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The Impact of Gender on Sources of Social Capital within Technology Incubators: Technology Learning in Ventures with Female Founders

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ABSTRACT

New technology-based ventures (NTBVs) gain access to social capital through their affiliation with technology incubators, organizations created to facilitate learning leading to the successful development of nascent firms. Scillitoe and Chakrabarti identified three views of beneficial social capital within networks: “historical ties, organizational facilitation, and trust-based shared pursuit of common goals” (2005: 2). This study extends prior research investigating the development of social capital through organizational facilitation, focusing on female founders. Results are based on surveys collected from 54 technology-based firms affiliated with technology incubators in the United States and Finland. The results from this exploratory study show that the speed of technological learning is negatively affected by the network access in firms with female founding management teams. Implications for technology incubator managers are discussed.

Keywords

Technology incubators, gender, social capital.

* Authors are listed in alphabetical order.

INTRODUCTION

Business incubators serve new ventures in a number of ways – connections to venture capital, assistance in developing a sound business plan, availability of physical dedicated space and shared areas for informal discussions, and opportunities to network with founders of other new firms (Stevenson and Wetterhall Thomas, 2001). Technology incubators, by extension, focus on primarily new technology-based ventures (NTBVs), developing expertise specific to meeting the technological learning needs of the founders (Hansen, Chesbrough, Nohria and Sull, 2000). Researchers are just beginning to understand the actual benefits affiliated firms receive from these associations, although there is not yet a consensus on this issue (Mian, 1996). Building on prior research by Scillitoe and Chakrabarti (2005), and responding to a call for investigations (Forret and Dougherty, 2004), this study seeks to determine whether gender of the NTBVs founding management team impacts the actual contributions of accelerated technological learning within technology incubators. This aspect of creation of social capital has not been addressed within the literature. Social capital is defined as the structure of ties between individuals within a network (Raider and Burt, 1996; Adler and Kwon, 2002). As noted in Scillitoe and Chakrabarti, technological learning can be considered a precursor to innovation (2005), critical to the success of an NTB. The purpose of this study is to determine whether the speed of technological learning of NTBVs affiliated with technology incubators is the same for both male and female founding teams. Findings would assist managers of technology incubators in improving the overall experiences of resident ventures led by female founders.

THEORETICAL FOUNDATION AND HYPOTHESES

Social capital is the positive outcome of influence, often reciprocal, generated within a social network (Adler and Kwon, 2002). Although there exists a growing body of research on the outcomes of social capital within organizations (e.g., Burt, 2001), not much is known about the development of social capital within networks. Three separate streams of research exist: “the evolution of social capital through historical ties, the enabling of social capital creation through institutional or organizational facilitation, and the creation of social capital through the shared pursuit of common goals in the absence of historical ties and facilitation” (Scillitoe and Chakrabarti, 2005: 5). For this study, we focus on institutional or organizational facilitation which can, in the absence of historical ties, be used to generate social capital through collaborative interactions among actors (Warner, 2001). Schulman and Anderson (1999) identify these relationships as “paternalistic interactions”, based on hierarchical structures of patrons sharing information with clients, similar to a traditional mentoring relationship or apprenticeship. The patron provides access to a network of resources and information beneficial to the client.

Technology Incubators

Technology incubators provide resources and expertise necessary to establish new ventures (e.g., Hansen, et al., 2000; Stevenson and Wetterhall Thomas, 2001). They meet both physical and informational needs of the founders. In particular, incubators often contribute technological know-how skills, including legal protection of intellectual property, complex technological and scientific knowledge, and design and production skills (Deeds, DeCarolis, and Coombs, 1999). Affiliation with the technology incubator through a contractual agreement brings founders in contact with these valuable resources. Actors in the network may include university researchers and staff members, anchor tenants, consultants, financial organizations, and the other affiliated ventures (Stevenson and Wetterhall Thomas, 2001). Access to the technology incubator network contributes to the success of NTBVs by facilitating technology learning.

Hypothesis 1: Increased access to the network contacts of the technology incubator will be positively related to faster technological learning of affiliated NTBVs than teams with no access to network contacts.

Female Entrepreneurs and Networking

Networking behaviors have been defined as “individuals’ attempts to develop and maintain relationships with others who have the potential to assist them in their work or career” (Forret and Dougherty, 2004, p. 420). Networking is an activity often used to build social capital (Wellman and Frank, 2001). Kram (1985) describes these professional networks as relationship constellations, involving persons both internal and external to the immediate work environment. The value derived from networking relationships is context specific.

A number of women are creating new technology-based companies, abandoning the rigid structures of large firms for the flexibility of self-employment and choosing to leave behind the frustrations they encountered in the information technology (IT) field (Ahuja, 2002). Just as in the case of their male counterparts, female entrepreneurs often lack fundamental business management skills necessary to make their ventures financially viable. Incubators are intended to be equal opportunity resources, eager to assist founders with their business and professional needs (Stevenson and Wetterhall Thomas, 2001).

Associations with technology incubators could particularly benefit women since research has shown that, as a marginalized group, they often struggle to gain access to people with the information that would benefit them professionally (e.g., Kanter, 1977). Within organizations, men generally have less difficulty joining networks than women (Smith, 2000), since people prefer to network with others most like themselves. Women are often rejected from networking opportunities because they are “viewed as less important, less influential, and less valuable within organizations than men are” (Smith, 2000, pg. 151).

Although incubators are primarily managed by males and most of the founders for the affiliates are male, they are not intentionally artifacts of the proverbial “old boys network”. Female founders are also welcome in the incubators. The question for incubator managers is, “Do female founders learn technological know-how skills at the same speed as male founding teams through their affiliation with technology incubators?”

Hypothesis 2: Female founding management teams with access to the network contacts of the technology incubator will be positively related to faster technological learning of affiliated NTBVs than teams with no access to network contacts.

METHODS

Survey data was collected from NTBVs with contractual relationships with technology incubators in the U.S. or Finland. These two countries are recognized for technological sophistication, innovation, information and communication technology, research and development intensity, and patents (World Economic Forum, 2004). The data was not collected through random sampling techniques. Instead, one of the researchers gained access to various technology incubators through convenience sampling. The final sample included 54 NTBVs within 19 different technology incubators. Approximately 16% of the firms represented had at least one female member on the management team. The average size of the founding teams was eight members. For all respondents, the average educational level was some graduate work and at least a bachelor’s degree in business. All firms included in the study were 10 years old or younger. The average number of years NTBVs were affiliated with the technology incubators was 2 years, and the average age of the technology incubators was 10 years.

Measures

Control Variable. One control variable was included in the study (MOTTTL). Motivation of the founding team members to learn technology practices was used to indicate the level of involvement. The survey item is listed in Table 1.

Predictor Variable. Two predictor variables and an interaction effect were used in the study: the network access provided by the technology incubator (NETACCESS), the number of female founders for the venture (FFMGMT), and the interaction of the two variables (GENACC). See Table 1 for items.

Dependent Variable. The speed of technology learning (SPEEDTL) was used to estimate the length of time (from very slow to very fast) required for the NTB to gain knowledge technological know-how skills. Items are listed in Table 1.

Variable	Question	Type
MOTTL	Which of the following areas in regard to your products or services did your firm desire to learn while having a contractual arrangement with the incubator? Sourcing technologies, integrating technologies, and protecting trade secrets.	Control variable
FFMGMT	How many members of your firm founding team are women?	Predictor variable
NETACCESS	<ul style="list-style-type: none"> How many new contacts has the incubator personnel offered to your firm? What types of new contacts has the incubator personnel made available to your firm? Management, business planning, marketing, recruiting, public relations, legal, technology/science, manufacturing, suppliers, customers, funding, other.[#] 	Predictor Variable - Organizational facilitation
SPEEDTL	Adapted from Zahra, Ireland and Hitt (2000): At what speed did your firm learn about each of the following for your products or services? Use a scale of 1 to 7, with 1 being very slow and 7 being very fast. Sourcing technology, integrating new technologies, and protecting trade secrets.	Dependent Variable - Speed of technology learning $\alpha = .87$
GENACC	[Interaction effect of gender of the founding team and access to network contacts.]	Interaction

- a percentage of elements was used to determine diversity of contacts

Table 1. Survey items from questionnaire.

RESULTS

The factors were analyzed to determine multicollinearity. Table 2 shows the correlations between variables and descriptive statistics. Only two factors, network access and motivation, were significantly correlated with speed of technological learning. Neither correlation exceeds .60, causing concern for results of regression analysis. Although the interaction variable (GENACC) is highly correlated with the network access variable, the relationship is explained by the constituents of the interaction variable. Motivation is moderately correlated with both the interaction variable and the female founding management team.

	Mean	Std. Dev.	SPEEDTL	NETACCESS	FFMGMT	MOTTL	GENACC
SPEEDTL	0.02	1.01	1.00				
NETACCESS	0.04	0.96	.284*	1.00			
FFMGMT	0.48	0.77	-.001	-.06	1.00		
MOTTL	-0.02	1.00	.40***	.16	.18 ⁺	1.00	
GENACC	-0.03	0.99	.05	.59***	.07	.28*	1.00

+ $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$

Table 2. Correlations, means, and standard deviations of study variables.

Regression analysis results for the two models are presented in Table 3. The control variable, motivation, was statistically significant, indicating that the desire to learn technological know-how skills was important. Both models reveal that network access is related to speed of technology learning, supporting Hypothesis 1. In Model 2, the interaction of gender and network access is negatively related to speed of technology learning, the opposite of the prediction in Hypothesis 2. These results are explained in the next section.

	Model 1 (Std. Coeff.)	Model 2 (Std. Coeff.)
NETACCESS	.219 ⁺	.38*
FFMGMT	-.06 (n.s.)	-.03 (n.s.)
FSINMOT	.38**	.43**
GENACC		-.29 ⁺
F Value	4.557**	4.417**
Adj R ²	.168	.205

+ p < .10; * p < .05; ** p < .01; *** p < .001

Table 3. Hierarchical Regression Results (Dep. Var. Speed of Technological Learning).

DISCUSSION

Networking is vital to the success of start up firms. The results of this study indicate that access to networks promotes technological learning. Gender impacts the development process in creating social capital (Wellman and Frank, 2001). "It appears that a high percentage of women in a network potentiates the entire network to be more supportive," (Wellman and Frank, 2001: 252). An important contribution of this study is to inform managers of technology incubators that female founders of NTBVs do not utilize network access in the same way as their male counterparts. The analysis shows that access to beneficial contacts exists for both males and females. However, female founders do not benefit from the contacts in the same way as male founders. Based on the perceptions of the respondents in this study, the speed of technological learning is negatively affected by the interaction of gender and network access. Although we did not ask respondents to explain their perceptions, we provide two plausible explanations for this outcome. First, females might actually exercise their access to network contacts but then fail to benefit from the interactions in the area of technology know-how. For instance, they might refrain from asking for assistance, either due to feelings of embarrassment or intimidation (Kanter, 1977: 281). Alternatively, the female founders might not benefit from the associations at the same rate of speed as their male counterparts. Essentially, they might take a longer period of time to demonstrate and implement technological know-how. A limitation of this study is that the data represents only a snapshot of the phenomenon at a single point in time. A longitudinal study would be required to determine if technological know-how takes longer to occur in ventures led by female founders. Another limitation is that the findings might not be generalizable beyond the population sampled. These preliminary results should encourage researchers to continue to investigate this dimension of social capital development, and the expected benefits for NTBVs with female founders.

Although the findings are useful for exploring the influence of gender within founding teams, the small sample size is a limitation for this study. More data should be collected from founding teams with female members in order to substantiate these results. Additionally, respondents were asked for their perceptions of speed of learning. It is possible that the team members learned technology quickly, but the participant perceived the learning speed to be very slow.

Diversity is desirable in the technology workforce, both in the corporate environment and in entrepreneurial ventures. Therefore, it is important for technology incubators to address the needs of female founders of NTBVs, providing technological know-how skills. This study investigated the unique requirements of female founders of technology ventures when they are affiliated with technology incubators. The implications of this study will increase awareness of specific needs of female founders of new technology-based ventures affiliated with technology incubators.

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