homophilous relationships (Liu and Duff, 1972, p. 362). Thus, although strong ties may be more trusted, weak ties are more important for obtaining new information and getting new contacts; something which is clearly important for the entrepreneur. Shane and Cable (2002) say that information can be obtained about others to whom they are indirectly tied. For example, if a business angel wanted to find out more about an entrepreneur, (s)he might be able to do so by talking to people (s)he knows that also know the entrepreneur. Granovetter (1973) says that one is more likely to find information through weak ties. Thus, the business angel will be more likely to find information about the entrepreneur if (s)he talks to direct ties that are weak. It is more likely that someone the angel knows also knows the entrepreneur if that person does not know the angel well, because their networks will be less likely to overlap. Indirect ties are *created* by the presence of weak ties. Weak ties are seen as indispensable to opportunities (Granovetter, 1973). Weak tie networking may be considered a fundamental part of entrepreneurial behaviour (Chell and Baines, 2000).

In addition to the strength of ties and the density of the network, other factors must be considered. Trust, as discussed below, is one of these; trusted social ties are more important in technology-based (and therefore KBI) firms, regardless of the strength of the

social tie (Liao and Welsch, 2003). In addition, Madill et al. (2004b) introduce the measurement of the value the entrepreneur places on the networking activity as a relevant variable. If networking is not seen as having value it is unlikely to have an effect, regardless of how frequently it is engaged in. Thus, weak ties are unlikely to provide opportunities to an entrepreneur who does not value them.

The above describes how social ties operate within networks of entrepreneurs. It is clear that weak ties, which give access to indirect ties, are important. These ties may help entrepreneurs access many resources that they otherwise could not.

2.5. Social ties and technology firms

This section explores ways in which social ties operate in a technology firm environment. Literature generally talks about technology and non-technology firms. In the methodology of this study, the term KBI is used. However, at the Tier I KBI level used in this study, as defined by Industry Canada, these two terms are much the same thing. The literature on technology firms should apply to KBIs.

Social capital based on trust is more important for technology-based firms than it is for non-technology-based firms. This is cited by Liao and Welsch (2003), to explain the finding that technology firms will tend to have sparser networks than non-technology firms. In other words, the technology firms will have smaller (presumably denser) networks with strong ties. This affirms the idea that strong ties are important in transferring complex, tacit knowledge (Hansen, 1999 in Levin et al. 2002); however, strong ties tend to militate against the generation of new information and fresh

perspectives (Chell and Baines, 2000.) If this is primarily because of a lack of trust in weak ties, as argued by Levin et al. (2002), then developing trusted weak ties can be beneficial, allowing non-redundant information to be obtained from trusted sources.

Hence, firms that value complex, tacit knowledge (such as technology firms) should value *trusted* ties the most. If trust is present, weak ties are preferable, but if not, strong ties are. Cohen and Fields (1999) found that trust can be characterized as performance generated or socially generated, and that the type of trust predominant in relationships affects the type of social structures that are valued. Performance generated trust does not imply that people will be ready to share proprietary information, but does support network relationships with venture capital firms, lawyers, accountants, head-hunters, and to a certain extent, universities and graduate students (Cohen and Fields, 1999).

The concept of 'trusted ties' is further supported by Gerde and Mahto (2004). Their study finds that firms with low interdependence and disruptive technology (such as many high technology firms) will tend to have fewer linkages. Interdependence and the presence of complementary (rather than disruptive) technology promote trust; if firms are not interdependent and their products are not complementary then they will not have any reason to trust one another. This helps to explain why competing technology firms may not have many linkages between themselves, but may have extensive linkages with companies such as venture capital firms and head-hunters - as Cohen and Fields (1999) found in their study of Silicon Valley - where interdependent relationships do exist.

Finally, although social capital and networks play a significant role in the growth of technology firms, the presence of extensive social ties is not required for growth to occur (Liao and Welsch, 2003).

This section described the significance of social capital for technology firms. Although weak ties are important, it is necessary that ties be trusted. For several reasons listed above, the types of social ties and the significance of networking may be different for technology firms than for other types of firms.

2.6. Venture Capital and Networking

This section describes the relationship between networking and obtaining venture capital.

It has been suggested that extensive social ties may increase the likelihood that an entrepreneur will obtain venture capital. This appears to occur in one of two related ways.

First, the presence of social ties spreads knowledge about investment opportunities and generates referrals. Referrals may improve the odds of obtaining venture capital for entrepreneurs (Batjargal and Liu, 2004), and angels often find out about investment opportunities through friends and business associates (Freear et al., 2002). In high uncertainty situations, prior relationships are likely to facilitate investment inflows, as long as basic criteria are met (Batjargal and Liu, 2004). Shane and Cable (2002) found that, although most funded proposals come by referral, the reason is that the referral

provides information. If the information were publicly available, the entrepreneur would not need a referral.

Therefore, the second way in which networks help entrepreneurs to obtain financing is by making more information about them available publicly, or providing credibility. Credibility within a network makes a business seem more legitimate. Harrison et al. (2004) suggested that employment within a magnet organization that is connected to key networks may lend credibility when approaching external investors. Steier and Greenwood (1999) also suggest that when developing a network the entrepreneur has a greater chance of success where approaches are made to groups of contacts that, although not formally connected, have knowledge of one another. This is because: "Obtaining the support of one can 'legitimate' the entrepreneur's actions and ease the challenge of building support" (Steier and Greenwood, 1999, p.160).

The types of ties that are most helpful to entrepreneurs who wish to obtain and build venture capital relationships seem predominantly to be weak ties. Batjargal and Liu (2004) found an indirect effect for both strong and weak ties on investment selection at the screening stage. Shane and Cable (2002) found that while both direct and indirect ties were related to the probability of investment, direct ties were superseded by information from indirect sources. Previously established weak and dormant ties are particularly important in influencing angel investors' decisions to invest (Steier and Greenwood, 1999). These social ties operate primarily as a mechanism for information transfer (Shane and Cable, 2002). It seems that having a good network of social ties, particularly

weak ties that give access to indirect ties, is helpful to entrepreneurs trying to obtain venture capital.

However, agreement that networking is valuable when securing venture capital is not universal. Carter et al. (2003) found that networking had no significant main effect on securing equity financing or loans. It has also been suggested that it is not the network itself that helps organizations to obtain financing, but rather the value that is placed on the network by the organization (Madill et al., 2005a).

This section describes the possible relationship between access to venture capital and social ties. Although the literature is somewhat divided, it appears at least possible that networking has an effect on an entrepreneurs' ability to obtain venture capital. If this is true, then it is important to examine another area which may have an effect on both networking and venture capital: clusters.

2.7. Clusters

This section serves to define and describe the concept of clusters, as it is found in literature. Clusters have been defined in many different ways, ranging from simple to complex. Michael Porter, who is well known for his promotion of the 'cluster' concept, is often referred to when defining a cluster. According to Porter (2003, p. 562), a cluster is:

“... a geographic proximate group of interconnected companies, suppliers, service providers and associated institutions in a particular field, linked by externalities of various types.”

Similarly, Wever and Stam (1999, p. 393) define a regional cluster of high technology firms as “... a geographical concentration of firms which exhibit a significant degree of intraregional linkages.” Poudier and St. John (1996) describe ‘hot spots’ as regional clusters of firms that: compete in the same industry; begin as one or several start-up firms that grow more rapidly than other industry participants; and have the same or similar immobile physical resource requirements in the long run.

Wolfe and Gertler (2004) define the cluster concept in two ways:

- i. a functionally defined group of firms and supporting institutions that produce and market goods, which derive from a group of related industries that are concentrated in a specific geographic locale;
- ii. An overarching framework to guide policy makers in the design of initiatives to promote that development.

Based on Porter’s work, Simmie (2004) described three key features of a cluster.

- Clusters are subject to vigorous national or regional competition;
- Commonalties and complementarities interlink participating firms;
- The interactions take place between geographically proximate groups of interlinked companies.

He notes that firms may group together without being a cluster. For example, in pure agglomeration, firms group together without linkages or interactions between them, purely to minimize costs by being near other firms in the production and consumption hierarchy (Simmie, 2004).

All of these definitions agree that a cluster must be a group of firms in geographic proximity, and that the firms must be related in some way (whether by industry, through the value chain, or by sharing common inputs). Most suggest that there must be linkages between the firms. Some Canadian clusters that have been discussed in literature are: Montreal; Toronto; Vancouver; Ottawa; London; Saskatoon; Halifax; Calgary; Waterloo; Quebec City; New Brunswick; Cape Breton; Southern Ontario; Niagara; Okanogan; Sudbury; Edmonton; Saskatoon; and Winnipeg (Wolfe, 2004; Doutriaux, 2003).

According to Porter (1998), clusters affect competition in three ways. They increase the productivity of competitors, because they have better access to inputs such as labour and information; they drive the direction and pace of innovation by making opportunities more visible and promoting closer inter-firm linkages; and they stimulate the formation of new businesses within the cluster.

Pouder and St. John, (1996) find that a clustered subgroup of competitors will move through three evolutionary phases:

- i. Origination of the cluster and emergence of the 'hot spot' identity;
- ii. Convergence of clustered firms;

- iii. Firm reorientation, which includes a decline in the performance of the cluster.

They argue that clustered competitors will be slower to recognize and respond to an industry-wide environmental jolt than will competitors outside of the hot spot, and that following a jolt, the former hot spot will experience disproportionate losses in growth and innovation compared to competitors outside the hot spot. Madill et al. (2004a) found that firms located in the Ottawa, Canada technology cluster had a high survival rate during the recent technology recession. Firms in the study identified opportunities and strategies for surviving the recession, some of which relied on their location within the cluster. However, since no non-clustered sample was included, it cannot be determined whether or not their results contradict Pouders and St. John's theory. These seemingly contradictory papers may also be partially explained by Simmie (2004), who notes that clustered firms without an outward orientation will eventually decline. However, if they are part of an internationally distributed system of innovation, this will not occur. The period of decline predicted by Pouders and St. John may only occur for clustered firms that do not also have an outward orientation.

Other authors focus on the benefits of clusters. Clusters promote both competition and cooperation (Porter, 1998). This implies that companies located in a cluster may have more opportunities than non-clustered companies for innovation (due to increased competition and also due to shared information garnered through cooperative relationships) and for relationship building. Indeed, location within a cluster serves as a spur to learning and innovation, as firms within the cluster will be well informed about

what others are doing (Wolfe and Gertler, 2004). Innovation depends on the presence of networks that link generators and exploiters of knowledge (Cooke et al., 2002). In addition, the availability of skilled labour is considered to be one of the most important local assets (Wolfe and Gertler, 2004; Mason et al., 2004).

The key features of cities which develop into innovative clusters involve the interaction of institutions like venture capital firms, knowledgeable attorneys, research centres or creative knowledge sources, firms, and to varying degrees public support services (Cooke et al., 2002). Although the importance of a strong local customer base and local competition has been highlighted (Nachum and Keeble, 2002), Wolfe and Gertler (2004) find that these things are not as important as previously thought, and that a large component of the knowledge inputs to local production comes from outside the region. Similarly, Madill et al. (2005a) found that the Ottawa technology cluster did not initially compete in the product market, but did compete in the labour market.

Different definitions may lead to different conclusions; however, Benneworth and Henry (2004) note that the concept of a cluster should not be considered as a singular brand, but rather as an emergent set of multiple perspectives in dialogue. Therefore, many different views may be considered valid.

2.8. Technology Clusters

This section will discuss some particular characteristics of technology (and thus KBI) clusters, as compared to clusters in general. Madill et al. (2004b) found that technology firms in clusters are less likely to use and value local linkages than are non-technology

firms in the same cluster. To explain why technology firms have fewer linkages, they suggest three possibilities. First, engineers and employees with technical backgrounds may not be good at establishing and maintaining the social ties required for networking. Alternatively, the time demands of establishing and maintaining ties may be too high for technology companies, known for their rapid growth and high rate of change. They also suggest that technologically-based firms may be more likely to develop relations with similar firms in other parts of the world than with less similar local firms. Other studies of technology firms found that global linkages were indeed at least equally, if not more, important than local linkages (Wever and Stam, 1999; Leibovitz, 2004; Simmie, 2004).

Firms in uncertain industries, such as high technology, may be more likely to cluster, since their suppliers and customers are unstable, and clustering allows them to more easily use shifting combinations of partners with fewer transaction costs (Maskell and Lorenzen, 2004). One idea on technology cluster formation that is present in the literature is that of an incubator organization from which the cluster grows; however, Harrison et al. (2004) note that the idea that there is a single incubator organization for technology-based firms is over-simplistic. Although there are 'magnet organizations' that attract entrepreneurs to a region, entrepreneurs are spatially mobile during their pre-start-up life and career, and learning occurs both inside and outside of the region where it is applied. Madill et al. (2005a) also note that the collective learning that arises from the spin-off process need not be regional; people may move into or within a cluster for a variety of reasons. The literature on technology clusters emphasizes the presence of global linkages as well as the local linkages recognized in traditional cluster literature.

It is clear that there is still much to learn about technology clusters, how they form, and why they are beneficial. In fact, despite their interest in promoting clusters, the most successful high-technology clusters were not planned by governments (Bygrave and Timmons, 1992). Regions should try to upgrade the productivity of all clusters rather than trying to create 'desirable' ones (Porter, 2003); although there have been some deliberately planned high technology regions, they tend to develop slowly and painfully (Bygrave and Timmons, 1992). If technology clusters – and their benefits - were better understood, then they could be more easily promoted by governments.

This section has described some of the particularities of technology clusters, as well as differences between high technology clusters and other clusters. Many of these differences are related to the ways in which high technology firms network within a cluster. Previously in this literature review, differences between technology firms' and other firms' networks were explored; it is now important to look at how networking itself differs within a cluster.

2.9. Clusters and Networking/Social Ties

Location in a cluster is thought to facilitate networking and relationship building. By using existing relationships within the cluster to build new ones, the firm can minimize their search costs (Maskell and Lorenzen, 2004). Clusters also promote weak ties that bring down information costs for insiders within the cluster by spreading information through meetings, gossip, and direct observation (Maskell and Lorenzen, 2004), as well as through local social contacts and informal networks (Nachum and Keeble, 2002). A

mobile labour market also helps to spread information throughout the cluster (Nachum and Keeble, 2002). Proximity fosters collective learning and knowledge development by encouraging this flow of information and ideas (Nachum and Keeble, 2002). Networking and social ties are therefore very important to the concept of clusters.

Maskell and Lorenzen (2004) argue that firms tend to cluster spatially if they are a type of firm for which weak ties are important, because weak ties are sensitive to geographical distance. It has been suggested that outsider assistance leads to the development of tacit knowledge useful in business start-up (Chrisman, 1999). This may be easier to find within a cluster, due to the predominance of weak ties.

The networking benefits of proximity may be facilitated by the presence of universities and magnet organizations. Due to their production of knowledge and contributions to the labour force, research universities have been found to be an important catalyst (although not a driver) to cluster development (Doutriaux, 2003). Magnet organizations facilitate networking in two ways: by contributing to the labour force by attracting highly educated and skilled people to the region; and by providing access to key social and professional networks, thereby lending credibility to the people associated with the organization (Harrison et al, 2004). These two types of institutions allow regions to develop a diverse labour force, with ties both within and outside of the region. Both attract people, and therefore knowledge, to the region; and they provide these people with access to local networks. Both eventually send a percentage of the people they attract into the general labour force of the region where they can spread their knowledge among the other firms

for which they will work. The social ties which they bring from previous locations benefit the region by adding to the collection of weak ties available.

To maximize the benefits of cluster involvement, companies must actively establish a significant local presence, and must foster ongoing relationships with government bodies and local institutions (Porter, 1998). Getting value from being a member of the cluster requires networking among the firms (Vanhaverbeke, 2001).

2.10. Venture Capital in Clusters

This section discusses venture capital within clusters. In fact, venture capital itself may be clustered. One reason for this is the importance of contact networks and information to deal flow and investment monitoring (Florida and Kenney, 1988). Venture capital firms provide networking and referrals; they help to create a social network (Powell et al., 2002). When one venture capital firm invests in a geographic region, others notice; they monitor one another's activities. The availability of venture capital attracts entrepreneurs and high quality personnel to a region, and provides tremendous incentives for start-ups (Florida and Kenney, 1988).

Florida and Kenney (1988) found three types of venture capital complexes: technology-oriented, which are located close to concentrations of technology intensive businesses; finance-oriented, which are located around financial institutions; and hybrid complexes which mix characteristics of the other two types. Technology-oriented complexes invest most of their funds locally and attract more capital from outside the regions, while finance-oriented complexes tend to export their capital. The two types are linked, as the

finance-oriented firms often act as free riders on venture capitalists located in technology regions, but provide significant infusions of capital which allow the technology-oriented funds to expand their investments.

Local venture capital firms may be beneficial to technology clusters and important to the growth of these clusters. They provide referrals to relevant sources of expertise, and they provide legitimacy for the firms in which they invest (Powell et al., 2002). They also help to attract venture capitalists from outside of the region (Powell et al., 2002; Florida and Kenney, 1988). Location within the cluster might be important in part because financing is often based on personal ties, which are fostered in regions that allow for extensive two-way communication among the relevant parties (Powell et al., 2002). Venture capital firms may be more likely to invest within a cluster because a cluster provides a sense of legitimacy to the firms within it (Pouder and St. John, 1996); because referral networks are easier to tap into within a cluster (Harrison et al., 2004); and because cluster linkages (especially access to past employers) make due diligence easier (Harrison et al., 2004).

However, venture capital does not have to be present in order for a cluster to form. Although Florida and Kenney (1988) found that finance-oriented complexes of venture capital often exported capital to deals that technology-oriented firms had already invested in, they also exported capital elsewhere. In addition, Mason et al. (2001) describe the formation of the Ottawa cluster, with its initial lack of venture capital, and its importation of capital from other parts of Canada and from the United States. They note that there is

a need to rethink the links between geography and venture capital investment activity. The reasons that they state for this are: technology, which weakens the need for face-to-face contact; that networking is the key to finding deals, regardless of proximity; that entrepreneurs are looking over a wider area for money; and that specialist funds which focus on industry sectors are less insular with regard to geography.

This discussion on venture capital reveals two views. The first is that venture capital is easier to obtain or somehow inherently present within clusters; and the second is that local venture capital is not necessary to cluster formation because it can be obtained externally. If the first view is correct, then why? The reasons given in the literature mainly relate to networking. Earlier in this literature review, it was suggested both that networking is facilitated by being located within a cluster, and that networking may have an effect on an entrepreneur's ability to obtain venture capital.

2.11. Linkages: Internal vs. External to the Cluster

Despite the many benefits to local networking that clusters present, it is vital not to ignore the presence of external linkages within the cluster. This section examines the debate around the importance of external linkages. Several studies have found that external linkages are equally, if not more, important than internal or local linkages for firms within a cluster (Vanhaverbeke, 2001; Simmie, 2004; Leibovitz, 2004). For instance, Freel (2000) found that the most innovative firms within a cluster were more likely to have had extra-regional rather than intra-regional collaborative arrangements with suppliers and customers. Nachum and Keeble's (2002) study of Soho firms found that

global linkages were more important than local with respect to intangible assets such as knowledge. It seems clear that external sources of knowledge are important (Freel, 2000).

The concept of local dynamics as the dominant influence on the activities of firms in clusters underestimates processes taking place on wider geographic scales (Nachum and Keeble, 2002). For instance, studies on incubator organizations generally fail to take into account that many of the entrepreneurs in question originally developed their skills outside of the region, and thus, the role of national and global links is downplayed (Harrison et al., 2004). A large component of the knowledge inputs to local production are drawn from well outside the cluster (Wolfe and Gertler, 2004).

Local and global networks interact to help the firm create competitive advantages. Collective knowledge developed locally must be incorporated with the external sources of knowledge (Nachum and Keeble, 2002). Global sources of knowledge, therefore, allow firms to leverage what they already know – the ‘cluster knowledge’ - into a true advantage. There is a constant tension between local and non-local relationships, which has been described as ‘the dynamic tension that exists between local buzz and global pipelines’ (Wolfe and Gertler, 2004, p.1089). This suggests that external linkages add to, rather than supplant, internal linkages; they add to the benefits of being in the cluster. If this is so, then firms located in a cluster may have a net advantage over un-clustered firms when it comes to networking, even in terms of external relationships.

Others put less weight on the advantages of being in a cluster. Freel (2000) stated that proximity was not a necessary condition for co-operation. Leibovitz (2004) noted that the key drivers that influence biotechnology firms tend to be non-local by nature, and that the role of localized relationships is overemphasized in cluster discussions about this type of firm. Direct competitors, customers, and venture capital were often international, and clustering in his study was mainly related to such benefits as reduced transportation costs. Simmie (2004) states that, without an outward orientation, clustered firms are liable to fail. He cites examples of entire clusters that have ceased to exist.

It is clear that clustered firms benefit from external linkages. Innovative, successful, firms are marked not only by the frequency and duration, but also by the geographic reach of their networks (Freel, 2000). However, the question remains as to whether firms located in a cluster have a net advantage over other firms. Some researchers feel that the benefits of external linkages are complementary to and enhance the value of internal linkages; while others find the local linkages to be relatively insignificant. Do external linkages make firms in clusters more competitive by enhancing the benefits of being in a cluster, or are external linkages simply more important than internal linkages? If the latter is the case, than any firm with geographically diverse linkages should do equally well (controlling for all other factors), regardless of whether they are located within or outside of a cluster. On the other hand, if the former is true, then clustered firms with external linkages may have a net competitive advantage over other firms, regardless of the amount of networking the un-clustered firms do.

2.12. Implications and Limitations

If location in a cluster gives firms a net advantage, and if networking makes access to venture capital easier, then firms within a cluster should be able to obtain venture capital more easily than firms located outside of clusters, regardless of the extent of their social ties. If networking is the key to obtaining venture capital, firms with good networks of social ties should be able to do so. On the other hand, the legitimizing effects of clusters and the improved internal networks might give clustered firms an advantage. If firms located in a cluster have a net competitive advantage over other firms, they may also have a net advantage in terms of access to capital. Does a firm with a geographically diverse network have the same ability to access capital regardless of whether they are located within a cluster or outside of one?

This literature review brings forward a number of questions. Many of the studies on which it is based are contradictory. For example, networking may not improve access to venture capital. Clusters may not give firms a net competitive advantage.

This literature provides a well balanced, complex, and interesting background for the study. However, although many studies provide an intersection of two or three of the areas discussed in this review, no studies appear to provide an intersection between four topics in literature which seem to be related, namely: the venture capital literature, the cluster literature, the general networking literature, and the social capital literature. Therefore, it is clear that a study which looked at the intersection of these four topics would be a contribution to knowledge.

3. Research Premise

3.1. Research Objectives

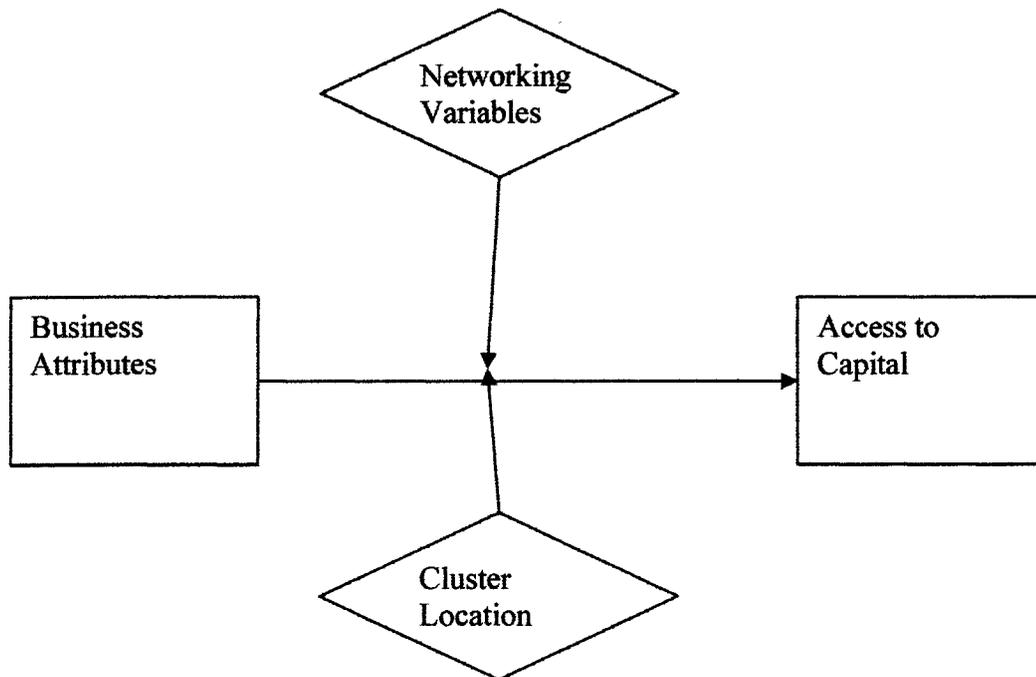
A number of studies have been done in the areas of venture capital, technology clusters, networking, and social capital. However, no studies appear to provide an intersection between these four related topics. Research on the financing of businesses could benefit from a comparison of companies within and outside of Canadian KBI clusters. Cluster literature agrees, for the most part, that cluster location provides advantages. Whether or not these advantages affect access to venture capital, and why, needs to be more clearly understood. The objectives of the study proposed here are as follows:

1. To determine, using a quantitative analysis, the networking differences between KBI firms within clusters and KBI firms that are not located in clusters;
2. To determine whether there are differences between KBI firms within clusters and firms outside of clusters in terms of their propensity to seek formal and informal venture capital, and in terms of the likelihood that they receive this financing;
3. To qualitatively explore whether firms with more weak ties and greater trust within their networks are more or less likely to seek and receive financing;
4. To qualitatively explore the consequences of networking differences between clustered and non-clustered KBI firms in terms of venture financing;
5. To explore whether, given similar KBI firms with similar networks of social ties from within and outside of clusters, the clustered KBI firms will be more likely to have sought and received venture financing;
6. To provide a basis for future research that will use the results to ask deeper questions about the advantages of clusters for Canadian businesses.

3.2. The Model

Propositions can be made to support the research objectives, following a research model that assumes that venture capital investments are made based on the attributes of a firm. The business attributes are therefore the independent variables that predict access to capital. However, the research model suggests two moderating variables: networking; and cluster location. These variables will affect the relationship between the dependent and independent variables:

Figure 1: The Model



3.3. Propositions

The purpose of this study is to provide a link between the networking and social capital literatures; the venture capital literature; and the cluster literature. The literature reviewed above was used to guide this study. The following propositions were developed based on this literature. Each set of propositions is linked with one of the research objectives described previously.

Research objective one:

Proposition 1: KBI firms within clusters are more likely to have weak links in their networks (i.e. more links, but less frequent interaction with each) than do firms outside of clusters.

Proposition 2: KBI Firms outside of clusters are more likely to have strong links in their networks (i.e. fewer links, but more frequent interaction with each) than do firms within clusters.

Proposition 3: The networks of KBI firms within clusters are characterised by more trust than those of firms outside of clusters.

Note: The research on trusted ties is not linked with the research on clusters. However, since weak ties are preferable if trust is present, and since cluster literature indicates that more weak ties are present within clusters, then it may follow that this is due to an increased level of performance-based trust between firms located in clusters.

Research objective two:

Proposition 4: KBI firms within clusters are more likely to seek equity financing than firms outside of clusters.

Proposition 5: KBI firms within clusters that seek venture capital are more likely to receive financing than firms outside of clusters that seek venture capital.

Research objective three (qualitative research):

Proposition 6: KBI firms with weak ties (i.e. more links, but less frequent interaction with each) are more likely to receive financing than KBI firms with strong ties (i.e. fewer links, but more frequent interaction with each).

Proposition 7: KBI firms whose networks are characterized by higher levels of trust are more likely to receive financing than KBI firms with lower levels of trust within their networks.

Note: These questions must be answered qualitatively because of the timeframe. The level of networking and characteristics of social ties that are of interest in this case are those *at the time of* access to capital. This may require some prompting and relies on the memory of the interviewee. If the capital was received more than a year or two in the past, it is unlikely that such a question could be answered accurately enough for quantitative analysis. However, qualitative analysis may provide enough confident responses to give some indication of the relationship in question.

Research objectives four and five (qualitative research):

Proposition 8a: Comparing similar KBI firms with similar networks of social ties from within and outside of clusters, the clustered KBI firms will be no more likely to have received financing.

Proposition 8b: Clusters provide a net advantage to KBI firms in terms of access to capital that is not explained by networking.

Note: Propositions 8a and 8b are contradictory. Some of the literature supports the idea that it is improved networking, not some net advantage of clusters, that allows clustered firms to have better access to capital (8a). For instance, some researchers found external linkages to be so important that the local linkages (unique to the cluster) were thought to be relatively insignificant. This suggests that any firm with diverse linkages should do equally well (controlling for all other factors), regardless of whether they are located within or outside of a cluster. On the other hand, some research seemed to support the idea of a net advantage for clusters (8b). For instance, clusters might have legitimizing effects, and the improved internal networks might give clustered firms an advantage by better assimilating knowledge, providing an increased source of competitive advantage over un-clustered firms, regardless of the amount of networking they do. If firms located in a cluster have a net competitive advantage over other firms, they may also have a net advantage in terms of access to capital.

Research objective six:

This research objective cannot be linked to a proposition. However, it suggests a general research question for the qualitative interviews:

Can some exploratory explanations be given for the result of propositions 8a and 8b, or to further describe the financing process within clusters?

4. Methodology

4.1. The Research Concept

The research combines quantitative and qualitative approaches; however, the focus is on exploratory qualitative interviews. It involves a number of KBI companies both within and outside of Canadian technology clusters. The locations were determined based on previous work that has identified Canadian technology clusters. Additionally, this map was verified and enhanced by superimposing it with the postal codes of a number of Canadian KBI companies. This is designed to further support the clusters found in previous studies and to ensure that none were overlooked.

In the initial stage of the research, the database of companies was built. The industries were limited by NAICS code to include only Knowledge Based Industries (KBIs) as defined by Industry Canada. Four categories of firms were required for this study. These are: firms located within a cluster, which have obtained venture capital; firms located within a cluster which have tried but failed to obtain venture capital; un-clustered firms which have obtained venture capital; and un-clustered firms which have failed to obtain venture capital.

Following this stage, short questionnaires were sent via fax to the companies. One purpose of the surveys was to get respondents to agree to a further interview. Additionally, the surveys asked questions about the business and questions regarding current networking practices. Respondents were asked to indicate whether or not the business had ever applied for formal or informal venture capital and whether this was obtained. The purpose of this was to allow several initial questions to be considered. The first concerns the differences between networking within and outside of clusters. The second considers the effect of cluster location on access to capital. The results of the questionnaire were intended to be categorized into the four segments described above, and analyzed using SPSS. This was not possible due to a low response rate, which will be further explained in section 5.1. However, a secondary database based on a Statistics Canada, Industry Canada, and Finance Canada telephone survey of Canadian SMEs was obtained and analyzed to allow some quantitative questions to be answered.

As mentioned above, the questionnaires asked for participation in a follow up interview via telephone. A limit of thirty interviews was decided on in advance. This research is exploratory, and considered the company *at the time of application for venture capital*, rather than at the present time. This is because it is really the networks of the company at that time that are relevant to whether or not they were able to access capital. Hence, the link between networking and access to capital is considered in these interviews. The interviews explored differences in networking practices between companies located inside and outside of clusters in relation to their access to capital. Ways in which

clusters are perceived as supporting or inhibiting access to capital were also considered. How companies have contacted any suppliers of capital, and how this is affected by their networking characteristics and their location within a cluster were explored. Briefly, these interviews asked the participant to describe what happened when they sought venture capital (regardless of the outcome).

The quantitative approach (using the secondary database) allowed some questions to be answered empirically. The result described differences in access to capital between firms located in clusters and firms which are not located in clusters. The follow-up qualitative research allowed for some exploratory examinations of possible reasons for these differences, including interactions between networking and access to capital at the time of application, thus providing a clearer basis for follow-up research on the topic.

This study considers some basic questions about the role that clusters play in networking and access to capital. The results will provide a basis for further studies on these topics, which will be better able to explore how clusters benefit companies.

4.2. Definition of Concepts

4.2.1. Technology Clusters & Un-Clustered Firms

Two Canadian studies (Wolfe, 2004; Doutriaux, 2003) have been used to identify the main technology clusters located in Canada. In addition, a recent book (Wolfe and Lucas, 2004) discussing several Canadian clusters was referred to. While it does not claim to have a comprehensive list, it was used as a check for missing clusters. The following list resulted:

Table 1: List of Canadian Clusters from Literature

Cluster Type	Cluster Location
Biotech/Biomed/Health Sciences	Montreal, Toronto, Vancouver, Ottawa, London, Saskatoon, Halifax, Edmonton, Winnipeg, Quebec City
Software/IT/Telecom/Photonics/Wireless/e-Commerce	Vancouver, Calgary, Waterloo, Ottawa, Quebec City, New Brunswick, Cape Breton, Toronto, Montreal, Edmonton, Winnipeg, Saskatoon, Halifax
Aerospace	Montreal, Edmonton, Winnipeg
Multimedia	Montreal, Toronto, Vancouver, Edmonton
Energy/Environmental	Vancouver, Winnipeg, Halifax, Calgary
Electronics	Edmonton

To further verify that the identified clusters were correct, this map was superimposed with the postal codes of a number of Canadian KBI companies. The postal codes in question came from an Industry Canada, Finance Canada, and Statistics Canada joint survey about the financing experience of Canadian SMEs, called *the Survey of Financing of Small- and Medium-Sized Enterprises*. To determine which postal codes belong to technology companies, the recommended NAICS codes used to identify Tier I Knowledge Based Industries (KBI) according to Industry Canada (Clendenning, 2000)

were used. The complete process that was used to identify the clusters is described in Appendix One. This analysis produced the following list of clusters:

Table 2: Summary List of KBI Clusters

<i>Industry</i>	<i>Regions</i>
Machinery Manufacturing	Quebec City, Lindsay, St. Catharines, Greater Toronto Area, Winnipeg, Prince Albert, Lloydminster, Quesnel
Computer and Electronic Product Manufacturing	Halifax, Quebec City, Montreal, Ottawa/Gatineau, Toronto Corridor, Brooks, Edmonton
Electrical Equipment, Appliance and Component Manufacturing	Montreal, Drummondville, Toronto Corridor, Calgary
Transportation Equipment Manufacturing	Montreal, Ottawa/Gatineau, Toronto Corridor, Uxbridge, Toronto, Vancouver, Victoria
Publishing Industries	Montreal, Drummondville, Toronto Corridor
Motion Picture and Sound Recording Industries	Montreal, Toronto Corridor, Winnipeg, Calgary, Edmonton, Vancouver
Broadcasting and Telecommunications	Truro, Riviere-Du-Loup, Montreal, Niagara Falls, Medicine Hat
Information Services and Data Processing Services	St Johns, Ottawa/Gatineau, Toronto Corridor, Edmonton, Vancouver
Professional, Scientific and Technical Services	St Johns, Truro, Halifax, Charlottetown, Moncton, Edmundston, Quebec City, Sept-Iles, Montreal, Sherbrooke, Ottawa/Gatineau, Kingston, Cobourg, St. Catharines, Newmarket, Toronto Corridor, Guelph/Cambridge/Kitchener/Waterloo Triangle, Leamington, Sudbury, Timmins, Winnipeg, Regina, Saskatoon, Medicine Hat, Calgary, Edmonton, Grande Prairie, Vermilion, Dawson Creek, Kelowna, Kamloops, Prince George, Vancouver, Straits of Georgia Region, Victoria, Nanaimo, Yellowknife, Whitehorse

Any KBI firm that does not fall within one of the clusters identified using the Industry Canada data, or within one of the clusters from literature, was considered an un-clustered firm for the purpose of this research. Any KBI firm that does fall within one of the

clusters corresponding to its NAICS code or industry type was considered as a clustered firm.

4.2.2. Access to Formal and Informal Venture Capital

Venture capital is defined in terms of both formal and informal venture capital. All participants were asked whether they had ever tried to obtain venture capital. The access to capital variable has two potential values: yes and no. An answer of yes indicates that a company tried to obtain risk capital and succeeded. An answer of no indicates that a company tried to obtain risk capital and failed.

4.2.3. Access to Other Types of Capital

Some of the respondents will not have tried to obtain risk capital. Thus, in addition to considering firms which have tried to obtain only risk capital, access to other types of capital will also be considered. Although this is not the focus of the study, these responses may still lend further insight to the research. As with risk capital, this variable may have one of two values: yes, if capital is received; no, if it is not received.

4.2.4. Networking and Social Capital

This concept is related both to the questionnaire and to the qualitative interviews which took place in the latter half of the research. As such, this concept must be clearly understood conceptually. Networking is defined as comprising all of the relationships in which an entrepreneur participates (Dodd and Patra, 2002) or as the relationships or businesses that influence the functioning of the firm (Schutjens and Stam, 2003). Chell and Baines (2000, p. 196) note that “networking comprises social process over and above the normal economic trading relationship.” Social capital, the set of resources that accrue

to actors through the social structure, facilitating the attainment of the actors' goals (Gabby & Leenders, 1999 in Greve and Saliff, 2003, p. 2) is acquired through networking.

Three dimensions of social capital are of interest. These are the strength of the social ties, the density of the network, and the value or trust put on the relationship. Following Dodd and Patra (2002), strong ties will be defined as those with whom the entrepreneur interacts at least twice a week; whereas weak ties will be those enacted at least once a year, but less than twice per week. As such, frequency of interaction will be measured.

Density of the network is likely to be related to the strength of ties. Since network density measures the proportion of network contacts who also know each other (Dodd and Patra, 2002), and the degree of overlap of two individuals' friendship networks varies directly with the strength of their ties to one another (Granovetter, 1973), the frequency measure for strength of ties above can also be used as a proxy for network density.

The third dimension involves the value or trust put on the relationship. Trust has been highlighted in the literature on technology firms, showing that firms that value complex, tacit knowledge (such as technology firms) should value trusted ties the most, regardless of the strength of the tie. Therefore, this dimension will be referred to as trust.

Survey respondents were asked to rate the frequency of their interactions with each of their social ties, as well as the level of trust that they have with each of them. The

method followed a previous study by Madill et al. (2004b) which evaluated entrepreneurs' networks on frequency and value, as well as the questionnaire used by Dodd and Patra (2002). A similar method was used verbally with the interview respondents.

4.2.5. The Measurement of Business Characteristics

The literature on access to capital shows that business characteristics such as industry, age of firm, and size of firm are related to their likelihood of receiving financing (Madill et al., 2005a; Haines et al., 1999). Therefore, these factors must be known in order to determine networking and cluster effects on access to capital. Industry was limited by the initial data, as described above, using the KBI Tier One NAICS codes (Clendenning, 2000). The rest of the measures were defined and measured following Madill et al. (2004b) and Menard (2003). Thus, size of firm was measured by the number of employees, and age of firm was calculated by determining the date that the firm was founded.

4.3. Research Design

4.3.1. The Survey and Interview Database Construction

A database was constructed from which the contact information for conducting the surveys and qualitative interviews was drawn. The database was constructed in such a way that it contained the four categories of firms described above, namely: firms located within a cluster, which have obtained venture capital; firms located within a cluster which have tried but failed to obtain venture capital; un-clustered firms which have obtained venture capital; and un-clustered firms which have failed to obtain venture capital.

Before being entered into the database, firms were sorted by NAICS code. Only firms in the KBI Tier One grouping were included, as described above.

The database was obtained using two sources. The first source was derived from a commercial database purchased from *The Ottawa Business Journal*, which provides an industry classification for each firm. This source was recently used in a previous study of the Ottawa technology cluster (Menard, 2003). It provided data on clustered firms which have and have not received venture capital. It also easily allowed both industry and location within the cluster to be identified.

The second source provided data on firms that are not located in a cluster (and have or have not obtained venture capital), and on some firms that are located in a cluster. A list of firms was obtained from Dunn and Bradstreet. This list contained headstone data on the firms and was sorted into clustered and un-clustered firms by postal code. Both clustered and un-clustered firms were sent questionnaires. Some of the un-clustered firms had tried and failed to obtain venture capital, providing a sample that falls with the last category of firm described above.

4.3.2. The Survey

Questionnaires were sent to the companies in the database. One purpose of the survey was to obtain a screened sample for qualitative interviews. An additional purpose of the questionnaire was to study the differences in networking between clustered and un-clustered firms (propositions 1-3); and to study the effect of clusters on access to formal and informal venture capital (propositions 4 and 5).

The survey instrument asked respondents about business indicators, the frequency of networking, the level of trust in their networking links, and whether or not they had applied for and accessed venture capital. As described in section 4.2 above, the questions themselves followed a study by Madill et al. (2004b), as well as the *Survey of Financing of Small- and Medium-sized Enterprises*. One question was also designed using the questionnaire designed by Dodd and Patra (2002) as a guide. Each survey questionnaire was accompanied by a fax cover sheet, a personalized introductory letter and a generic description of the research. This survey package is found in Appendix Two. Respondents were asked if they would agree to participate in a follow-up telephone interview. If they agreed to participate, they will be offered access to a copy of the final research via a password-protected website.

4.3.3. The Telephone Interviews

Telephone interviews were run with survey respondents who agreed to participate in the second part of the study. In other words, the interview respondents were individuals who had already answered the questionnaire, and had then agreed to participate in a further interview via telephone. The number of qualitative interviews was limited to thirty. Fewer than thirty actually agreed to participate so this limit did not pose a problem. The interviews were used to add insight to propositions 1-3 and also studied the effect of networking on access to capital (propositions 6 and 7). The interviews also examined the differences in networking practices between companies located inside and outside of clusters in relation to their access to capital (propositions 8a and 8b). Participants were asked to describe how they contacted any suppliers of venture capital, and what occurred

as a result. They were also asked questions that were meant to further describe the financing process within clusters (following research objective 6). The interview script is found in Appendix Three.

The goal of the qualitative interview process was to provide exploratory data concerning the differences in networking practices within clusters and outside of clusters, and to examine how this might affect access to capital. Since they are qualitative and exploratory, they do not provide definitive answers. However, they can act as a basis for further study, by suggesting directions for future empirical research.

4.3.4. The Secondary Database

The results of the *Survey of Financing of Small- and Medium-sized Enterprises* were also available for this research. They were used as a secondary source to allow for further testing of propositions 4 and 5. This database is made up of survey data obtained via a large-scale telephone survey conducted by Statistics Canada (in conjunction with Industry Canada and Finance Canada) in 2002. The survey is representative of the approximately 1.2 million Canadian SMEs and comprises 3,842 cases. Its estimates of proportions are accurate to 0.008 (0.8%) 19 times out of 20 and it boasts a 66 percent response rate. The results are such that they allowed for statistical tests to be performed as regards seeking and receiving equity and other types of financing.

4.4. Analysis Procedures

4.4.1. The Quantitative Analysis

It was intended that propositions one, two and three would be tested using a series of t-tests to measure differences between clustered and un-clustered firms, as was done by Madill et al., (2004a) to compare two different groups' networking frequencies and values.

Proposition four and five test a part of the model; they examine the moderating effect of cluster location on access to capital. In both cases, the dependent variable of interest (access to capital - in the former case 'seeking' and in the latter 'receipt') is dichotomous: yes or no, represented by 0 or 1. The covariate is cluster location, which is also dichotomous. Specifically, for each of the two propositions, this would have tested to what degree location in or out of a cluster is a predictor of seeking or receiving venture capital.

These tests were not, in the end, carried out, for reasons explained in detail in the next section.

4.4.2. The Secondary Data Analysis

An examination of propositions 4 and 5 was done via t-test comparing clustered versus un-clustered firms within the secondary database. The intention is to determine whether there are differences in terms of the propensity to seek equity capital or the actual receipt of equity capital between clustered and un-clustered firms. This was also be done for other types of capital for comparison.

4.4.3. The Qualitative Analysis

The qualitative analysis examines propositions 1, 2, 3, 6, 7, 8a and 8b, as well as the further research question described above. Qualitative data from the interviews were classified and compared using the NVIVO program. It was expected that major concepts would be highlighted based on the interviews. Similar firms with similar networks of social ties from both within and outside of clusters were qualitatively compared to see if they would be equally likely to have received capital or if the likelihood differs depending on cluster location. Similarities and differences between firms located within technology clusters and firms not located in clusters were revealed by this qualitative analysis.

5. Analysis

This section will report on the results of the research. The first section will examine the survey results and consider explanations for these based on literature. The second section will look at the Industry Canada database results, comparing the demographics of clustered versus non-clustered firms, and testing research proposition 4 and 5. Lastly, the qualitative interviews will provide some insight based on the research propositions and the quantitative results.

5.1. Survey Results and Analysis

The database, which was created from the purchased D&B information and the Ottawa Business Journal database, contained a total of 2679 firms. As outlined in the methodology, the survey was faxed to respondents. A progress check was performed

after 300 faxes had been sent. At this juncture, 197 of the faxes (65.7%) had actually been received. The remaining firms were unreachable in that they either had no fax number (in the case of the OBJ firms), the firm's fax number was no longer in service, or the faxes bounced back. After one week, firms from whom no response had been received were telephoned. If the owner was not available a message was left. After these attempts, only six completed surveys had been returned. This represents an approximate response rate of three percent. This is very low and suggests the presence of a response bias.

At this point, the survey and cover letter were modified in the hopes that this would improve the response rate (See Appendix Four). An additional 700 surveys were sent out per the intended methodology. Unfortunately, including the original six, only 32 completed surveys were returned at this time. The response rate remained at less than five percent. This meant that, for quantitative purposes, the survey results were unusable. Hence, the process was discontinued at this time.

An explanation for this non-response phenomenon has been suggested by several authors. Porter (2004) notes that survey non-response has become a serious problem for academic researchers, since as the demand for survey research has increased, the response rates have been falling. He adds that this is due at least in part because refusals to participate are increasing, and not just due to increased difficulty in contacting people. Even in 1980, Sosdian and Sharp were indicating that, although more research was needed, some researchers were citing respondent resistance as "a widespread and serious phenomenon"

(pg 396). Over-surveying and the resulting decline in response rates may have had an effect in this study.

Baruch (1999) indicated that top managers such as CEOs, managing directors, etc. were less likely to answer questionnaires than other populations of individuals and thus, surveys directed to them often have lower response rates. Since these were the population at which this study was directed, this may have contributed to a lower response rate.

5.2. Industry Canada Database Results

Using the Industry Canada database described in the methodology section, research question two (propositions 4 and 5) could still be examined. This question attempted to determine whether KBI firms within clusters are more likely to apply for or receive formal or informal venture capital than firms outside of clusters.

First, this section compares the demographics of clustered vs. non-clustered KBI firms and descriptive statistics are examined. Secondly, some observations are made about these two groups based on the preliminary comparison. Lastly, the propositions arising from research question two are tested statistically.

5.2.1. Demographic Comparison of Clustered and Un-clustered KBI Firms

In the sample of 466 firms in the database that were classified by Industry Canada as participating in the Tier I Knowledge Based Industries (referred to as KBI firms), 88 were not located in a cluster and 378 were located in a cluster. Since this sample is

supposed to be representative of the population of Canadian SMEs, this suggests that more Canadian KBIs are located in clusters than are not located in clusters. First, an exploration was made to see whether these firms differed demographically as well as in location.

This research study is concerned with the networking and financing differences between clustered and un-clustered KBI firms. However, before comparing these two samples, it is important to look at their salient attributes in order to determine whether or not they are well matched and provide a reasonable basis for comparison. Literature on business financing generally lists size, sector and age of firm to be important variables in predicting access to capital (Madill et al., 2005a; Haines et al., 1999). In addition, some authors have considered owner attributes such as gender and relevant experience. For instance, Greene et al (2001) speculated that gender might have an effect on financing, and Buttner and Rosen (1992) suggest that business experience may influence financing decisions. Sector has already been controlled in this study. This section thus compares size, age, gender, and relevant experience (for which education and years of industry experience are proxies) between the two samples.

Age and Size of Firm:

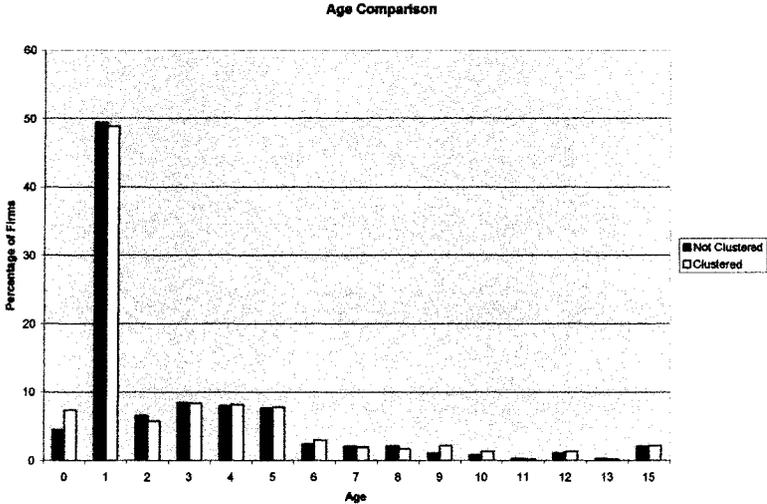
There are fifteen different ages represented within the sample. The following tables show the number and percentage of clustered and un-clustered firms in each age category:

Table 3: Comparison of the Age of Firms, by Number and Percentage

Age of firm * cluster Crosstabulation					Age of firm * cluster Crosstabulation				
Count		cluster		Total		cluster		Total	
		Not In a Cluster	In a Cluster			Not In a Cluster	In a Cluster		
Age of firm	.00	4	28	32	Age of firm	.00	4.5%	7.4%	6.9%
	1.00	41	186	227		1.00	46.6%	49.5%	48.9%
	2.00	2	25	27		2.00	2.3%	6.6%	5.8%
	3.00	7	32	39		3.00	8.0%	8.5%	8.4%
	4.00	8	30	38		4.00	9.1%	8.0%	8.2%
	5.00	7	29	36		5.00	8.0%	7.7%	7.8%
	6.00	5	9	14		6.00	5.7%	2.4%	3.0%
	7.00	1	8	9		7.00	1.1%	2.1%	1.9%
	8.00	0	8	8		8.00		2.1%	1.7%
	9.00	6	4	10		9.00	6.8%	1.1%	2.2%
	10.00	3	3	6		10.00	3.4%	.8%	1.3%
	11.00	0	1	1		11.00		.3%	.2%
	12.00	2	4	6		12.00	2.3%	1.1%	1.3%
	13.00	0	1	1		13.00		.3%	.2%
	15.00	2	8	10		15.00	2.3%	2.1%	2.2%
Total		88	376	464	Total		100.0%	100.0%	100.0%

Graphically represented, this leads to the following:

Figure 2: Bar Graph of Age Comparison, Clustered vs. Un-Clustered



From this graph, it is clear that the two samples do not differ substantially in terms of the number of firms within each age category.

Firm size is represented by the number of full-time employees, and has been divided into six different categories. The following tables show the number and percentage of clustered and un-clustered firms in each size category:

Table 4: Comparison of the Size of Firms, by Number and Percentage

Size of firm, categorized by N of employees * cluster Crosstabulation

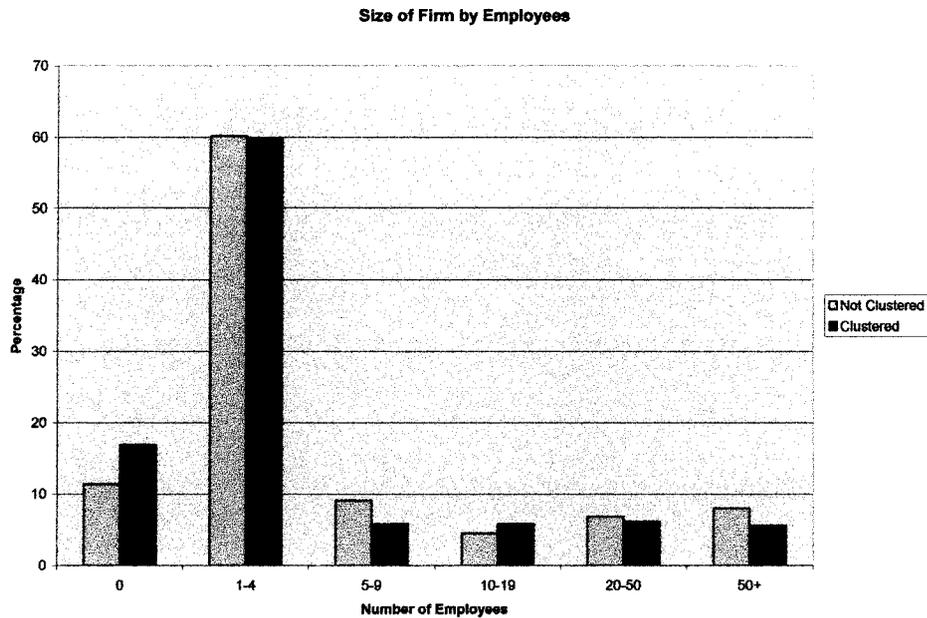
Count		cluster		Total
		Not in a Cluster	In a Cluster	
Size of firm, categorized by N of employees	No Employees	10	64	74
	1 to 4	53	226	279
	5 to 9	8	22	30
	10 to 19	4	22	26
	20 to 50	6	23	29
	More than 50	7	21	28
Total		88	378	466

Size of firm, categorized by N of employees * cluster Crosstabulation

% within cluster		cluster		Total
		Not in a Cluster	In a Cluster	
Size of firm, categorized by N of employees	No Employees	11.4%	16.9%	15.9%
	1 to 4	60.2%	59.8%	59.9%
	5 to 9	9.1%	5.8%	6.4%
	10 to 19	4.5%	5.8%	5.6%
	20 to 50	6.8%	6.1%	6.2%
	More than 50	8.0%	5.6%	6.0%
Total		100.0%	100.0%	100.0%

These tables lead to the following bar graph:

Figure 3: Bar Graph of Size Comparison, Clustered vs. Un-Clustered



This chart shows some slight differences between the two samples. However, as in the age chart, there seems to be little substantial difference between the samples with respect to the number of firms in each category. In order to determine whether the small differences that do exist are significant, t-tests of the means were performed.

Table 5: Summarized Group Statistics for Size and Age of Firm

		Group Statistics			
	cluster	N	Mean	Std. Deviation	Std. Error Mean
Size of firm, categorized by N of employees	Not In a Cluster	88	2.5909	1.39487	.14869
	In a Cluster	378	2.4101	1.31654	.06772
Age of firm	Not In a Cluster	88	3.5000	3.53960	.37732
	In a Cluster	376	2.7367	3.04672	.15712

Table 6: T-test of the means for Size and Age of Firm, Clustered vs. Un-Clustered

		Independent Samples Test									
		Levene's Test for Equality of Variances		t-test for Equality of Means						95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper	
Size of firm, categorized by N of employees	Equal variances assumed	1.005	.317	1.148	464	.252	.18086	.15781	-.12885	.49057	
	Equal variances not assumed			1.107	125.581	.270	.18086	.16339	-.14249	.50420	
Age of firm	Equal variances assumed	5.320	.022	2.049	462	.041	.76330	.37248	.03133	1.49527	
	Equal variances not assumed			1.867	118.958	.064	.76330	.40873	-.04603	1.57263	

There is a difference in average age, but it is not significant at the 5% level (having a p-value of 0.064). The means of 2.7 and 3.5 years are not materially different, and the bar graph exhibited no difference within each category for practical purposes. The samples exhibit no significant differences in terms of average firm size, which did show slight differences in the bar graph. It appears to be safe to assume that the two categories of firms are well matched in terms of the classic predictors of access to capital: age, size and sector (which was controlled).

Owner Attributes

As noted above, some authors have identified owner attributes as being potential predictors of financing. Thus, these attributes will also be compared for the two samples.

The following four tables and related graphs compare the gender of ownership, the college or university education of the owner, and the years of industry experience that the primary owner has obtained. The table and graph comparing gender show the percentage of firms that are primarily men-owned, the percentage that are equally owned by men and women, and the percentage that are primarily women-owned:

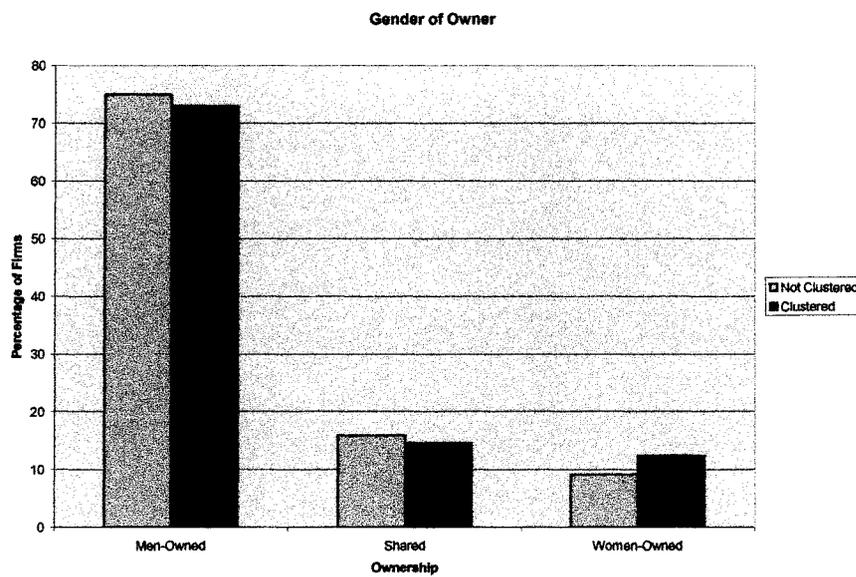
Table 7: Comparison of the Gender of Firm Owners, by Percentage

Gender of Ownership * cluster Crosstabulation

% within cluster

		cluster		Total
		Not in a Cluster	In a Cluster	
Gender of Ownership	Men-Owned	75.0%	73.0%	73.4%
	Equally shared ownership	15.9%	14.6%	14.8%
	Women-Owned	9.1%	12.4%	11.8%
Total		100.0%	100.0%	100.0%

Figure 4: Bar Graph of Gender Comparison, Clustered vs. Un-Clustered

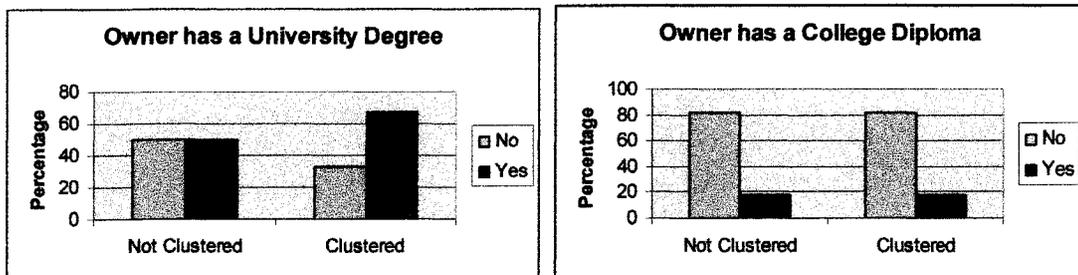


Education can be taken as a proxy for relevant experience. The following two sets of tables and graphs examine the likelihood that the business owner has a university degree or a college diploma, between clustered and un-clustered firms:

Table 8: Comparison of the Education Level of Firm Owners , by Percentage

Crosstab					Crosstab				
% within cluster		cluster		Total	% within cluster		cluster		Total
		Not In a Cluster	In a Cluster				Not In a Cluster	In a Cluster	
Has University degree	No	50.0%	32.3%	35.6%	Has college diploma	No	81.8%	81.5%	81.5%
	Yes	50.0%	67.7%	64.4%		Yes	18.2%	18.5%	18.5%
Total		100.0%	100.0%	100.0%	Total		100.0%	100.0%	100.0%

Figure 5: Bar Graphs of Education Level Comparison, Clustered vs. Un-Clustered



It is fairly clear from these graphs that, while the percentage of people having a college diploma does not differ substantially, there is a big difference in the percentage having a university degree.

Lastly, the table and graph showing years of industry experience, another proxy for relevant experience, give the percentage of firms in each of five categories:

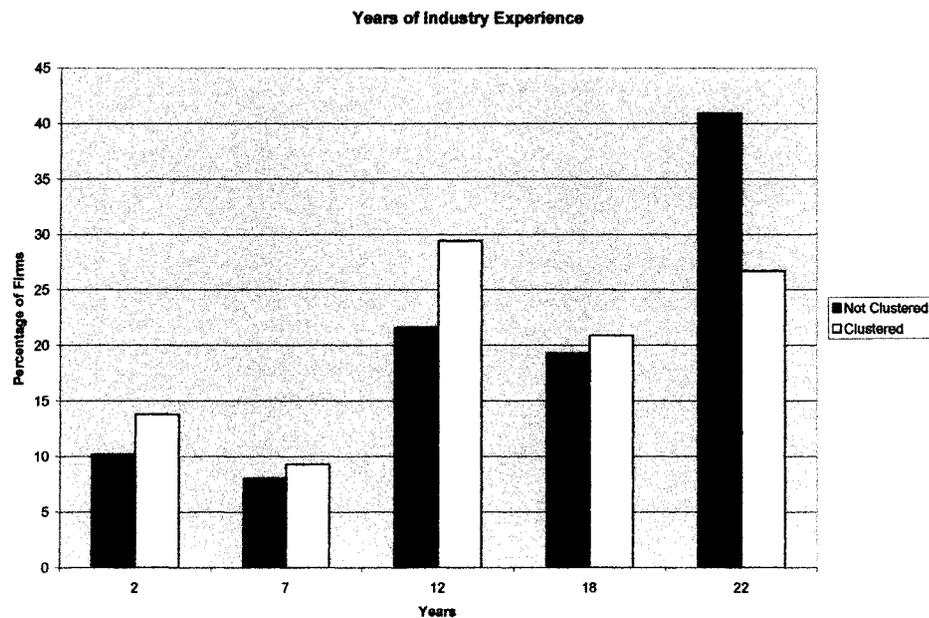
Table 9: Comparison of the Industry Experience Obtained by Firm Owners , by Percentage

Years of Industry Experience * cluster Crosstabulation

% within cluster

		cluster		Total
		Not in a Cluster	In a Cluster	
Years of Industry Experience	2.00	10.2%	13.8%	13.1%
	7.00	8.0%	9.3%	9.0%
	12.00	21.6%	29.4%	27.9%
	18.00	19.3%	20.9%	20.6%
	22.00	40.9%	26.7%	29.4%
Total		100.0%	100.0%	100.0%

Figure 6: Bar Graph of Years of Industry Experience, Clustered vs. Un-Clustered



The percentage of firms in each of the gender categories appears to be very similar across the three samples. However, both the amount of education and the amount of industry experience look like they may differ.

In order to determine whether these differences are significant, t-tests of the means were performed for the two experience proxies: education and industry experience.

Table 10: Summarized Group Statistics for Education Level of Firm Owner

Group Statistics

Cluster		N	Mean	Std. Deviation	Std. Error
Has University degree	Not in a Cluster	88	.5000	.50287	.05361
	In a Cluster	378	.6772	.46815	.02408
Has college diploma	Not in a Cluster	88	.1818	.38790	.04135
	In a Cluster	378	.1852	.38896	.02001

Table 11: T-test of the means for Education Level, Clustered vs. Un-Clustered

Independent Samples Test

		Levene's Test for Equality of Variances		T-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Has University degree	Equal variances assumed	12.59	.00	-3.15	46	.00	-.1772	.0562	-.2876	-.0668
	Equal variances not assumed			-3.01	124.44	.00	-.1772	.0587	-.2836	-.0608
Has college diploma	Equal variances assumed	.02	.88	-.07	46	.94	-.0033	.0460	-.0937	.0870
	Equal variances not assumed			-.07	130.84	.94	-.0033	.0458	-.0942	.0875

As expected, there is no significant difference for a college diploma but there is for the university degree. Above, it was determined that knowledge-based firms are more likely to be in clusters, and this t-test shows that the percentage of owners that are university educated is higher in clusters. These may be related.

Table 12: Summarized Group Statistics for Years of Industry Experience

Group Statistics					
cluster		N	Mean	Std. Deviation	Std. Error Mean
Years of Industry Experience	Not In a Cluster	88	15.8295	6.77762	.72250
	In a Cluster	378	14.0873	6.78822	.34915

Table 13: T-test of the means for Industry Experience, Clustered vs. Un-Clustered

Independent Samples Test											
		Levene's Test for Equality of Variances		t-test for Equality of Means						95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper	
Years of Industry Experience	Equal variances assumed	.003	.954	2.169	464	.031	1.74224	.80322	.16384	3.32064	
	Equal variances not assumed			2.171	130.734	.032	1.74224	.80244	.15480	3.32969	

There is a significant difference at the 5% level in the years of industry experience.

5.2.2. Observations and conclusions based on preliminary profile comparison

Although the sample appears relatively well matched in terms of the traditional determinants of financing of size, sector and age, there does seem to be a difference in the experience of firm owners between clustered and un-clustered firms. This may suggest that owners of firms in clusters are more educated and start their businesses sooner (i.e. with less industry experience). These factors may contribute to financing differences. Alternatively, however, the two 'experience' factors may simply substitute for one another in the different environments and not have much effect on financing. Owners of firms in clusters have more education, but owners of firms that are not in clusters have more industry experience. It is possible that this difference is to be expected, given the resources available in clusters and the fact that knowledge-based firms are more likely to be located in clusters. The two samples are relatively well matched and thus the

statistical results should be fairly accurate; however, it is necessary to keep in mind that these differences do exist and may have some influence.

Another observation arises from this preliminary comparison: there are many more clustered firms than un-clustered firms. One can ask whether this is due, at least in part, to the nature of the firms (i.e. that they are all in knowledge based industries). This would support the view of Mashell & Lorenzen (2004) that technology firms are more likely to be clustered. Since the entire sample in the secondary database does include many non-KBI firms, it is possible to verify this.

Overall, even including non-KBIs, it appears that there are still more clustered than un-clustered firms:

Table 14: Entire Population Including non-KBIs, by Cluster location

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not In a Cluster	765	30.4	30.5	30.5
	In a Cluster	1744	69.3	69.5	100.0
	Total	2509	99.8	100.0	
Missing	-99	3	.1		
	System	3	.1		
	Total	6	.2		
Total		2515	100.0		

However, descriptively speaking, there are more KBIs than non-KBIs that are clustered:

Table 15: Descriptive Comparison of location of KBIs and non-KBIs

		Not In a Cluster	In a Cluster
Industry	Not a KBI	33.2%	66.8%
	A KBI	18.9%	81.1%

A t-test confirms this:

Table 16: T-test of the means for cluster location, KBI vs. non-KBI

		Independent Samples Test									
		Levene's Test for Equality of Variances		t-test for Equality of Means						95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper	
cluster	Equal variances assumed	228.683	.000	6.111	2510	.000	.144	.023	.097	.190	
	Equal variances not assumed			6.858	801.994	.000	.144	.021	.102	.185	

KBI firms do appear to be concentrated in clustered areas, even more than other firms. The reasons for this are unclear and should be examined in a future study, although this does agree with some previous research, such as the study by Maskell & Lorenzen (2004) described in the literature review. However, given this difference, it is probable that the results that will be obtained when testing the research propositions are particular to KBI firms. It would be expected that different results would be found for non-KBIs.

5.2.3. Research results: examining and testing the propositions

This section examines propositions four and five using the secondary database from Industry Canada.

Proposition 4: KBI firms within clusters are more likely to seek equity financing than KBI firms outside of clusters.

Proposition 5: KBI firms within clusters that seek venture capital are more likely to receive financing than KBI firms outside of clusters that seek venture capital.

These two propositions will be tested using t-tests comparing clustered and un-clustered firms. The following table describes the differences between clustered and un-clustered KBI firms in terms of the application rates for different types of capital.

Table 17: Application Rates by Type of Capital

Type of Capital	Clustered (% of total)	Un-clustered (% of total)
Loans	70 (18.5%)	10 (11.4%)
Lease Financing	41 (10.8%)	10 (11.4%)
Supplier Financing	70 (18.5%)	11 (12.5%)
Equity	29 (7.7%)	3 (3.4%)
TOTAL	378 firms (100%)	88 firms (100%)

It seems that, descriptively, there are differences for all types of financing except perhaps for lease financing. However, whether these differences are statistically significant must still be tested. This table looks at whether these differences persist for approval for different types of capital.

Table 18: Approval Rates by Type of Capital

Type of Capital	Clustered (% of applicants)	Un-clustered (% of applicants)
Loans	56 of 70 (80%)	7 of 10 (70%)
Lease Financing	38 of 41 (92.7%)	10 of 10 (100%)
Supplier Financing	62 of 70 (88.6%)	8 of 11 (72.7%)
Equity	20 of 29 (69%)	2 of 3 (66.7%)

Equity capital is the focus of this study. Thus, the following t-tests examine whether propositions four and five hold; they explore whether there are differences in the application and approval rates for equity between clustered and un-clustered firms.

Table 19: T-test for Equity Application and Approval Rates of KBIs, Clustered vs. Un-Clustered

		Independent Samples Test								
		Levene's Test for Equality of Variances		t-test for Equality of Means					95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Applied for equity	Equal variances assumed	8.770	.003	-1.424	464	.155	-.04263	.02993	-.10145	.01619
	Equal variances not assumed			-1.791	184.332	.075	-.04263	.02380	-.08958	.00432
Equity Application Turned Down	Equal variances assumed	.023	.881	.079	30	.937	.02299	.29030	-.56988	.61586
	Equal variances not assumed			.067	2.284	.952	.02299	.34461	-1.29641	1.34239

For proposition four (application rates) there is a statistically significant difference at a p-value of 0.075. However, for proposition five, the null hypothesis is not rejected for the turndown rate: i.e. one cannot say that there is a difference between clustered and un-clustered firms. In other words, it appears that firms in clusters are more likely to apply for equity, but having applied, are no more likely to receive it. The following table further illustrates the difference in application rates.

Table 20: Comparison of Equity Application Rates by Number

Crosstab

Count		cluster		Total
		Not In a Cluster	In a Cluster	
Applied for equity	No	85	349	434
	Yes	3	29	32
Total		88	378	466

Overall, there was some support for proposition four but none for proposition five. However, it is important to note that the sample of un-clustered firms is small, so it is difficult to get meaningful results. The number of firms out of 466 who actually applied for equity was only 32, and of these, only three were not in a cluster.

Above, it was predicted that the findings might be different for non-KBI firms. This can be verified:

Table 21: Summarized Group Statistics for Total Population Application and Approval Rates, Clustered vs. Un-Clustered

		Group Statistics			
cluster		N	Mean	Std. Deviation	Std. Error Mean
Applied for equity	Not In a Cluster	768	.0247	.15543	.00561
	In a Cluster	1744	.0338	.18084	.00433
Equity Application Turned Down	Not In a Cluster	19	.2632	.45241	.10379
	In a Cluster	59	.2373	.42907	.05586

Table 22: T-test for Equity Application and Approval Rates of all firms, Clustered vs. Un-Clustered

		Independent Samples Test								
		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Applied for equity	Equal variances assumed	5.915	.015	-1.210	2510	.226	-.00909	.00751	-.02382	.00564
	Equal variances not assumed			-1.283	1889.791	.200	-.00909	.00709	-.02299	.00481
Equity Application Turned Down	Equal variances assumed	.193	.661	.226	76	.822	.02587	.11467	-.20251	.25425
	Equal variances not assumed			.219	29.178	.828	.02587	.11787	-.21513	.26687

There is now no support for either proposition. There are only 78 applications for equity in the entire database of about 2500 firms. This is interesting, because it suggests that the difference between propensities to seek equity does not exist for non-KBI firms.

5.3. Qualitative Interviews

The major benefit derived from the attempted survey was that sixteen respondents agreed to participate in qualitative interviews. These were analyzed in NVivo with the purpose of generating insights in answer to several of the propositions that were not able to be tested quantitatively in this study.

5.3.1. The Interviews

Sixteen of the survey respondents agreed to participate in an interview. Of these, five firms were in the cluster/equity quadrant, two were in the cluster/no equity quadrant, four were in the un-clustered/equity quadrant, and five were in the un-clustered/no equity quadrant. This means that there were nine un-clustered firms and seven clustered firms. There were nine firms that had received equity at some point during their lifetime and seven that had never received equity.

Although there was not as much demographic information available for these firms as was in the Industry Canada database, each of the firms did answer some questions about their attributes and each firm was present, along with some background information, in the databases. Unfortunately, no information was available on the owner attributes. This would have been interesting to compare. However, there was information on the age and size of the firms. As above, all of the firms are in the Tier I KBI sectors. The following table summarizes some of the salient attributes of the interviewed firms.

Table 23: Statistics on the Interviewed Firms

Average age (years)	17
Average Sales (in \$100)	2299
Average Number of Employees	43
Provinces	12 ON, 2 AB, 1 SK, 1 MB
Number in Clusters	7
Number with Equity	9

Age, as well as the two measures of size, which are number of employees and sales, can be further broken down by the four categories of firms interviewed.

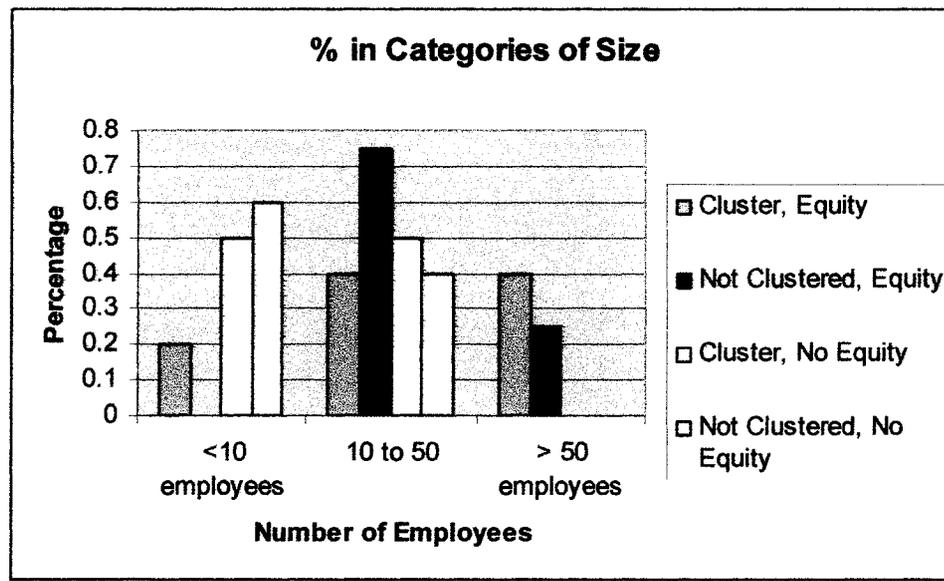
Table 24: Statistics on the Interviewed Firm, Broken Down by Group

	Clustered with Equity	Un-Clustered with Equity	Clustered without Equity	Un-Clustered without Equity
Average Age (years)	6	29	5	16
Average Sales (in \$000)	2550	3200	350	1148
Average Number of Employees	97	39	3	6

Unlike the complete database, the averages for the interviewed firms seem to vary across groups. This is probably due to the small number of interviewed firms, especially in the 'clustered without equity' group which only contains two firms. In general the un-clustered firms in the interview sample appear to have been older than the clustered firms. The firms that had obtained equity are larger than those that did not, both inside and outside of clusters. In the sample of interviewed firms, it does not seem like size of the firm is too different between clustered and un-clustered firms; however, age may have had an effect on the results, as it does differ across these groups.

To further illustrate these effects graphically, size and age can be grouped into categories and the distributions of the groups across these categories can be modeled. First, size is shown.

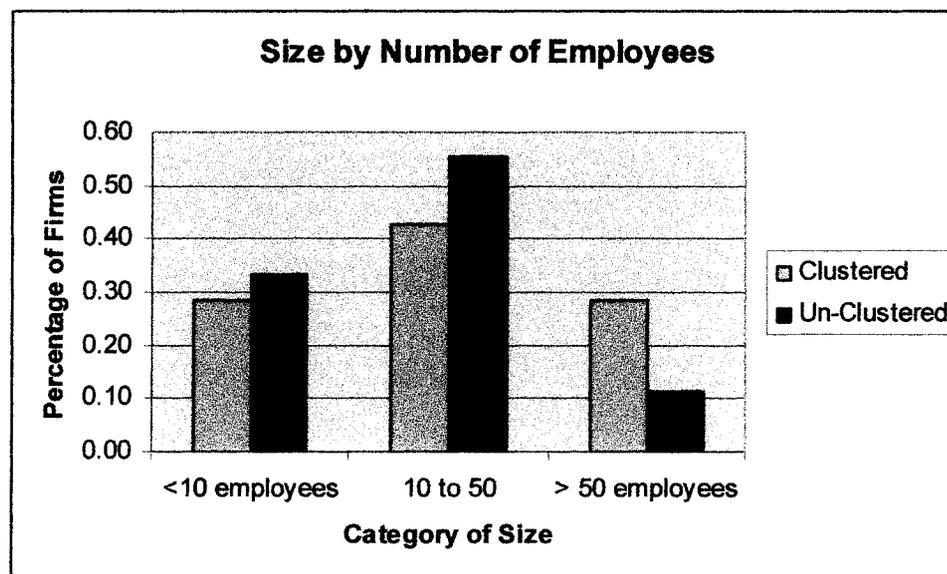
Figure 7: The Percentage of Firms across Categories of Size



As noted statistically, although there are differences between the four separate categories, there is no obvious size difference when looking at clustered versus un-clustered firms.

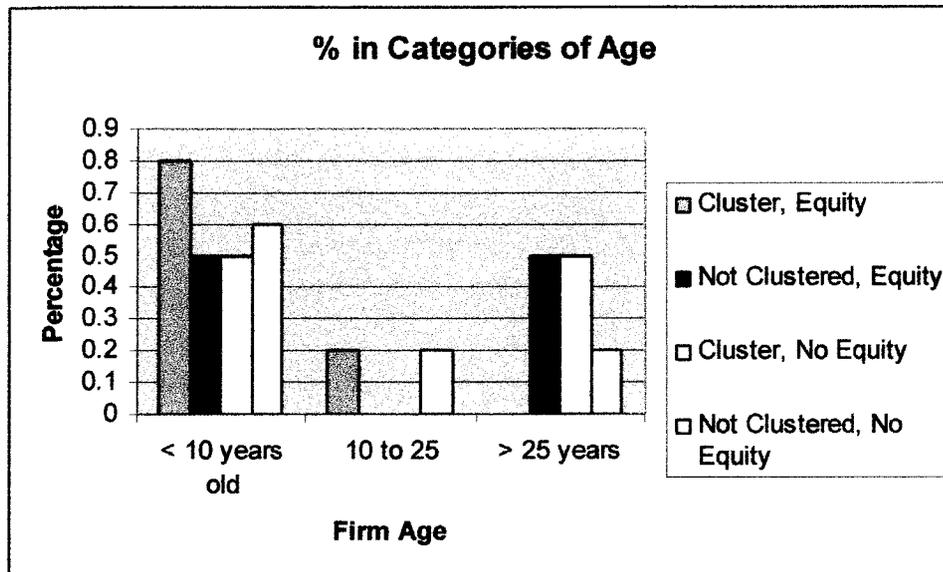
This becomes clearer when amalgamating the clustered and un-clustered groups:

Figure 8: Clustered vs. Un-Clustered by Size



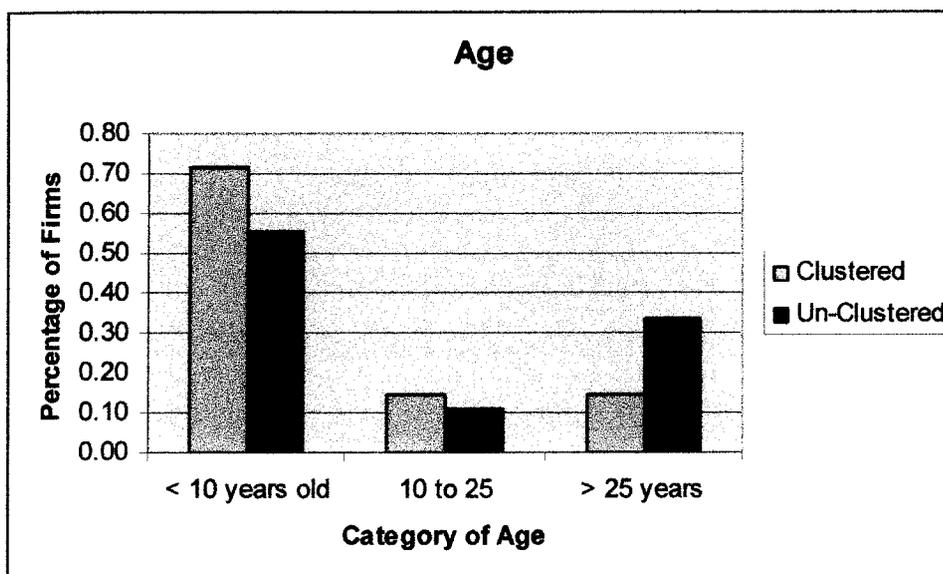
The un-clustered firms are slightly smaller, but there does not seem to be a large difference. The means indicated that there might be some age differences, however:

Figure 9: The Percentage of Firms across Categories of Age



The clustered firms are somewhat younger. Amalgamated by cluster, the results are clearer:

Figure 10: Clustered vs. Un-Clustered by Age



Although the means indicated that there was a difference in age between clustered and un-clustered firms, when grouped by category the difference, at least descriptively, does not appear to be large. Of course, the sample is too small to analyze statistically. However, it did appear, at least descriptively, to be reasonably well matched in terms of size, age and sector.

The qualitative interviews were able to reveal several differences between clustered and un-clustered firms as well as between those firms that had received equity and those that had not. Propositions one, two, three, six, seven and eight were explored, at least to some extent, by these interviews. The results follow.

5.3.2. Propositions 1-7

Proposition One: KBI firms within clusters are more likely to have weak links in their networks than do KBI firms outside of clusters

Proposition Two: KBI firms outside of clusters are more likely to have strong links in their networks than do KBI firms within clusters

Some minor support is found for these two propositions, since the firms within clusters did report weaker ties, at least at the time of financing, than did firms outside of clusters. At least five of the seven clustered firms indicated that their most important contacts within their networks at the time of financing were weak ties, meaning that they were in contact less than twice a week. This provides some support for proposition one.

In contrast, four of the nine un-clustered firms had mostly strong ties, one noting that this was especially true during “critical times”. Of the remaining five, only one was predominantly weak and the rest did not respond to the question. This provides some support for proposition two, although it would have been useful to know the responses of the missing four firms.

Proposition Three: The networks of KBI firms within technology clusters are characterized by more trust than those of KBI firms outside of clusters

There is no support for this proposition. There do not appear to be any strong cluster-related differences in terms of trust.

Proposition Six: KBI firms with weak ties are more likely to receive financing than KBI firms with strong ties

Proposition Seven: KBI firms whose networks are characterized by higher levels of trust are more likely to receive financing than KBI firms with lower levels of trust within their networks.

On an aggregate level, there did not appear to be any differences between firms that had received equity and firms that had never received equity when it came to the strength of ties or the level of trust within their networks.

However, the quadrant with the lowest level of trust and the highest degree of weak ties was that which contained clustered firms that had obtained equity financing. The non-clustered firms that had obtained equity mostly exhibited strong ties instead of weak, and trust was higher. This provides some evidence that clustering matters. In other words, weak ties, postulated to be a determinant of financing, were not exhibited to be a major predictor of access to equity capital for the un-clustered firms. Trust, however, did appear to be more important for these firms. The opposite is true for clustered firms.

Proposition six appears to be true for clustered firms, while proposition seven does not. Clustered firms that had received equity exhibited much weaker ties than those which had not received equity, although the level of trust did not differ. On the other hand, neither proposition appears to be true for un-clustered firms. Un-clustered firms that had received equity had no substantial differences in terms of strength of ties and level of trust as compared to those that did not receive equity. Strong ties and trust, as noted above, were more important for these firms, but only as compared to the *clustered* firms that had received equity.

5.3.3. The role of networking further explored

Every firm that was interviewed identified networking as having an extremely important role in its development. Not even one, when asked about the role that networking had played in their business' development, suggested that it did not play a role. Many identified it as having a key role or even a survival role. This was true across all four categories. Among other things, networking was described as being "instrumental"

(cluster/no equity); as being “key” (cluster/equity); as having “kept us around” (not cluster/equity); and as “absolutely invaluable” (not cluster/no equity).

In fact, four distinct roles of networking came through, although all four were not identified by each firm. Their networks and contacts allowed the firms to: receive advice and mentoring; access financing more easily; get access to industry contacts or customers; and obtain legitimacy or credibility within their industry.

The financing role that networking plays was recognized slightly more by clustered firms, but this is likely due to the fact that more of the clustered firms had actually received financing. Five of seven clustered firms mentioned a connection between networking and financing (of which four had received equity), while four of the nine un-clustered firms did this. Of course, the firms that had been financed were more likely to recognize this particular role, with six of the nine firms that had received equity recognizing a role for networking while three of seven non-equity firms did so. Comments on the role that networking played in financing given by clustered firms include:

“..When you’re talking about financing networking is everything (...) It’s almost always through previous contacts.”

We were brought together by some other people; two people I knew from a people-networking perspective, previously.” (Referring to an equity financing deal)

Un-clustered firms likewise noted:

“If you were to come in off the street without any reference points or knowing this person you’re dealing with, you’re out to lunch and they won’t even talk to you.” (Referring to business financing in general)

“... it really ultimately came through a connection through a tax lawyer that I knew.” (Referring to an angel syndicate deal).

Even some of the un-financed firms recognized the role that networking could play. One firm owner noted:

“Had we had more fully developed networks, we might have pursued some funding.”

The other three roles did not seem to be much different regardless of whether the firm was financed or located in a cluster. Six firms of the sixteen noticed an advisory role, eleven noted a role in getting them contacts or business, and four indicated a legitimacy role. All of these were fairly evenly divided.

In general, it appears that networking played a similar, and relatively equal, role across all of the firms. That is, even though the clustered firms receiving equity had weak, less trusted ties and the un-clustered firms that received equity had strong, more trusted ties, both types attributed a strong role for networking in terms of receiving financing for their firm. Three of the five clustered/equity firms and three of the four un-clustered/equity firms identified this as an important role of networking in their business.

5.3.4. Propositions Eight a and b

Proposition Eight (a): Comparing similar KBI firms with similar networks of social ties from within and outside of clusters, the clustered KBI firms will be no more likely to have received financing.

Proposition Eight (b): Clusters provide a net advantage to KBI firms in terms of access to capital that is not explained by networking.

These two propositions cannot be fully answered by the interviews. However, in the interviews, respondents were asked to describe any advantages or disadvantages that they felt location had given their businesses. The responses were interesting. Two of the seven clustered firms felt that location had been helpful and the rest saw no particular positive or negative effect. Three of the nine un-clustered firms, however, thought that their location had had a distinctly negative effect, and four saw no benefit. Two thought that their location was 'probably' or 'possibly' helpful. This is a distinct difference. While it seems that the interviewed firms were generally unable to see much advantage to their location, some of the un-clustered firms – and none of the clustered firms -- did see negative effects. Some of these were that: not being in a major centre has made it harder for them to succeed; there is not a lot of growth opportunity; they had a hard time getting financing at first; that their location makes it hard to find talented employees; and that they had to go looking for non-local financing. In other words: being in a cluster makes a difference, but this difference is noticed by those that are not in the cluster rather than those that are; it is described more in terms of a lack of disadvantages rather than a conferral of advantages.

It is to be noted that it was three of the four firms that were not in a cluster but had obtained equity that cited a distinct negative effect due to their location. The other un-clustered firms were more ambivalent. This leads to a discussion of differences between the financed and un-financed firms. The firms that had not received equity were much less likely to see either positive or negative effects of being located where they were. The firms that had received equity were divided: two of five clustered firms saw positive effects while the other three saw no effect; three of four un-clustered firms saw negative effects. It thus appears that location was more important to those firms that were seeking equity financing. Looking at these firms, it would appear that location in a cluster does confer some advantage – or at least a lack of disadvantage.

Looking back at the quantitative results from the secondary database, one might notice that clustered firms seem more likely to apply for equity. Firms that are in clusters are more likely to seek equity, and firms that have sought equity within clusters see a positive advantage to their location. Firms that are not in clusters are less likely to seek equity, and when they do, they identify their location as having had a negative effect. The reasons for this are not clear, however. It seems that perhaps the advantage that the cluster confers is to make it easier for firms to apply for equity. However, while this is one possibility, it is not the only one. Another possibility could be that KBI firms that want to grow and thus will want to apply for equity are more likely to locate in clusters than firms that will not apply for equity.

This does partially address propositions 8a and 8b in that there might be an advantage to being located in a cluster, and this advantage has to do with the ease of access to capital. However, this still does not conclusively answer the question about networking effects on clustered firms. More research is required to determine exactly how firms' networks play into this.

5.3.5. Other comments

Firms were asked an open ended question regarding their views on equity financing. Overall, the firms that had been financed were fairly positive (seven of nine were positive and two were mixed in their reviews.) This did not differ by location. However, the un-financed groups did differ. The clustered, non-equity group both said that they 'might' finance with equity at some point. However, four of the five firms in the un-clustered, non-equity group said that they would never consider equity financing. This was the only predominantly negative group, although even those firms who admitted a positive feeling toward equity did indicate some of its drawbacks. Many of these individuals mentioned that it was extremely important to choose the right individual or firm as your equity investor. Drawbacks of equity noted in the study, both by the happily financed firms and the wary firms, were: reduced control and loss of independence; requirement to share future profits; and increased time requirements for management.

5.4. Results of the Analysis

It is important to note that these results apply only to KBI firms, and that KBI firms are more likely to reside in clusters than are non-KBI firms. Some qualitative support was found for propositions one and two, but none was found for proposition three. In other words, there is some evidence that firms within technology clusters are more likely to have weak links in their networks than are firms outside of clusters and vice versa, but there is no difference in the level of trust exhibited. Proposition four was supported by the empirical evidence, but proposition five was not. Firms located in clusters are more likely to seek equity than un-clustered firms, but having applied, are no more likely to receive it.

Propositions six and seven looked at the links between network characteristics (strength of ties and trust) and the likelihood of receiving equity. On aggregate, no support was found for either of these propositions. However, the networks of 'successful' (e.g. firms that received equity) clustered and un-clustered firms appeared to exhibit different characteristics. Those of 'successful' clustered firms appeared to have weaker ties and less trust, while those of 'successful' un-clustered firms appeared to have stronger ties and more trust. However, even though the clustered firms receiving equity had weak, less trusted ties and the un-clustered firms that received equity had strong, more trusted ties, both types attributed a strong role to networking in terms of receiving financing for their firm. In general, it appears that the role and importance that networking plays is similar for both types of firms, but that the way in which networking is done may differ

between clustered and un-clustered firms. This could be an interesting area for future research.

Propositions 8a and b were not able to be completely confirmed or denied by the analysis. However, there could be some support for proposition 8b in that clustered firms may have a location-conferred advantage in terms of applying for equity. Alternatively, however, it is also possible that firms that are more likely to apply for equity are also more likely to locate in clusters. This does not conclusively answer the question about networking effects on clustered firms and more research should be done to determine how firms' networks interact with location to determine ease of access to risk capital. This being said, it is clear from the interviews and the secondary database that clustered firms are more likely to seek equity and feel more positively about the effect of their location, while un-clustered firms are less likely to seek equity, and when they do, they feel negatively about their location. This idea of likelihood of equity application is further supported by the fact that even among the non-equity firms, those in clusters felt more positively about the possibility of applying for equity in the future than did un-clustered firms.

6. Conclusions and Implications

The conclusions and implications of the research findings will be examined in this section, including a summary of the key findings. Some important implications of the research will be enumerated. The limitations and strengths of the research will be noted in order to provide a better context for the research findings, and suggestions will be made for future research.

6.1. Research Overview

This research was intended to look at the question of whether clustered firms have a net advantage over un-clustered firms when accessing formal and informal venture capital. This was approached both qualitatively and quantitatively.

Clusters have recently been a popular subject in the literature. Researchers have outlined many benefits, among these the ability to attract investment. However, the literature has not been consistent on the subject of financing in clusters. This research was meant as an attempt to further build on the literature through an actual comparison of firms located inside clusters with similar firms located outside clusters. These firms would be compared, combining existing research on venture capital, clusters, networking, and social capital, in order to help determine the role that clusters may play in the receipt of financing.

The focus of this study was to determine (a) networking differences between clustered and un-clustered KBI firms, including strength of ties and level of trust; (b) risk financing differences between clustered and un-clustered KBI firms, including propensity to seek risk capital and the likelihood of receipt; and (c) the interactions between these two

factors. The goal was, in the end, to have a broader idea of what, if any, advantages a KBI firm gains by cluster location when attempting to access external equity capital. This was translated into six research objectives and further into a number of propositions.

There were three sources of research. First, a questionnaire was distributed. This was meant to contribute some quantitative aspects to the networking and financing analyses. However, the questionnaire itself was unsuccessful since the response rate was too low to be of any empirical use. Secondly, a secondary database was available for quantitative financing analysis only. This was completed successfully. Lastly, qualitative research was completed in the form of telephone interviews, with interviewees being drawn from survey respondents who had agreed to participate. These were able to contribute some insight into the networking differences, as well as the interactions between networking, financing, and location.

6.2. Summary of key findings

Overall, no firm conclusion was able to be made as to whether or not clusters contribute a net advantage to KBI firms that are located within them. However, it was clear that firms within clusters are more likely to apply for equity capital. One potential interpretation of this is that there is a cluster advantage and that this advantage affects access to equity capital. Moreover, KBI firms are different than other firms, both from literature, and in the analysis in that they are even more likely to be clustered than other types of firms. This is interesting since one possible explanation is that, not only do KBI firms receive an access to risk capital benefit by locating in clusters, but they appear to take advantage of this by doing so disproportionately to other firms.

Several differences were found between clustered and un-clustered firms in the sample. Interestingly, owners of firms in clusters have more education, but owners of firms that are not in clusters have more industry experience. The reasons for this are uncertain. It is possible that owners of firms in clusters have more resources available to them and are thus able to be successful with less prior industry experience; or alternatively, that education acts as a substitute for industry experience in some places. Further research would be interesting.

Networking differences were present. However, all firms interviewed in both groups felt that networking was critical for their firm in at least one of four different ways, by allowing them to receive: advice and mentoring benefits; contacts in the form of partners, clients, suppliers, etc.; assistance in getting financing; and/or legitimacy or

enhanced reputation. The main networking differences did not, in fact, refer to the way in which the networks were used at all. Instead, they referred to the general make-up of the networks in terms of strength of ties and trust. Firms within technology clusters were more likely to have weak ties in their networks and firms outside of clusters were more likely to have strong ties. This is consistent with Maskell and Lorenzen (2004), who noted that clusters promote weak ties. However, un-clustered firms that had been 'successful' (meaning that they received equity) did not have these weak ties, supposedly important when obtaining equity (Freear et al., 2002). Instead, they had strong but trusted ties. This is consistent with Liao and Welsch (2003) who noted that firms that value complex, tacit knowledge, such as high-tech firms, should value trusted ties the most, which may result in more strong ties in the network. The successful firms in both samples did not have the same types of networks; yet they got the same results. This leads to an interesting question. Perhaps the un-clustered firms had to rely more on trusted ties to get the complex, tacit knowledge they required; while clustered firms did not have to do so in order to get *the same type of knowledge* because of the inherent networks of similar firms that exist within clusters – in other words, because of a cluster advantage. More research on the nature, rather than the role, of networks within and outside of clusters would be of interest.

Financing differences were also present. Clustered firms were found to be more likely to seek equity than un-clustered firms, but no more likely to receive it. In other words, once a firm sought equity, it did not appear to be important whether or not it was in a cluster. However, clustered firms are much more likely to seek it. In addition, clustered firms

were much more positive about equity in general and even those firms that had not tried to get risk capital were more likely to express a potential future willingness to do so. Perhaps this is due to the fact that angels and venture capital firms can be hard to approach, and referral networks are often easier to tap into with a cluster (Harrison et al, 2004). Another alternative might be that firms within a cluster are simply more likely to have information about risk capital and thus are more aware of it – and more comfortable with it -- as an available type of financing. Yet a third alternative might be that those firms that are more likely to seek equity also happen to be the type of firms that are more likely to be located in a cluster i.e. there is not necessarily a causal relationship.

Lastly, the interactions between financing, networks, and location were examined. As alluded to above, there may be a cluster conferred advantage with respect to application for equity. It is not clear how networking affects this phenomenon; however, it is possible that it has an effect since referral networks and previous contacts are known to play a role in contacting risk capital providers, especially business angels. Since it is known that the nature of the networks was different, with clustered firms having more weak ties than un-clustered firms, one partial explanation for the application rate differential might be the role that weak ties are known to play in contacting risk capital providers. What is clear is that clustered firms are more likely to seek equity and feel more positively about the role that their *location* played in this transaction. When asked, un-clustered firms that had obtained equity felt that their location had been a barrier to financing.

6.3. Implications of the Research

This section will review the various implications that this research has, including implications for entrepreneurs and implications for research. This research had led to further insight into the effects of clusters on access to formal and informal venture capital. This research has also attempted to demonstrate whether networking can explain differences in access to risk capital between clustered and un-clustered firms. No research to date combines the four literatures pertaining to networking, venture capital, clusters, and social capital.

6.3.1. Practical Implications for Entrepreneurs

From the perspective of the entrepreneur, this research will answer questions that pertain to strategy. When starting a business, should an entrepreneur locate in cluster or not? The results of this study help to explain what businesses should expect in terms of access to capital. It implies that location does matter, and that being located in a cluster may make it *easier* to apply to risk capital. However, given a desire to apply, location does not seem to prevent a firm that desires it and is qualified from obtaining this capital. In other words, although it is easier for clustered firms to apply for equity, it is no more or less likely that equity will be obtained. This should be somewhat reassuring for entrepreneurs who are located outside of clusters. This study also attempted to determine how networking plays into location and access to capital. Although the results on this front were uncertain, it does appear that one of the things that make application for equity easier for firms in clustered areas might be the greater propensity for these firms to have weak ties in their networks. Thus, firms, regardless of location, should perhaps attempt

to cultivate weak ties. Increasing their knowledge in these areas will help entrepreneurs to better understand their businesses.

6.3.2. Research Implications

The proposed research has contributed to the understanding of technology clusters by bringing together four fields of literature to consider the question of how clusters affect access to capital. Since this topic is under-researched, any new contributions should benefit academics in terms of broadening the current knowledge base surrounding clusters. In addition, cluster studies are relatively uncommon in the Canadian context, most of the research in this area having been undertaken in the United States and, to a certain extent, in Europe.

This research is expected to provide a basis for further studies. The findings help to resolve some of the debates in literature; however, they open up many more questions for the future.

6.4. Limitations of the Research

6.4.1. Limitations of the Secondary Database

It is expected that the secondary database is representative of the population of Canadian entrepreneurs seeking venture capital investments. It was collected by Statistics Canada and is relatively free of non-response bias. However, since it is secondary data, the researcher has no direct information about collection, and must rely on the veracity of the source. An additional limitation of this data is that very few of the KBI firms actually applied for or received equity. In total, thirty-three firms in the sample applied for equity

and twenty-two received equity. There is, therefore, a possibility of statistical error due to the small 'n'.

6.4.2. Limitations of the Telephone Interviews

Since the sample is not randomly selected from a single sampling frame, but is from two separate sources based on convenience and availability, the sample may not be fully representative. Further, observations from the telephone interviews may or may not be generalizable, as the sample for the qualitative data was drawn from those survey respondents that agreed to participate.

Another limitation of this study is the potential for inaccuracy. Since entrepreneurs are self-reporting, their responses may be based on their own perceptions rather than on reality. For example, since some concepts, such as the level of trust in networking, are subjective, the entrepreneur's responses may not reflect the actual situation. Responses to the telephone interviews have an increased likelihood of inaccuracy since they rely on the entrepreneur's ability to recall information from the past. In addition, since only one person from an organization was involved, a single respondent bias could exist in that one person's view may not be completely representative of the firm (Phillips, 1981).

In addition, potentially useful data may be missed in the survey, if respondents are hesitant to admit failure. If respondents do not admit to having tried to obtain risk capital if they failed, then potentially interesting responses will be discarded.

6.5. Strengths of the research

The secondary database that was used is representative of 1.2 million Canadian private sector commercial businesses with less than \$50 million in sales and fewer than 500 employees. The database represented a strength of the research because, since it was collected by Statistics Canada, it was quite reliable. This database contained telephone survey responses that were accurate to 0.008 19 times out of 20, with a 66% response rate. Thus, despite possible limitations that are often associated with secondary data, this particular sample was probably more accurate and reliable than anything that could have been collected through primary research without government participation.

This research is exploratory in nature, looking at an intersection of subjects that has not been well explored in the past. It directly compares clustered and un-clustered firms, which has not often been done in the past. Yet it was also able to draw on four separate groups of literature, and to learn from the past. As noted in the above sections, other researchers' work was drawn on when creating the questionnaire and telephone interview. Concepts from the literature were the basis for these tools as well. It is a strength of this study that it was able to draw so much on previous work to explore an emerging area in a new way.

6.6 Research Benefits

This research offers a number of benefits. First, it contributes to the literature on technology clusters, and by combining this research with that on networks, social capital, and financing, helps to fill a gap in the research that currently exists. This research contributes to an understanding of clusters and will help make sense of the current debates around this topic.

Secondly, this research opens up a number of further questions for future study. One major benefit of exploratory work is that, as the understanding of a field progresses, not only do some questions get answered, but more questions are discovered. This is what this thesis has achieved. In addition to providing some answers and some partial answers to the propositions outlined at the beginning, it has also opened the door to many new paths to be explored.

6.7 Future research questions

Much research remains to be done regarding the roles of networking and cluster location in access to equity capital. Specifically:

- A further examination of why Canadian KBI firms are more likely to be clustered than non-KBI firms;
- Reasons why KBI firm owners in clusters have more education and KBI firm owners that are not in clusters have more industry experience;
- Further research on the nature of networks, comparing clustered and un-clustered firms;
- Confirmation of the lower risk capital application rate phenomenon for un-clustered firms, and research into why this occurs;
- More information on how networking affects risk capital application rates inside and outside of clusters.

The answers to these questions will further increase the academic world's understanding of technology clusters and how they operate, and help guide entrepreneurs in their decision-making.

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Appendix 1: Cluster Identification

The Database:

In order to verify the clusters found in literature and to further establish a list of Canadian clusters by industry, a reliable database was required. Survey data collected by Statistics Canada (in conjunction with Industry Canada and Finance Canada) in 2002 seemed appropriate to this task, since the survey in question was representative of the approximately 1.2 million Canadian SMEs. The 2002 Survey of Financing of Small and Medium-sized Enterprises is a large-scale telephone survey administered during the Fall of 2002 that collected data regarding the financing experiences of SME owners for the preceding year. It is a carefully designed stratified sample of SMEs that represents private sector commercial businesses with: less than \$50 million in annual sales; fewer than 500 employees; and that reported business activity during 2001. This survey was also reliable, since its estimates of proportions are accurate to 0.008 (0.8%) 19 times out of 20, it boasts a 66 percent response rate and the sample data comprises 3,842 cases. It is therefore relatively free of non-response and selection biases. The database in question also allowed for the weighting of each data point to better represent the actual number of SMEs present in each region of Canada.

The Procedure:

In the computer program SPSS, the available weights were applied. Three digit postal codes and three digit NAICS codes were used to represent region and industry respectively. Using the Statistics Canada list of NAICS code, firms whose industries are major determinants of their location, such those in agriculture, fishing, hunting, forestry, and oil & gas extraction, were excluded. The weighted frequency table was produced,

and the result exported to Microsoft Excel. Using the frequency table, lists of postal codes were produced for each of the NAICS codes. Using the Canada Post list of postal code regions (obtained at www.canadapost.ca), this list was then grouped logically into cities and regions. For example, the Greater Toronto Area was considered to be one area, although it comprises many three digit postal codes. On the other end of the spectrum, some groupings consisted of a city with only one three-digit postal code. Rural codes (i.e. codes not associated with a city) were excluded. Groups with less than one hundred firms located in a region-NAICS code pairing were discarded. The remainder were considered as clusters for their three-digit NAICS group. This was then compared with the list from literature, and a final list of clusters was created.

This information could then be used to code firms as to whether or not they are located within a cluster. This was done in the survey database (including the firms for which qualitative interviews were done) as well as in the original Industry Canada database used to create this cluster data.

For Tier One KBI firms, since this is the area of interest in the study, the list of clusters is as follows:

Table 266: KBI Cluster Lists

<i>Industry</i>	<i>Cities</i>
Machinery Manufacturing	Pont-Rouge, Pintendre, Lindsay, St. Catharines, Greater Toronto Area, Winnipeg, Prince Albert, Lloydminster, Quesnel
Computer and Electronic Product Manufacturing	Halifax, Val-Belair, Montreal, Farnham, Hull, Greater Toronto Area, Brooks, Edmonton
Electrical Equipment, Appliance and Component Manufacturing	Montreal, Drummondville, Saint-Hubert, Saint-Eustache, Greater Toronto Area, Toronto, Calgary
Transportation Equipment Manufacturing	Montreal, Hull, Greater Toronto Area, Uxbridge, Toronto, Vancouver, Salt Spring Island
Publishing Industries	Montreal, Drummondville, Greater Toronto Area, Hamilton, Toronto
Motion Picture and Sound Recording Industries	Montreal, Greater Toronto Area, Toronto, Winnipeg, Calgary, Edmonton, Vancouver
Broadcasting and Telecommunications	Truro, Riviere-Du-Loup, Montreal, Boucherville, Niagara Falls, Medicine Hat
Information Services and Data Processing Services	St Johns, Ottawa, Georgetown, Toronto, Sherwood Park, Vancouver
Professional, Scientific and Technical Services	St Johns, Truro, Halifax, Charlottetown, Moncton, Edmundston, Quebec, Sept-Iles, Bernieres, Montreal, Sherbrooke, Magog, Saint-Luc, Beloeil, Saint-Hubert, Boucherville, Longueuil, La Prairie, Terrebonne, Sainte-Therese-De-Blainville, Valleyfield, Gatineau, Aylmer, Ottawa, Kingston, Cobourg, Oshawa, St.

	Catharines, Newmarket, Bradford, Aurora, Greater Toronto Area, Oakville, Georgetown, Burlington, Hamilton, Toronto, Guelph, Cambridge, Kitchener / Waterloo, Leamington, Sudbury, Timmins, Winnipeg, Regina, Saskatoon, Medicine Hat, Strathmore, Calgary, Airdrie, Edmonton, Grande Prairie, Devon, Vermilion, Dawson Creek, Kelowna, Kamloops, Prince George, Chilliwack, Vancouver, Powell River, Sidney, Central Saanich, Victoria, Black Creek, Qualicum Beach, Duncan, Nanaimo, Yellowknife, Whitehorse
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This list is further summarized by region in the main text of the thesis, as below:

<i>Industry</i>	<i>Regions</i>
Machinery Manufacturing	Quebec City, Lindsay, St. Catharines, Greater Toronto Area, Winnipeg, Prince Albert, Lloydminster, Quesnel
Computer and Electronic Product Manufacturing	Halifax, Quebec City, Montreal, Ottawa/Gatineau, Toronto Corridor, Brooks, Edmonton
Electrical Equipment, Appliance and Component Manufacturing	Montreal, Drummondville, Toronto Corridor, Calgary
Transportation Equipment Manufacturing	Montreal, Ottawa/Gatineau, Toronto Corridor, Uxbridge, Toronto, Vancouver, Victoria
Publishing Industries	Montreal, Drummondville, Toronto Corridor
Motion Picture and Sound Recording Industries	Montreal, Toronto Corridor, Winnipeg, Calgary, Edmonton, Vancouver
Broadcasting and Telecommunications	Truro, Riviere-Du-Loup, Montreal, Niagara Falls, Medicine Hat
Information Services and Data Processing Services	St Johns, Ottawa/Gatineau, Toronto Corridor, Edmonton, Vancouver
Professional, Scientific and Technical Services	St Johns, Truro, Halifax, Charlottetown, Moncton, Edmundston, Quebec City, Sept-Iles, Montreal, Sherbrooke, Ottawa/Gatineau, Kingston, Cobourg, St. Catharines, Newmarket, Toronto Corridor, Guelph/Cambridge/Kitchener/Waterloo Triangle, Leamington, Sudbury, Timmins, Winnipeg, Regina, Saskatoon, Medicine

	Hat, Calgary, Edmonton, ,Grande Prairie, Vermilion, Dawson Creek, Kelowna, Kamloops, Prince George, Vancouver, Straits of Georgia Region, Victoria, Nanaimo, Yellowknife, Whitehorse
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Any KBI firm that does not fall within one of the clusters identified using the Industry Canada data, or within one of the clusters from literature, was be considered an un-clustered firm for the purpose of this research.

Appendix 2: The Survey Package

FAX TRANSMISSION

To: «Full_Name», «Business_Name»

From: Kathryn Manley, Carleton University

Fax #: «Fax_Number»

Pages: 6

Date: April 13, 2005

Re: Technology Cluster Study



Date

««AddressBlock»»

Dear «Prefix» «Last_Name»:

I am writing to ask if you would be willing to participate in a research study that I am conducting as part of my Master's thesis on the role that technology clusters play in networking and access to capital. A major objective of the study is to achieve a better understanding of the effects of business location on the ability of that firm to access certain types of financing, and on its networking practices. As a result, companies both inside and outside of technology clusters will be studied in order to determine what effect, if any, location in such a cluster has on these important aspects of business operations.

If you agree to participate, access to the results will be available to you so that you can benefit from the research even before it is publicly available. The resulting research report will provide useful insights to both entrepreneurs and public policy makers. First, it will help to answer questions for economic development practitioners and Canadian public policy makers with respect to the ability of entrepreneurs to access risk capital. Second, it will explore the importance of location to obtaining risk capital, and how networking fits into the equation.

If you will consent to participate in this research, please complete the attached questionnaire and return it to me. For your convenience, I have included a fax cover sheet for this purpose. Most of the questions are of the convenient 'check-off' variety and filling out the questionnaire should only take 5 to 10 minutes of your time. If you so choose, you may also participate in a follow-up telephone interview designed to collect more detailed information on your firms' networking practices for our study. If you would like further information or if you have any questions about the questionnaire or the telephone interview please feel free to contact myself, Kathryn Manley, at 613-851-2679 or my advisor, Professor Allan Riding, at 520-2600 ext. 2394.

There is no foreseen risk to the study. I am not seeking any confidential or proprietary information, but please be assured that all responses will be kept strictly confidential and only aggregated findings will be reported. Surveys will be kept indefinitely for comparability with similar future studies, but will remain confidential and secure. Thank you for considering my request. I look forward to learning from your experiences.

Sincerely,

Kathryn Manley
MBA Student, Carleton University

FAX TRANSMISSION

To: Kathryn Manley, Carleton University

From: «Full_Name», «Business_Name»

Fax #: 1-613-520-5630

Pages:

Subject: Technology Cluster Study

Date:

RESPONSES:

Yes, I have completed the questionnaire and it is attached, but do not wish to participate in a further interview.

Yes, I have completed the questionnaire and I agree to participate in a follow-up telephone interview. You may contact me at the following telephone number:

_____ and I am willing and available to participate in the
telephone interview on _____, 2005 at _____.

No, I am unable to participate in this study.

Survey on Access to Capital, Networking, and the Effect of Clusters

Section One: Interactions

1. Please choose five people with whom you interact professionally, and who you feel are valuable to your business dealings. Using their initials as a reference, provide the following details:

Initial	Years Known	Relationship	How often do you talk business with them? (Check one)				
			Once a week or less	Twice a week	3 times a week	daily	more than daily
1							
2							
3							
4							
5							

Section Two: Access to Capital

2. Has your company applied for or attempted to obtain any financing in exchange for a share of ownership at any stage in its development?

- Yes (Go to 3)
 No (Go to 6)

3. Were you looking for:

- Less than \$500,000
 Between \$500,000 and \$2 million
 More than \$2 million

4. From which sources? (Please indicate all that apply)

- Family
 Friends
 Employees
 Partners
 Non-financial Corporations
 Private individuals not connected with the company ('business angels')
 Local venture capital firms
 Other Canadian venture capital firms
 US venture capital firms
 Other foreign venture capital firms
 Other (please specify) _____

5. As a result, did the company obtain any financing?

- Yes
 No

Section Three: Networking

6. Using the following set of 5-point scales, please rate the usage frequency of your firm's links with each of the following sectors (1= never; 2= less than once per year; 3= annually; 4=weekly; 5= more than once per week):

	Never				> Weekly				
Suppliers	1	-----	2	-----	3	-----	4	-----	5
Firms providing professional, business or technical services	1	-----	2	-----	3	-----	4	-----	5
Customers	1	-----	2	-----	3	-----	4	-----	5
Research collaborators – universities	1	-----	2	-----	3	-----	4	-----	5
Research collaborators - government agencies	1	-----	2	-----	3	-----	4	-----	5
Research collaborators – industry	1	-----	2	-----	3	-----	4	-----	5
Firms in your industry	1	-----	2	-----	3	-----	4	-----	5
Subcontractors	1	-----	2	-----	3	-----	4	-----	5
Professional Organizations (e.g., OCRI, Zone5, etc.)	1	-----	2	-----	3	-----	4	-----	5
Board of Trade / Chamber of Commerce	1	-----	2	-----	3	-----	4	-----	5
Ottawa or other regional economic development office	1	-----	2	-----	3	-----	4	-----	5
Other (please specify) _____	1	-----	2	-----	3	-----	4	-----	5

7. This question is about the level of trust that your firm has with its partners in terms of performance. Performance-based trust refers to the degree of reliability and quality that you may consistently expect, and to the commercial reputation of a partner. Using the following set of 5-point scales, please rate the level of performance-based trust that you have with each of your firm's links within each of the following sectors (1 = not trusted; 5 = very trusted):

	NOT TRUSTED				VERY TRUSTED				
Suppliers	1	-----	2	-----	3	-----	4	-----	5
Firms providing professional, business or technical services	1	-----	2	-----	3	-----	4	-----	5
Customers	1	-----	2	-----	3	-----	4	-----	5
Research collaborators – universities	1	-----	2	-----	3	-----	4	-----	5
Research collaborators - government agencies	1	-----	2	-----	3	-----	4	-----	5
Research collaborators – industry	1	-----	2	-----	3	-----	4	-----	5
Firms in your industry	1	-----	2	-----	3	-----	4	-----	5
Subcontractors	1	-----	2	-----	3	-----	4	-----	5
Professional Organizations (e.g., OCRI, Zone5, etc.)	1	-----	2	-----	3	-----	4	-----	5
Board of Trade / Chamber of Commerce	1	-----	2	-----	3	-----	4	-----	5
Ottawa or other regional economic development office	1	-----	2	-----	3	-----	4	-----	5
Other (please specify) _____	1	-----	2	-----	3	-----	4	-----	5

Section Four: Additional Information**8. What is the gender of the majority owner of this business?**

- Male
 Female
 50% Male-owned and 50% Female-owned

The purpose of this questionnaire has been to gather important background information about your company. To further enrich our understanding of your company, we would like to interview you. Such interviews would take approximately one half hour of your time and we would conduct it, if you agree, at a time that is convenient for you. If you would be willing to participate in a brief follow -up telephone interview please provide contact details:

Name: _____
Company: _____
Address: _____
Telephone: _____
Fax: _____
E-mail: _____

THANK YOU FOR COMPLETING THIS QUESTIONNAIRE.

Appendix 3: The Interview Protocol

Preamble:

Good morning. This is Kathryn Manley from Carleton University. Thanks for filling out the questionnaire and agreeing to participate in this interview today. To refresh your memory, this is a study on networking, access to capital and the effect of technology clusters.

Thanks for taking time to do this interview. It should take about half an hour, but that might depend on how it goes. I will try to keep it as short as possible, since I know you are busy. If it is alright with you, I would like to tape this interview in order to help me take notes. However, if at any time you would like me to stop the tape or if you are not comfortable with this interview being taped, please let me know. As for confidentiality, everything is completely confidential and we're only going to release results on an aggregate level so there will be nothing firm specific.

There are two main sections in the interview today. The first section is some background and just confirming some basic information which we have already gathered, making sure it is accurate. The second section will look at your networks and relationships, as well as how the firm is financed.

Background: (confirming information I already have)

Your headquarters is in _____?
 Private or public firm?
 Founded in ____?
 Number of employees? Total/local?

If you had to classify your firm, what industry or sector would you be in?

If you could just tell about your core business activities, your day to day activities...

Who are your main customer segments? Where are they located (local, provincial, etc)?

Could you tell me a little about the structure of your mgmt team? (hierarchy, board of directors etc)

Where would you say that your three main competitors are located...i.e. in the same city, in the same province, within Canada, North America etc.

Access to capital

Great! That is all of the background information. Now we can continue with the next section.

How has geographical location affected your business's development?

Do you think that your geographical location has played any role in receiving financing for your business or provided any other kind of support for your business?

How have your networks and contacts affected the development of your business? Do you think that your networks or contacts have played a role in receiving financing for your business? Have your networks played a role in supporting other aspects of your business, for instance mentoring?

I'd like to talk with you a bit about how your firm has been financing. I noticed from your survey - you said you got....

But could you tell me, just very generically, no names or anything, if you have received any other financing, such as loans from a FI, loans from friends or family, lease financing etc.

Talking about the specific financing relationships that were mentioned.....For each supplier they mentioned go through this set of questions (except for the last one).

(If risk capital, talk about those - otherwise if more than 2): Which two of those do you think were the most important for your firm?

Okay so going back to your _____ financing...

Do you remember what year this happened?

Can you tell me about any non-financial contributions that this supplier of capital gave you, such as guidance or advice?

A lot of firms have important contacts and networks outside of their firms and we are interested in knowing what were your most important ones at the time that you received the _____ financing... Could you think of the three people that you networked with the most frequently at that time - I don't want their names, but just the relationship of that person to the firm (i.e. a friend, a supplier, a customer, a colleague from a previous job, an accountant, etc...)

How frequently did you network with each of them? (go through the list..)

On a scale of 1-7, how much did you trust them (1 being not at all and 7 being very high level of trust) (going through the list).

Okay, so I just want to do the same thing for your _____ financing and then we will be almost done....

Great! I just have two more questions and we should be through. We are just trying to find out how the financing you received affected your ability to do business. Can you give us an idea of approximately how much sales growth (as a %) you have had since you

received that financing (for both...since your _____ financing, and your _____ financing)?

(If they did not receive equity financing):

Okay, the last question... I know that you have not tried to get any equity capital. Have you ever considered equity financing or would you consider it? Why/why not?

(If they did receive equity financing):

We have talked about your equity financing and I just have one more question about it.

Could you tell me if it was a positive or a negative experience or if you have any comments about the process of obtaining equity financing that you would be able to share with me?

Okay that's it! I really appreciate you taking time to do this interview - it is very helpful and I know your time is valuable.... Thank-you so much for your time...Goodbye...

Appendix 4: The Modified Survey Package

FAX TRANSMISSION

To: «Full_Name», «Business_Name»

From: Kathryn Manley, Carleton University

Fax #: «Fax_Number»

Pages: 6

Date: June 1, 2005

Re: Technology Cluster Study



DATE

««AddressBlock»»

Dear «Prefix» «Last_Name»:

I am writing to ask if you would be willing to participate in a research study that I am conducting at Carleton University on the role that technology clusters play in networking and access to capital. A major objective of the study is to achieve a better understanding of the effects of business location on the ability of that firm to access certain types of financing, and on its networking practices.

I know that we're all deluged by so many people wanting to do surveys -- or worse, trying to sell you something -- and I know that as a business owner you are always busy. I am writing in the hope that you will nonetheless help me with this work. If you agree to participate, access to the results will be available to you so that you can benefit from the research even before it is publicly available. Ultimately, the results of this work will help inform federal and provincial governments with respect to the financing issues that small businesses, like your own, have to face.

If you will consent to participate in this research, please complete the attached questionnaire and return it to me. For your convenience, I have included a fax cover sheet for this purpose. Most of the questions are of the convenient 'check-off' variety and filling out the questionnaire should only take 5 to 10 minutes of your time. If you so choose, you may also participate in a follow-up telephone interview designed to collect more detailed information on your firms' networking practices for our study. If you would like further information or if you have any questions about the questionnaire or the telephone interview please feel free to contact myself, Kathryn Manley, at 613-851-2679 or my research advisor, Professor Allan Riding, at 520-2600 ext. 2394.

There is no foreseen risk to the study. I am not seeking any confidential or proprietary information, but please be assured that all responses will be kept strictly confidential and only aggregated findings will be reported. Surveys will be kept indefinitely for comparability with similar future studies, but will remain confidential and secure. One of the benefits of working with universities is that confidentiality is always assured, and we definitely won't be selling you anything. Thank you for considering my request. I look forward to learning from your experiences.

Sincerely,

Kathryn Manley
Research Associate, Carleton University

FAX TRANSMISSION

To: Kathryn Manley, Carleton University

From: «Full_Name», «Business_Name»

Fax #: 1-613-520-7507

Pages:

Subject: Technology Cluster Study

Date:

RESPONSES:

Yes, I have completed the questionnaire and it is attached, but do not wish to participate in a further interview.

Yes, I have completed the questionnaire and I agree to participate in a follow-up telephone interview. You may contact me at the following telephone number:

_____ and I am willing and available to participate in the
telephone interview on _____, 2005 at _____.

No, I am unable to participate in this study.

Survey on Networking, Access to Capital, and the Effect of Clusters

Section One: Networking

1. Using the following set of 5-point scales, please rate the usage frequency of your firm's links with each of the following sectors (1= never; 2= less than once per year; 3= annually; 4=weekly; 5= more than once per week):

	Never				> Weekly
Suppliers	1	2	3	4	5
Firms providing professional, business or technical services	1	2	3	4	5
Customers	1	2	3	4	5
Research collaborators – universities	1	2	3	4	5
Research collaborators - government agencies	1	2	3	4	5
Research collaborators – industry	1	2	3	4	5
Firms in your industry	1	2	3	4	5
Subcontractors	1	2	3	4	5
Professional Organizations (e.g., OCRI, Zone5, etc.)	1	2	3	4	5
Board of Trade / Chamber of Commerce	1	2	3	4	5
Ottawa or other regional economic development office	1	2	3	4	5
Other (please specify) _____	1	2	3	4	5

2. This question is about the level of trust that your firm has with its partners in terms of performance. Performance-based trust refers to the reliability and quality that you may consistently expect, and to the commercial reputation of a partner.

Using the following set of 5-point scales, please rate the level of performance-based trust that you have with each of your firm's links within each of the following sectors (1 = not trusted; 5 = very trusted). Do not answer this question (leave blank) for those sectors with whom you do not interact. :

	NOT TRUSTED				VERY TRUSTED
Suppliers	1	2	3	4	5
Firms providing professional, business or technical services	1	2	3	4	5
Customers	1	2	3	4	5
Research collaborators – universities	1	2	3	4	5
Research collaborators - government agencies	1	2	3	4	5
Research collaborators – industry	1	2	3	4	5
Firms in your industry	1	2	3	4	5
Subcontractors	1	2	3	4	5
Professional Organizations (e.g., OCRI, Zone5, etc.)	1	2	3	4	5
Board of Trade / Chamber of Commerce	1	2	3	4	5
Ottawa or other regional economic development office	1	2	3	4	5
Other (please specify) _____	1	2	3	4	5

Section Two: Access to Capital**3. Has your company applied for or attempted to obtain any financing in exchange for a share of ownership at any stage in its development?**

- Yes (Go to 4)
- No (Go to 7)

4. Were you looking for:

- Less than \$500,000
- Between \$500,000 and \$2 million
- More than \$2 million

5. From which sources? (Please indicate all that apply)

- Family
- Friends
- Employees
- Partners
- Non-financial Corporations
- Private individuals not connected with the company ('business angels')
- Local venture capital firms
- Other Canadian venture capital firms
- US venture capital firms
- Other foreign venture capital firms
- Other (please specify) _____

6. As a result, did the company obtain any financing?

- Yes
- No

Section Three: Interactions

7. Please choose five people with whom you interact professionally, and who you feel are valuable to your business dealings. Using their initials as a reference, provide the following details:

Initial	Years Known	Relationship	How often do you talk business with them? (Check one)				
			Once a week or less	Twice a week	3 times a week	daily	more than daily
1							
2							
3							
4							
5							

Section Four: Additional Information

9. What is the gender of the majority owner of this business?

- Male
 Female
 50% Male-owned and 50% Female-owned

The purpose of this questionnaire has been to gather important background information about your company. To further enrich our understanding of your company, we would like to interview you. Such interviews would take approximately one half hour of your time and we would conduct it, if you agree, at a time that is convenient for you. If you would be willing to participate in a brief follow-up telephone interview please provide contact details:

Name: _____
 Company: _____
 Address: _____
 Telephone: _____
 Fax: _____
 E-mail: _____

THANK YOU FOR COMPLETING THIS QUESTIONNAIRE.