Networking Among Firms and Organizations in the Ottawa-Region Technology Cluster

.

Sylvie Mitchell is Marketing Manager, Advertising and Brand, Export De elopement Canada. Her current research interests include the study of relationship marketing and networking both inside and outside of organizations.

Judith Madill is Professor of Marketing in the Eric Sprott School of Business, Carleton University. Dr. Madill's current research interests include the study of small business financing and relationship marketing as well as not for profit marketing.

George H. Haines, Jr. is the Distinguished Research Professor of the Eric Sprott School of Business, Carleton University. Dr. Haines's current research interests include the study of Canadian financial markets for small business financing.

Allan Riding is Co-holder of the Deloitte Professorship in the Management of Growth Enterprises, School of Management, University of Ottawa. Dr. Riding's current research interests include the study of Canadian financial markets for small business financing.

Contact:

George H. Haines Jr.
Eric Sprott School of Business
1125 Colonel By Drive
Ottawa, ON, K1S 4Y7
Phone: (613) 520-2388(messages only)
Fax: (613) 520-4427
E-mail: george_haines@carleton.ca

Networking Among Firms and Organizations in the Ottawa-Region Technology Cluster

Abstract

It has been argued that technology firms need to develop more external relationships than non-technology based firms in order to be successful. Conflicting views exist on networking usage and value for technology firms and there is a lack of empirical research on this issue. Few empirical studies have been conducted comparing technology-based with non-technology based firms in terms of networks and linkages. This work compares technology and non-technology based firms to assess the quantity and value of their networks and linkages within the Ottawa cluster and also examines networks and linkages with organizations external to the Ottawa technology cluster.

Keywords: Networking, linkages, clusters, relation marketing

Introduction

The objectives of this study are to gain a better understanding of the forces that create and shape regional technology clusters and the nature of the networks that appear to be central to regional cluster formation. The specific issue studied is whether there are significant differences between technology-based firms and non-technology based supplier firms in their usage and valuation of networks and linkages with other organizations in their cluster and their market web.

Regional collective learning processes that occur in clusters appear to play a central role in creating a capability for combining and reassembling knowledge to generate high rates of technological and product innovation (Lawson and Lorenz, 1999). In turn, this leads to enterprise development and employment growth. According to Keeble and Wilkinson (1999b), the key elements of these processes are: linkages and networking among firms and other organizations; flows of highly skilled workers within scientific and professional labour markets; and, spin-offs of new firms from existing organizations.

Keeble and Wilkinson (2000: 1) state that “regional high technology clusters … are characterized by substantial numbers of small, new, and innovative enterprises engaged in technology-advanced manufacturing and service activities”. There is argument in the research literature about what the definition of a cluster should be. Cooper and Folta (2000) cite Prevezer (1997) as defining clusters as “groups of firms within one industry based in one geographical area.” Cooper and Folter (2000) also cite Porter (1998) as defining clusters as “geographic concentrations of interconnected companies and institutions in a particular field.” As Cooper and Folta (2000: 348) note, the Prevezer and Porter definitions suggest a cluster is “a set of related firms in close geographic proximity,” a concept also embraced by Keeble and Wilkinson’s definition. This paper will define a cluster as a set of firms in close geographic proximity. Doyle (2005) published a genealogy of firms in the Ottawa region that demonstrates that the great majority of Ottawa enterprises share common roots. Therefore, this study adopts the view that there is one technology cluster in Ottawa, and that the one cluster represents a geographic concentration of interconnected companies and institutions in advanced technology.

This paper compares the use of networks and linkages by technology firms and non-technology firms in the Ottawa technology cluster. Ottawa is Canada's leading technology cluster and home of such leading companies as Mitel, March Networks, Corel, Cognos and others. The origins of this centre were examined by Steed in the early 1980s (Steed and DeGenova, 1983), in the business media at around the same time (e.g. Mittelstaedt, 1980, Sweetman, 1982, McDougal, 1986), and, more recently, by Harrison, Cooper and Mason (2004), Madill, Haines, and Riding (2005a), and Mason and Harrison (2005).

Literature Review

Clusters: What is Known

Numerous studies have sought to assess how regional collective learning processes contribute to the success of various regional high technology clusters in the United States of America. Recent work in the European context includes papers on Cambridge (Keeble and Wilkinson, 1999a,1999b), Sophia-Antipolis (Longhi, 1999), Grenoble (de Bernardy, 1999), Pisa, Piacenze and NE Milan (Capello, 1999), Munich (Sternberg and Tamasy, 1999) and Goteborg (Lindholm Dahlstrand, 1999). Keeble and Wilkinson (2000) also include papers by all the preceding authors as well as Lawson (2000). Pinch and Henry's (1999) analysis of the clustering of the British motor sports industry also draws heavily on concepts of regional collective learning. The Urban Studies special issue of 2004 (volume 41, number 5/6) contains theoretical studies by Cumbers and MacKinnon (2004), Phelps (2004), Maskell and Lorenzen (2004), Benneworth and Henry (2004), Wolfe and Gertler (2004), Simmie (2004), and Cooke (2004) as well as empirical studies of clusters in Stockholm (Power and Lundmark,2004), Ottawa (Harrison,Cooper and Mason,2004), Scotland (Leibovitz,2004),Oslo (Isaksen,2004), and Styria (Todtling and Trippi,2004). Perhaps the most influential seminal study, however, is Saxenian's comparison of Silicon Valley and Boston's Route 128 (Saxenian, 1994), followed up by the studies reported in Kenney (2000) and Lee, Miller, Hancock, and Rowen (2000).

Saxenian sought to explain the contrasts in the development of Silicon Valley and Route 128 during the early 1990's based on a framework that embraced three components. The first part of Saxenian's framework (1994: 7) comprised local institutions and culture, defined as “the shared understandings and practices that unify a community and define everything from labor market behavior to attitudes toward risk-sharing”. This concept embraces non-firm entities such

as educational and research institutions, business associations, local governments, and other formal and informal organizations that provide for local social integration. Second, Saxenian defines 'industrial structure' as the degree of vertical integration linking firms in the community. This includes linkages among producers, suppliers, and customers and is, to a large extent, similar to the model postulated by Ryans et al. (2000). Saxenian, however, argues that industrial structure must be embedded within an overarching framework. The framework she proposed incorporates the three components mentioned previously. The third component of the Saxenian's model is 'corporate organization,' which she defines as 'the degree of hierarchical or horizontal coordination, centralization or decentralization, and the allocations of responsibilities and specialization of tasks' within firms (Saxenian 1994: 8). According to Saxenian, the relative size of firms within their cluster is also an important element of this component.

Using this framework, Saxenian examines the origins of both the Silicon Valley and Route 128 technology clusters. Both areas had benefited from federal government funding and university linkages (Stanford and San José State, MIT respectively). In both settings, key individuals provided starting points that led to both areas becoming renowned for electronics and computer-related industries during the 1970s. Saxenian describes Route 128's decline through the 1980s, relative to Silicon Valley, and attempts to infer lessons from this difference.

Saxenian concludes that local institutions and culture are important elements in fostering innovation and wealth creation. She reasons that within such a culture, a local economy built on flexible networks of firms of various sizes is more desirable than larger, more autonomously structured firms in terms of economic competitiveness and market responsiveness. In short, the East Coast setting was characterized, according to Saxenian, by relatively greater degrees of corporate secrecy, more conservative universities, and more independent and

hierarchical firms. She maintains that in Silicon Valley a more open and entrepreneurial environment fostered a network-based region with a relatively greater capacity to innovate and share knowledge.

Roy (1999) argues that Saxenian's paradigm has considerable merit, but that it is mute with respect to the roles of various levels of government. He therefore expands Saxenian's model and defines a framework that he calls the 'strategic localism' template. Roy (1999) concludes that his paradigm is a useful extension of Saxenian's approach and that governments (especially local governments) and local trade associations can play a key role in cluster formation and development.

Finally, some accounts of technology clusters identify the importance of venture capital firms. For example, Florida and Kenney (1988: 43) refer to venture capital as being 'an integral part of the well developed technology infrastructures', or 'social structures of innovation'. Saxenian (1994:39) notes the involvement of Silicon Valley's venture capitalists in the businesses they funded: 'advising entrepreneurs on business plans and strategies, helping find co-investors, recruiting key managers, and serving on the board of directors'. The Ottawa cluster may be unique in that very little institutional venture capital was available in the region until relatively recently. Because of this difference, the Ottawa region may be an important example of cluster development for other regions in which a venture capital infrastructure may be lacking.

Networking and Small and Medium Sized Enterprises

A developing body of literature built on the foundations of the seminal Granovetter studies (1973, 1985) is focused on networking in entrepreneurial firms (c.f. Johannisson, 1995a and 1995b, 1998, Katz and Williams 1997, Chell and Baines 2000, Collinson 2000, Freel 2000,

George, Wood, and Khan 2001, Vanhaverbeke 2001, Shane and Cable 2002, Singh 2005). Much academic literature argues that networking is a desirable activity for entrepreneurial firms – especially knowledge-based technology firms (Freel 2000, Ryans et. al. 2000) leading to competitive advantages which in turn leads to increased performance.

Networking is often defined as the set of all links among people (Granovetter 1985, Katz and Williams 1997). This set of links comprises both strong and weak ties. There is considerable discussion about the value of both strong and weak ties in networking. Strong ties to family and close friends lead to trust as well as sharing of contacts and information (Chell and Baines 2000, George et al. 2001). However, reliance on strong ties mitigates against the generation of new information and fresh perspectives to create and exploit business opportunities for growth and development. The 'strength of weak ties' (Granovetter 1973, 1985) allows individuals in business to draw upon information, advice and assistance from a large diverse pool of contacts with people. This paper follows the work of Chell and Baines (2000), George et al. (2001) and Shane and Cable (2002) in defining networking as the action by which an individual develops and maintains contacts for business development purposes.

There is debate in the literature concerning the relationship between networking and success in entrepreneurial firms (Witt, 2004). The majority of the literature argues that weak tie networking is fundamental to success in entrepreneurial endeavors (Chell and Baines 2000, George et al. 2001, Freel 2000, Vanhaverbeke 2001). Madill, Haines and Riding (2005b) show that valuing network connections on the part of entrepreneurs leads to a higher probability of achieving venture capital financing, one possible intermediate success criteria for entrepreneurial firms. However, this view is not universally held. Johannisson's (1990) study of Swedish firms

did not find networking related to success and Johannisson (1995a: 190) argues that a causal relationship is far from self evident:

> 'That which is taken for granted, especially in American but also European network research, that networks enhance qualitative and quantitative growth, must be reconsidered'.

Research by Curran et al (1993) has shown that owners of small firms in the U.K. do not actively engage in networking activities with other business owners or organizations. Reasons for lack of networking include lack of time; lack of growth aspirations; as well as a reluctance to network arising from the entrepreneur's need for independence (Johannisson, Alexanderson, Nowicki, and Sesseseth 1994, Chell and Baines 2000). On the basis of 104 interviews with small business owners, Chell and Baines (2000) show that small businesses do use their trading links as sources of useful information. Customers were found to be the most important source (71% overall) while other business owner-managers were also important (57% overall). Chell and Baines (2000) also report on the frequency (not on value) of contact with more formal institutions showing that only slightly more that one-third of owner managers had had any contact during the previous three years with the Chamber of Commerce (38%), or professional or trade associations (35%).

The research literature also suggests that there may be sectoral differences in the extent and type of networking. Collinson (2000: 236) presents Scottish data to show that high technology firms utilize networks although 'the kinds of interaction and interdependencies … in Scotland are certainly very different… from the Silicon Valley model', while Ryans et al. (2000) argue that high technology firms should utilize networking in order to be successful. Freel's (2000) study of 228 U.K. manufacturers showed generally that innovators make relatively greater use of external linkages, in particular, vertical value chain linkages. The most innovative

firms are significantly more likely to be linked (a) with their suppliers (51.5% compared to 37.2% of non-innovators), (b) with universities and colleges (21.1% of innovators compared to 13.2% of non-innovators), and (c) with government, support services and trade bodies (49.5% of innovators compared to 38% of non-innovators). However, Freel (2000) found no evidence that the most innovative firms are more likely to have been involved with joint activity with customers generally (47.5% of innovators had such linkages compared to 43.4% on non-innovators). The study also showed a relatively low number of firms involved in formal collaboration with competitors – only 14.1% of innovators and 9.3% of non- innovators engaged in any form of joint venture with competitors. Chell and Baines (2000) found that 'knowledge' business owner-managers in the U.K. were more likely to be active networkers – more that one-half (52%) of the 'knowledge' business owner-managers were networkers compared to less than one-quarter (23%) of the 'non-knowledge' owners. Both Freel (2000) and Chell and Baines (2000) made no distinction between local and non-local network linkages. Indeed, as Britton (2004:374) points out "…research indicates that the material input and output connections established by smaller firms in advanced technology industries such as electronics often are not limited to local opportunities" (MacPherson 1987, 1988, 1997, Grotz and Braun 1993, 1997, Keeble et.al. 1998, 1999, Freel 2000). Britton (2004) shows differences exist between types of firms, as well as that (p.387)" network choices made by innovative firms…include strong extra-regional relationships…". Simmie (2004) and Wolfe and Gertler (2004) also present evidence that they claim supports the conclusion that "national and international collaboration is more important for innovative firms than local linkages" (Cumbers and MacKinnon, 2004: 965).

Lastly, in a very innovative piece of research, Shane and Cable (2002) show that direct and indirect ties between entrepreneurs and seed-stage investors influence the financing of new

firms. Both direct and indirect ties are positively and strongly related to the probability of investment. Direct ties encourage investment, but are superceded by information from indirect sources. These social ties operate primarily as a mechanism for information transfer between investors and SMEs. Shane and Cable argue that future research is needed on the effects of social ties on the financing of high technology firms in clusters.

Conclusions and Questions From the Research Literature

Central to all accounts of cluster formation and development is the notion of linkages and networks among firms. However, the growing body of literature focusing upon networks and linkages (described above) leaves many questions about the role of networking in SMEs in key sectors including high technology. This topic is the focus of this study. To provide a conceptual context for this analysis, the work of Ryans et al. (2000) is examined. They argue that in many technology-intensive businesses, there is less vertical integration than in more mature less technology intensive businesses. This often results in long market chains in technology intensive industries with different organizations playing key roles in creating and delivering the products and services for customers and end users. 'For this reason, successful competitors in technology-intensive industries often are companies that are very effective at developing both the internal and external relationships required for success' (Ryans et al. 2000: 5). There also is a growing body of marketing research and writings on the importance of managing relationships with customers and suppliers in industrial markets and services in particular, for example, Gronroos, 1991, 1996, Morgan and Hunt, 1994, Buttle 1996, Sivada and Dwyer 2000. However, Madill, Haines and Riding (2004:363) found that:

> "technology based firms are significantly less linked (with other organizations) than are non-technology based firms…. In no instance did

> technology firms value their linkages more than non-technology firms in the Ottawa area did".

This result raises the possibility that the viability of technology clusters may well depend critically upon the networking practices of suppliers to the technology firms in the cluster. For example, Power and Lundmark (2004) demonstrate a much higher level of mobility (for labour) in clusters than in the urban economy as a whole.

Ryans et al. (2000) have proposed a strategic planning process which differs from more traditional models in that it introduces a new step in the process – planning and managing critical relationships. This new step occurs after analysis and tentative decisions have been made regarding strategic directions for the firm. They argue that some of these crucial relationships will be with other organizations within the supply chain, while others will be with individuals or organizations outside it. The authors use the concept of a 'market web' to capture all the relationships that they believe need to be managed. At the centre of the web is the market chain. The chain consists of the focal company and a number of relationships upstream and downstream from it. Surrounding the market chain are a number of 'off-chain' relationships which augment the chain and turn it into a web. The difference between a market web and a cluster is physical propinquity that is found in a cluster, but not in a market web. The second difference between a market web and a cluster is that a cluster includes the presence of networking among non-marketing participants while a market web focuses on marketing participants.

The Ryans et.al. (2000) marketing planning model was developed based on the author's work with companies in technology-intensive industries, and to our knowledge, no prior empirical testing of the ideas concerning market web linkages in the model has been conducted. Empirical work done by Sivada and Dwyer (2000) can be tied in loosely in that it shows that there is a link between the factors supporting new product development success and alliance

success, two areas that on first glance may not appear to be directly related. This research suggests that successful technology firms (well known for the speed at which they introduce new products to the market) may have a skill set which also supports successful new product introductions. This, in turn, can support the development of alliances and relationships necessary for competitive success as prescribed in the Ryans et. al. (2000) model.

Therefore, the purpose of the present study is to conduct research concerning the usage and value of technology and non-technology based firms' linkages both within their cluster and within their market web(i.e., external to the cluster). The literature reviewed above was used to guide the research and propositions were developed from the existing literature as a result of the research reviewed above.

Conceptual Context and Research Propositions

Research Questions

Are there significant differences between technology-based firms and non-technology based supplier firms in the usage and valuation of networks and linkages with other organizations in both their cluster and their market web?

Hypotheses

Hypothesis 1: Technology-based firms use more linkages with organizations in their cluster than do firms in non-technology based sectors.

Hypothesis 2*:* Technology-based firms value their linkages with organizations in their cluster more than do firms in non-technology based sectors.

Hypothesis 3*:* Technology-based firms use more linkages with organizations external to their cluster than do firms in non-technology based sectors.

Hypothesis 4*:* Technology-based firms value their linkages with organizations external to their cluster than do firms in non-technology sectors.

Research Methodology

Population Definition

The population for the study comprises technology intensive firms and non-technology based firms that supply the technology intensive firms in the Ottawa cluster.

Sampling Frame

The sampling frame was a commercial database purchased from the *Ottawa Business Journal*, which provides an industry classification for each firm. The use of this database as the sampling frame is appropriate in this situation because there is no other up-to-date listing readily available that distinguishes the technology industry classification.

Unit of Analysis

SMEs are defined as firms with annual revenues of $50,000,000 or less and 500 employees or less. Storey (1994, p.13) provides support for this in his definition of SMEs as he divides the sector into three as follows:

1. Micro-enterprises are those with between 0 and 9 employees;
2. Small enterprises are those with 10 to 99 employees; and
3. Medium enterprises are those with 100-499 employees.

Type of Sampling

Given that the population of technology firms in the Ottawa cluster was a manageable number (769 technology-based firms and 698 non-technology supplier firms), the entire population of firms provided by the commercial database were sent a faxed survey. Questionnaires were thus sent out as a fax-back form and were addressed to the attention of the CEO. The package consisted of a fax cover sheet, a personal letter from the researchers, a one-page description of the research project, a return-fax cover sheet, and the questionnaire. The entire package faxed consists of 11 pages.

Follow-up letters were also faxed out two weeks after the initial distribution to encourage participation. An additional option of filling out the survey online was offered to the recipients, which helped bring up the response rate. This fieldwork was carried out during the months of May to July of 2003.

Pre-Test

Pre-testing was performed in the last week of April 2003. The survey included an additional question as recommended by Aaker and Day (1983) which goes as follows, "We would appreciate any suggestions you may have for making this questionnaire clearer or easier to answer. For instance, were any of the questions confusing? Why?" The pre-test survey was delivered to some graduate students at Carleton University who have full-time employment in technology firms in the Ottawa region. Further, the survey was also distributed to a few additional contacts from both the technology and non-technology databases. The pre-test phase was quite useful in making sure that the intended audience would understand what was asked of them. Two pretest respondents suggested that the questions be re-arranged into "a more strategic and rational order", a change that was indeed made prior to faxing out the survey to the sample at large.

Results

The technology database purchased from the *Ottawa Business Journal* (sampling frame) contained 759 companies classified as technology firms and 691 classified as suppliers to the technology firms (non-technology). For this study, 587 (77.3 percent) technology firms and 493 (71.3 percent) non-technology firms actually received the survey. The remaining firms were unreachable.

Surveys were received from 182 firms. Of these firms, 96 were classified as technology firms and 86 were classified as non-technology firms (supplier firms). That calculates as 16.4% and 17.4% response rates respectively. This is a lower response rate than that reported in Madill, Haines and Riding (2004). Porter (2004) notes that survey non-response has become a serious problem for academic researchers since response rates have been falling. These numbers may be further evidence of this general trend.

The technology firms in this study were mainly formed in the Ottawa area (93 percent) and most were founded as independent companies (94 percent), of which most remain independent (85 percent). The non-technology firms in the 2003 sample were mainly founded in the Ottawa region (85 percent). Nearly all firms (97 percent) were founded as independent firms, most of which (90.7 percent) remain independent. Most of the technology and non-technology firms (76 percent of technology firms and 77 percent of non-technology firms) were founded by a team consisting of at least two individuals. Founders in technology firms in 2003 were likely to come from Production/Operations and Sales/ Marketing backgrounds (see Table 1).

Insert Table 1 Here

The technology firms have a higher proportion of founders coming from a Production/Operations background than the non-technology firms in 2003. Finally, the non-technology firms in this sample are slightly older than the technology firms. The large majority of firms in both groups were formed in the Ottawa cluster region and formed as an independent firm. A high percentage of these firms remain independent.

The two categories of groups are different with respect to the use of venture capital. Nearly half of the technology firms raised risk capital; less than one quarter of the non-technology firms raised such funds. Both groups do however show a use of financing from

business angels. The two categories of firms also appear to differ with respect to the proportion of founders still with their respective firms. Founders for the non-technology firms appear to remain with the firms longer than those from technology firms. The type of organizations the founder/founders worked for immediately before their companies were founded varied on different levels but most of the founders for the technology and non-tech firms came from small firms.

The large majority of founders for both the technology and non-technology firms worked within 30 miles of the founded company, before founding it. This indicates proximate homegrown talent and entrepreneurship. The technology and non-technology firms differed slightly in terms of the functional responsibility of the founders in their previous organizations. The technology firm founders were mainly set in technical roles while the non-technology founders were mainly in Sales/Marketing roles. Again, the two categories of firms appear to also differ with respect to the distribution and frequencies of sources of knowledge. However, it appears that overall the two categories of firms are well matched and provide a reasonable basis for comparison.

Research Results: Networks and Linkages Within the Cluster

This section will test empirically the difference in use and value for linkages within the cluster between technology and non-technology firms. The hypotheses being tested are listed below followed by the research findings.

> ***Hypothesis 1****:* Technology-based firms use more linkages with organizations in the cluster than do firms in non-technology based sectors.
>
> ***Hypothesis 2****:* Technology-based firms value their linkages with organizations in their cluster more than do firms in non-technology based sectors.

To measure the usage and value of linkages the respondents were asked to rate the frequency of use of linkages with 11 types of individuals and organizations in the Ottawa area. They rated usage on 5-point scales ranging from “not used at all” to “used frequently”. The value of these linkages was also measured by asking each respondent to rate the value of each linkage on a 5-point scale ranging from “not at all valuable” to “extremely valuable”. This approach is precisely the same as the one used by Madill et al. in 2004. Tables 2 and 3 present the 11 categories of possible linkages along with the means for each scale for technology and non-technology firms in terms of use of and value for linkages.

Insert Table 2 here

Insert Table 3 here

To test their propositions on usage of linkages among firms, Madill et. al. (2004) constructed a scale measuring overall firm linkage and networking by adding the scores on the frequency of usage of links with the 11 categories of potential linkages. A *t*-test comparing mean usage (as measured by this summated scale) between technology and non-technology firms showed that technology firms were significantly less linked than the non-technology firms in the Ottawa cluster ($t = -3.44$, $p < .001$). A similar method is used in this research to test Propositions 1 and 3.

To test the difference in use of linkages, 88 technology firms provided valid responses along with 80 non-technology firms. The technology firms reported a mean usage value of 26.85 (s.d. of 7.17) and the non-technology firms reported a mean of 28.78 (s.d. of 6.90). The *t*-test results comparing mean usage (as measured by the summated scale) between technology and non-technology firms showed that at the .10 level of significance, technology firms are significantly less linked than the non-technology firms in the Ottawa cluster ($t= -1.77$, $p=0.08$).

To compare the value of the linkages between the technology and non-technology firms, only valid responses were scored (89 technology firms and 76 non-technology firms). The overall mean generated from the summated scale for technology firms was 25.87 (standard deviation of 6.50) and 27.14 (standard deviation of 6.28) for non-technology firms. Note that the average for non-technology firms is higher. The *t*-test results comparing mean value (as measured by this summated scale) between technology and non-technology firms showed that technology firms do not significantly value more their linkages than the non-technology firms in the Ottawa cluster ($t = -1.28$, $p = 0.20$). The test was run at the .05 level of significance.

To find out if there are any significant differences at the individual category level between the two types of firms, *t*-tests were conducted to compare technology and non-technology firms on each of the 11 specific linkage categories measured in this study (see Table 2 for *t*-tests on use of linkages and Table 3 for *t*-tests on value for linkages).

The results reported in Table 2 show that technology based firms have significantly fewer linkages than non-technology firms with: suppliers, customers, and other firms in the industry. The significant differences are identified by the "*" in Table 2 at the .05 level of significance. Technology firms are also found to be significantly less linked than non-technology firms with boards of trade, at the 0.10 level of significance (identified as "**" in the Table 2).

The results reported in Table 3 are that technology based firms value significantly less their linkages than non-technology firms within the cluster with customers and other firms in the industry (.05 level of significance). The significant differences are identified by the "*" in Table 3. Testing at the 0.10 level of significance shows that technology firms value their linkages significantly less within the cluster with subcontractors and boards of trade than do the non-technology based firms. Conversely, technology firms value significantly more their linkages

with government research agencies than do the non-technology firms (t=1.85, p=0.07). The significant differences are identified by the "**" in the Table 3.

Overall, the mean values reported in the Table 2 suggest that technology firms do not network actively with a broad range of possible members of the *cluster web* including: research collaborators (universities, government agencies and the industry), firms in the industry, professional organizations, the Board of Trade, and the Economic Development Office. The means of usage and value are all significantly below the mid-points (3.0) of these respective scales.

Table 3 also suggests that technology firms do not value highly linkages with most of the possible members of the *cluster web* with the exception of suppliers, services firms and customers. These three reported scores are slightly above the mid-point of the scale (3).

In summary, technology based firms did not in any instance report significantly more linkages with other organizations or individuals in their *cluster web*. In no instance (at the .05 level of significance) did technology firms value their linkages more than did the non-technology firms in the Ottawa area. These results are thus not consistent with Hypotheses 1 and 2.

Research Results: Networks and Linkages in the Market Web

This section will test empirically the difference in use and value for linkages outside the cluster (i.e., with the *market web*) between technology and non-technology firms. The hypotheses being tested are listed below followed by a description of the research findings.

> ***Hypothesis 3:*** Technology-based firms use more linkages with organizations in their *market web* than do firms in non-technology based sectors.
>
> ***Hypothesis 4****:* Technology-based firms value their linkages with organizations in their *market web* more than do firms in non-technology based sectors.

To measure the usage and value of linkages outside the cluster region, the respondents were asked to rate the frequency of use of linkages with 11 types of individuals and organizations *outside* the Ottawa area. Table 4 and Table 5 present the 11 categories of possible linkages outside Ottawa, along with the means for each scale for technology and non-technology firms.

Insert Table 4 Here

Insert Table 5 Here

Once again, to test propositions 3 and 4 on usage of linkages among firms in the market web (i.e., outside of the cluster), a scale measuring overall firm linkage and networking was constructed by adding the scores on the frequency of usage of links with the 11 categories of potential linkages. A *t*-test was then performed comparing mean usage between technology and non-technology firms in terms of linkages outside Ottawa.

To test whether there were significant differences in the usage of linkages between the two groups of firms, valid responses by 86 technology firms and 81 non-technology firms were used to run a *t*-test. The results show that technology firms do not have significantly more frequent linkages in their *market web* than the non-technology firms ($t=0.370$, $p=0.712$).

A total of 96 technology firms and 85 non-technology firms provided valid responses to the summated value scale. The *t*-test showed that technology firms do not value significantly more their linkages in their *market web* than do the non-technology firms ($t=1.174$, $p=0.242$).

As was done for the within cluster linkages, further *t*-tests were performed to find out if there are any differences in detail between the two types of firms. To do this, *t*-tests were conducted to compare technology and non-technology firms on each of the 11 specific linkage

categories measured in this study (see Table 4). The results reported in Table 4 show that technology based firms have the same level of linkages in terms of frequency of use with respect to the market web as non-technology firms across all possible individuals or organizations.

The results reported in the value for linkages *t*-tests (Table 5) show that technology based firms value significantly more their linkages with universities as research collaborators outside the Ottawa region than do non-technology firms. The significant differences are identified by the "*" in Table 5. Technology firms also value more their linkages with industry research collaborators located outside Ottawa, at the .10 level of significance (identified by "**" in Table 5).

Limitations

There are certain limitations to this study that should be noted. As has been discussed above, the Ottawa cluster may be different in at least two ways from some of the other clusters that have been studied in the research literature. First, there was little or, at times, no venture capital available from venture capital firms to firms in the cluster until quite recently. Second, the cluster operates in a manner that generates interactions among firms across traditional industry categories. Thus, the generality of the results across clusters must be held to be unproven. The study may not have considered all relationships that are salient to technology based firms. Further, the study did not measure the strength of relationships, which be a relevant consideration as well as frequency and value. Finally, very young firms that are included in the data may not yet have had time to form all the relationships which they will eventually have, thus biasing the data toward a smaller reported frequency of interaction than would be the case in the long run.

Discussion and Conclusions

The intent of this research is to answer the research question: "Are there significant differences between technology-based firms and non-technology based supplier firms in the usage and valuation of networks and linkages with other organizations in their cluster and their *market web*?" The importance of the topic was established and an extensive literature review was performed outlining several different theories surrounding market web relationships, networks and linkages within clusters, technology-based firms and their use of linkages, and several other areas surrounding cluster research. The research premise was outlined along with propositions. The research design was laid out providing details on the research methodology, the data collection, and the data analysis. The study remained regional in scope (Ottawa region) and had a time frame of April 2003 to September 2003.

The results (reported in Table 2) showed that technology based firms have significantly fewer linkages within the cluster than non-technology firms with suppliers, customers, and other firms in the industry. Technology firms are also found to be significantly less linked within the cluster than non-technology firms with boards of trade, at the 0.10 level of significance.

The results reported in Table 3 are that technology based firms value significantly less their linkages within the cluster than non-technology firms with customers and other firms in the industry (.05 level of significance). Testing at the 0.10 level of significance shows that technology firms also value their linkages significantly less within the cluster with subcontractors and boards of trade than do the non-technology based firms. Conversely, technology firms value significantly more their linkages with government research agencies than do the non-technology firms. The results show that technology firms do not have significantly more frequent linkages in their *market web* than the non-technology firms ($t=0.370$, $p=0.712$). In

fact, the detailed results reported in Table 4 show that technology based firms have the same level of linkages in terms of frequency of use with respect to the market web as non-technology firms across all possible individuals or organizations. Finally, the detailed results reported in the value for linkages t-tests (Table 5) show that technology based firms value significantly more their linkages with universities as research collaborators outside the Ottawa region than do non-technology firms. Technology firms also value more their linkages with industry research collaborators located outside Ottawa, at the .10 level of significance.

The results give a very different impression of the networking and linkage practices of advanced technology firms from those commonly seen elsewhere. For example, Wolfe and Gertler (2004,1089) state:

> "Perhaps the most vivid examples come from the life sciences, where firms in Canada's leading biotech clusters….have strong non-local backward and forward linkages. Recent analysis of Statistics Canada's national survey of biotechnology firms…reveals the complex, dual geography of relationships in which successful firms are embedded. On the one hand, they tap into global knowledge markets by hiring highly qualified personnel from abroad. They also take advantage of other global flows of knowledge, through the use of scientific publications and databases, by licensing their intellectual property to foreign partners, or by licensing the intellectual property of foreign firms for their own use. When they develop collaborative relations with other firms, for both research and marketing purposes, these are both local and global in nature. On the other hand, they rely heavily on local sources of investment capital from private sources…and are highly likely to have spun off from another local company or research institution at some point in their past."

It would be easy to conclude from such a presentation that advanced technology companies were heavily involved in networking and linking in a global sense. The results of this study show, however, that advanced technology companies are no more heavily involved in networking and linkages outside of their local cluster area than any other companies in the local cluster. Where they differ is that the advanced technology firms place more value on linkages

and networking with research Universities and industrial partners in research activities outside of their cluster than do the non-technology based firms. Perhaps the results of Wolfe and Gertler (2004) are specific to biotechnology companies, or perhaps they saw in the data they worked with what was found above in this study, but chose to interpret the results differently. It is also interesting to note Simmie's (2004: 1110) remarks about his findings (he studied innovative U.K. firms, where innovative was defined as a firm that had introduced a product new to their market in the last three years):

> " Finally, the idea that clustering facilitates on-going relationships with other institutions including universities is also not supported by the data. Some two-thirds of the leading innovators did not use external collaboration at all. Among those who did use them, greater importance was attached to national and European collaborators than to local ones."

While it is difficult to know what interpretation respondents might put on the ambiguous word "importance", at the very least this result seems to be not at variance with the empirical results reported in this study. Clearly, further research is appropriate. Given the frequent use of the word "important" in data collection from clustered firms, it seems particularly relevant to engage in some qualitative work to determine what respondents mean when they report something as "important' or "unimportant'. Future research might also consider the effect of age of firm, where the source technology was developed, how the firm was financed, and perhaps even some subjective or objective measures of success. Perhaps, also, it is time to stop assuming firms will behave according to some arbitrary normative standard developed theoretically by researchers.

What difference do these results make to firms in regional technology clusters? It is a significant finding that non-technology supplier firms play a very real role in making the regional collective learning process work within and among clusters. Pay attention to your suppliers! The

Ryans, et. al. (2000) proposition that firms should explicitly plan and manage critical relationships receives support from these findings. Expending scarce resources to engage in networking activities that are held to be of little or no value is arguably an activity that would occur less if networking activities were in fact managed activities.

Acknowledgements

The authors acknowledge the support of the Social Sciences and Humanities Research Council for the study of knowledge transfer in regional technology centres that enabled this research to be performed. The authors also thank anonymous CCSBE reviewers and Kathryn Manley for helpful comments. However, any errors of omission or commission are the responsibility of the authors.

References

Aaker, D., and G. Day (1983). Marketing research second edition, Toronto: Ontario: John Wiley and Sons.

Benneworth, P. and N. Henry (2004). "Where is the value added in the cluster approach? Hermeneutic theorising, economic geography and clusters as a multiperspectival approach", *Urban Studies*, 41(5/6): 1011-1024.

Britton,J. (2004). "High technology localization and extra-regional networks", *Entrepreneurship & Regional Development* 16(5): 369-390.

Buttle, F. ed. (1996). Relationship marketing theory and practice, London: Paul Chapman Publishing: Sage Publications.

Capello, R. (1999). "Spatial transfer of knowledge in high technology milieux: learning versus collective learning processes", *Regional Studies*, 33: 353-365.

Chell, E., and S. Baines (2000). "Networking, entrepreneurship and microbusiness behaviour", *Entrepreneurship and Regional Development,*12, 195-215.

Collinson, S.(2000). "Knowledge, networks for innovation in small Scottish software firms", *Entrepreneurship & Regional Development*, 12: 217-244.

Cooke, P. (2004). "Life Sciences clusters and regional science policy", *Urban Studies*, 41(5/6): 1113-1132.

Cooper, A., and T. Folta (2000). "Entrepreneurship and High-technology Clusters", in *The Blackwell Handbook of Entrepreneurship*, eds. D. L. Sexton and H. Landström., Oxford: Blackwell Publishers, Ch.17.

Cumbers, A. and D. MacKinnon (2004). "Introduction: clusters in urban and regional development", *Urban Studies*, 41(5/6): 959-970.

Curran, J., R. Jarvis, R. A. Blackburn, and S. Black (1993). "Networks and small firms: constructs, methodological strategies and some findings", *International Small Business Journal,* 11(2): 13-25.

de Bernardy, M. (1999). "Reactive and proactive local territory: co-operation and community in Grenoble", *Regional Studies*, 33: 343-352.

Doyle, D. (2005). The family tree of Ottawa-Gatineau high technology companies 2005. Ottawa, Ontario: Doyletech Corporation.

Florida,R. and M. Kenney (1988). "Venture capital, high technology and regional development", *Regional Studies*, 22: 33-48.

Freel, M. (2000). "External linkages and product innovation in small manufacturing firms", *Entrepreneurship and Regional Development,* 12: 245-266.

George, G., D. R. Wood (Jr.), and R. Khan(2001). "Networking strategy of boards: implications for small and medium-sized enterprises", *Entrepreneurship and Regional Development,* 13: 269-285.

Granovetter, M.(1973). "The strength of weak ties", *American Journal of Sociology,* 78: 1360-1380.

Granovetter, M. (1985). "Economic action and social structure: the problem of embeddedness", *American Journal of Sociology,* 91: 481-510.

Gronroos, C. (1991). "The marketing strategy continuum: towards a marketing concept for the 1990s", *Management Decision*: 29: 7-13.

Gronroos, C. (1996). "Relationship marketing: strategic and tactical implications", *Management Decision* , 34(3): 5-14.

Grotz, R. and B. Braun(1993). "Networks, milieux, and individual firm strategies: empirical evidence of an innovative SME environment", *Geografiska Annaler*, 75 B: 149-162.

Grotz, R. and B. Braun (1997). "Territorial or trans-territorial networking: spatial aspects of technology-oriented cooperation within the German mechanical engineering industry", *Regional Studies*, 31: 545-557.

Harrison, R., S. Cooper, and C. Mason (2004). "Entrepreneurial activity and dynamics of technology-based cluster development: the case of Ottawa", *Urban Studies*, 41(5/6): 1045-1070.

Isaksen, A. (2004). "Knowledge-based clusters and urban location: the clustering of software consultancy in Oslo", *Urban Studies*, 41(5/6): 1157-1174.

Johannisson, B. (1990). "Building an entrepreneurial career in a mixed economy", paper presented at the Academy of Management annual meeting, San Francisco, CA.

Johannisson, B., O. Alexanderson, K. Nowicki. and K. Sesseseth (1994). "Beyond anarchy and organization: entrepreneurs in contextual networks", *Entrepreneurship & Regional Development,* 6,329-356.

Johannisson, B. (1995a). "Entrepreneurial networking in the Scandinavian context: theoretical and empirical positioning", *Entrepreneurship and Regional Development,* 7: 189-192.

Johannisson, B. (1995b). "Paradigms and entrepreneurial networks – some methodological challenges", *Entrepreneurship and Regional Development,* 7: 215-231.

Johannisson, B. (1998). "Personal networks in emerging knowledge-based firms: spatial and functional patterns", *Entrepreneurship and Regional Development,*10: 297-312.

Katz, J.A. and P.M. Williams (1997). "Gender, self-employment and weak-tie networking through formal organizations", *Entrepreneurship and Regional Development , 9*: 183-197.

Keeble, D. and F. Wilkinson (eds.) (1999a). Editors of Special Issue: Regional Networking, Collective Learning and Innovation in High Technology SMEs in Europe, *Regional Studies*, 33(4).

Keeble, D. and F. Wilkinson (1999b). "Collective learning and knowledge development in the evolution of regional clusters of high technology SMEs in Europe", *Regional Studies,* 33: 29-53.

Keeble, D. and F. Wilkinson (eds.) (2000). High technology clusters, networking, and collective learning in Europe .Aldershot: Ashgate.

Keeble, D., C. Lawson, H. Lawton-Smith, B. Moore, and F. Wilkinson (1998). "Internationalisation processes, networking and local embeddedness in technology-intensive small firms", *Small Business Economics*, 11: 327-342.

Keeble, D., C. Lawson., B. Moore and F. Wilkinson (1999). "Collective learning processes, networking and 'institutional thickness' in the Cambridge region", *Regional Studies*, 33: 319-332.

Kenney, M. (ed) (2000). Understanding silicon valley: the anatomy of an entrepreneurial region, Stanford: Stanford University Press.

Lawson, C. and E. Lorenz. (1999). "Collective learning, tacit knowledge and regional innovative capacity", *Regional Studies*, 33: 305-317.

Lawson, C. (2000). "Collective learning, system competencies and epistemically significant moments" in: *High Technology Clusters, Networking, and Collective Learning in Europe*. Ed. D. Keeble and F. Wilkinson, Aldershot: Ashgate.

Lee, C., W. Miller., M. Hancock, and H. Rowen (2000). The silicon valley edge: a habitat for innovation and entrepreneurship, Stanford: Stanford University Press.

Liebovitz, J. (2004). "'Embryonic' knowledge-based clusters and cities: the case of biotechnology in Scotland", Urban Studies, 41(5/6): 1133-1156.

Lindholm Dahlstrand, A. (1999). "Technology-based SMEs in the Goteborg region: their origins and interaction with universities and large firms", *Regional Studies*, 33: 379-389.

Longhi, C. (1999). "Networks, collective learning and technology development in innovative high technology regions: the case of Sophia-Antipolis", *Regional Studies*, 33: 333-342.

Madill, J., G. Haines, and A. Riding (2004). "Networks and linkages among firms and organizations in the Ottawa-region technology cluster", *Entrepreneurship & Regional Development*, 16: 351-368.

Madill, J., G. Haines, and A. Riding (2005a). "A tale of one city: the Ottawa technology cluster, in: L. Shavinina (ed.), *Technology, Innovation, Entrepreneurship and Competitive Strategy*, Elsevier, Amsterdam.

Madill, J., G. Haines, and A. Riding (2005b). "The role of angels in technology SMEs: a link to venture capital, *Venture Capital, 7(2): 107-130.*

Mason, C. and Harrison, R. (2005) "Venture capital investing after the bubble: the case of US VCs in Ottawa", paper presented before the 25th Babson Kaufmann Entrepreneurship Research Conference, Babson, Mass., June.

McDougal, B. (1986,December). "Digital dreamers", *Small Business,* 20-24.

MacPherson, A. (1987) "Industrial innovation in the small business sector: empirical evidence from metropolitan Toronto", *Environment and Planning A*, 20: 953-971

MacPherson, A. (1988). "New product development among small Toronto manufacturers: empirical evidence on the role of new technical service linkages", Economic Geography, 64: 62-75.

MacPherson, A. (1997). "The contribution of external service inputs to the product development efforts of small manufacturing firms", *R&D Management*, 27: 127-144.

Maskell,P, and M. Lorenzen, (2004). "The cluster as market organization", *Urban Studies*, 41(5/6): 991-1010.

Mittelstaedt, M. (1980,June). "Ottawa: the new high-tech haven", *Canadian Business.*

Morgan, R.M. and S. D. Hunt (1994). "The commitment-trust theory of relationship marketing", *Journal of Marketing*, 58: 20-38.

Phelps, N. (2004). "Clusters, dispersion and spaces in between: for an economic geography of the banal", *Urban Studies*, 41(5/6): 971-990.

Pinch, S. and N. Henry (1999). "Paul Krugman's geographical economics, industrial clustering and the British motor sport industry", *Regional Studies*, 33: 815-827.

Porter, S. R. (2004) "Raising Response Rates: What Works?, *New Directions for Institutional Research, 121: 5-21.*

Power, D. and M. Lundmark (2004). "Working through knowledge pools: labour market dynamics, the tranference of knowledge and ideas, and industrial clusters", *Urban Studies*, 41(5/6): 1025-1044.

Roy, J. (1999). Government and governance in high-technology localities; Ottawa- Carleton *and* Canada's technology triangle. Unpublished Ph.D. Thesis, Carleton University School of Public Administration.

Ryans, A., R. More,D. Barclay, and T. Deutscher (2000). Winning marketing leadership strategic market planning for technology-driven businesses, Toronto: John Wiley and Sons.

Saxenian, A. (1994). Regional advantage: culture and competition in silicon valley and route *128.* Cambridge, Ma.: Harvard University Press.

Shane, S. and D. Cable. (2002). "Network ties, reputation, and the financing of new ventures", *Management Science,* 48(3): 364-381.

Singh, J. (2005). "Collaborative Networks as Determinant of Knowledge Diffusion Patterns", *Management Science*, 51(5): 756-770.

Simmie, J. (2004). "Innovation and clustering in the globalised international economy", *Urban Studies*, 41(5/6): 1095-1114.

Sivada, E. and F. R. Dwyer. (2000). "An examination of organizational factors influencing new product success in internal and alliance based processes", *Journal of Marketing,* 64 (1): 31-49.

Steed, G.P.F. and D. DeGenova (1983). "Ottawa's technology-oriented complex", *Canadian Geographer*, 27: 263-278.

Sternberg, R. and C. Tamasy (1999). "Munich as Germany's No. I high technology region: empirical evidence, theoretical explanations and the role of small firm/large firm relationships", *Regional Studies*, 33:367-377.

Storey, D. (1994). Understanding the small business sector, London: Routledge.

Sweetman, K. (1982). "Ottawa is also our high-tech capital", *Canadian Geographer*, February/March: 20-31.

Todtling,F. and M. Trippi (2004). "Like phoenix from the ashes? The renewal of clusters in old industrial areas", *Urban Studies*, 41(5/6): 1175-1195.

Vanhaverbeke, W. (2001). "Realizing new regional core competencies: establishing a customer-oriented SME network", *Entrepreneurship and Regional Development,* 13: 97-116.

Wever,E. and E. Stam (1999). "Clusters of high technology SMEs: the Dutch case", *Regional Studies* ,33(4): 391-400.

Witt, P. (2004). "Entrepreneurs' networks and the success of start-ups", *Entrepreneurship & Regional Development*, 16(5): 391-412.

Wolfe, D. and M. Gertler, (2004). "Clusters from the inside and out: local dynamics and global linkages", *Urban Studies*, 41(5/6): 1071-1094.

Table 1

Prior Functional Responsibility of Founders: 2003 Sample

	Technology	**Non-Technology**
Research	19.0%	10.5%
Technical	29.3%	23.5%
Productions/Operations	11.6%	9.2%
Sales/Marketing	15.1%	24.4%
Finance	9.6%	9.2%
General Man.	11.9%	18.1%

Table 2

Technology and Non-Technology Firms – Usage of Linkages Within Cluster

		Technology		**Non-Technology**	
		Mean	Stan. Dev.	Mean	Stan. Dev.
1	Suppliers	3.21*	1.17	3.59	1.25
2	Service Firms	3.31	1.09	3.43	1.22
3	Customers	3.45*	1.50	4.12	1.31
4	Research/Universities	2.00	1.19	1.99	1.22
5	Research/Government	2.13	1.31	1.87	1.14
6	Research/Industry	1.92	1.13	1.92	1.17
7	Firms in Industry	2.34*	1.21	2.93	1.24
8	Subcontractors	3.01	1.36	3.3	1.39
9	Professional Organizations	2.39	1.20	2.64	1.28
10	Board of Trade	1.51**	0.76	1.75	1.05
11	Economic Development Office	1.63	0.93	1.64	0.98
	Mean of Total Summated Scores	26.85	7.17	28.78	6.90

* Significant at a type one error of 5%
** Significant at a type one error of 10%

Table 3

Technology and Non-Technology Firms – Value of Linkages Within Cluster

		Technology		Non-Technology	
		Mean	Stan. Dev.	Mean	Stan. Dev.
1	Suppliers	3.29	1.21	3.39	1.30
2	Service Firms	3.18	1.10	3.24	1.15
3	Customers	3.11*	1.49	3.90	1.35
4	Research/Universities	1.70	1.02	1.50	0.78
5	Research/Government	2.01**	1.20	1.69	1.08
6	Research/Industry	1.79	0.97	1.75	0.99
7	Firms in Industry	2.36*	1.19	2.77	1.19
8	Subcontractors	2.83*	1.33	3.24	1.39
9	Professional Organizations	2.54	1.23	2.52	1.29
10	Board of Trade	1.43**	0.60	1.64	0.98
11	Economic Development Office	1.57	0.84	1.49	0.84
	Mean of Total Summated Scores	25.87	6.50	27.14	6.28

* Significant at a type one error of 5%
** Significant at a type one error of 10%

Table 4

Usage of Linkages Outside Cluster: Comparing Technology and Non-technology Firms

		Technology		Non-Technology	
		Mean	St. Dev.	Mean	St. Dev.
1	Suppliers	3.36	1.31	3.49	1.38
2	Service Firms	2.65	1.18	2.61	1.33
3	Customers	4.20	1.25	4.20	1.16
4	Research/Universities	1.80	1.16	1.81	1.12
5	Research/Government	1.66	1.03	1.63	1.05
6	Research/Industry	2.00	1.22	1.99	1.28
7	Firms in Industry	2.90	1.30	2.73	1.30
8	Subcontractors	2.77	1.31	2.82	1.42
9	Professional Organizations	2.08	1.30	1.91	1.09
10	Board of Trade	1.35	0.72	1.40	0.71
11	Economic Development Office	1.39	0.76	1.30	0.66
	Mean Summated Scores	26.16	7.03	25.89	7.08

* Significant at a type one error of 5%
** Significant at a type one error of 10%

Table 5

Value of Linkages Outside Cluster: Comparing Technology and Non-technology Firms

		Technology		Non-Technology	
		Mean	St. Dev.	Mean	St. Dev.
1	Suppliers	3.34	1.30	3.02	1.34
2	Service Firms	2.29	1.17	2.30	1.16
3	Customers	3.89	1.30	3.59	1.36
4	Research/Universities	1.75*	1.12	1.41	0.79
5	Research/Government	1.56	0.86	1.37	0.90
6	Research/Industry	2.00**	1.16	1.67	1.07
7	Firms in Industry	2.67	1.34	2.70	1.19
8	Subcontractors	2.35	1.30	2.49	1.34
9	Professional Organizations	1.89	1.11	1.72	1.01
10	Board of Trade	1.33	0.48	1.26	0.37
11	Economic Development Office	1.46	0.59	1.56	0.58
	Mean Summated Scores	24.53	7.82	23.21	7.22

* Significant at a type one error of 5%
** Significant at a type one error of 10%