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THE THEORY AND DESIGN UNDERLYING A COURSE OF STUDY ON THE SOCIAL NETWORK OF HAWAII'S BIOTECHNOLOGY ENTREPRENEURS

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**Principal Topic**

Networks are an important element of social capital, which we define herein as the goodwill that is engendered by the fabric of social relations and that can be mobilized to facilitate action (Adler and Kwon, 2002). Networks and social capital are particularly crucial to the success of new ventures and to entrepreneurial endeavors. In this paper, we outline a rationale and a course of research that allow us to examine the social network and relationships associated with several early-stage, biotechnology start-up firms in Hawaii.

We view the networks that embody social capital as existing at two levels of interest, at the level of the firm, and at the level of the community. At the firm level, social capital refers to the value of the firm's social and business relationships, particularly those relationships that enable it to succeed in a competitive environment. At the community level, social capital refers to the quality of relationships and groups that the community fosters. Many *ad hoc* communities and organizations are created with the intent of fostering entrepreneurship or business development within certain geographical or topical boundaries. To these communities the quality and the utility of the networks they establish are primary determinants of their success.

We focus our research on networks developed by and among entrepreneurs in an isolated community (Hawaii), within a limited scope of development (biotechnology firms less than five years old having obtained their first round of investment capital and having qualified under the same section for tax-code treatment). The research methodology we outline addresses a number of research questions.

First, how are networks among entrepreneurs in a relatively small, isolated community configured? For this, our research program identifies, then maps a specific social network of entrepreneurs. Our mapping is built on network theory from Laszlo Barabasi, Steven Strogatz, and Duncan Watts. We adapt the methodologies developed by Rob Cross, Tiziana Casiaro and Miguel Sousa Lobo. The social network is comprised of the principals of the firms involved in the network and intermediaries that those principals identify. Examples of intermediaries are private placement capital investors, tax attorneys, intellectual property experts, university faculty and staff, and government officials. We are particularly interested in identifying certain types of individuals in the network, such as central connectors, boundary spanners, information brokers and peripheral people. Our methodology computes important characteristics of individuals and firms within networks such as individual centrality.

Second, we are interested in whether a strong network develops among entrepreneurs and intermediaries within our focal community. To test this, we measure group density and cohesion.

Both firms and the community are generally thought to benefit from dense relationships and internal cohesion. On the other hand, to be competitive, the community and the firms within the community, must develop critical links with external networks, which we will identify and map.

Third, we are interested in understanding the primary motivators of links in the network. Why do people link with people they link to? Are they primarily attracted to those who are most well-connected, which would indicate that the rich get richer? Do they seek those who are most competent, supporting the fitness model of networks? Or do they generally link with people they like and feel most comfortable with, which would suggest affiliation-based networks? We hypothesize that affiliation plays a stronger role than the strength of connections or competence.

Fourth, how does communication flow within the network? We hypothesize that direct communication generally follows functional links: scientists communicate with scientists, owners with owners, marketers with marketers, etc. We also hypothesize that more communication between firms occurs via intermediaries than directly between firms.

Finally, does social capital benefit both the firm and the community? We hypothesize that the greater the social capital, the more successful the entrepreneur. In our methodology, the measure for success is the length of time it takes the entrepreneur to raise external funds. Firms with high social capital should raise funds more quickly.

### **Methodology/Key Propositions**

We have chosen Hawaii as our relatively small, very isolated community. In particular, we examine companies that are less than five years old, are in the biotechnology industry, have completed their first round of equity investment and that qualify as “Qualified High Technology Business” (a tax designation by the State of Hawaii). As these start-up firms evolve, they may share laboratory space, incubators, investing groups and specialized tax and intellectual property attorneys. We first identify a population of [ten] qualifying firms. We then survey the principals of each firm, asking them to identify up to twenty people who are important in terms of providing them with information to do their work or helping them think about complex problems posed by their work and ask them a number of questions regarding the nature and quality of the links within the network. From this initial survey, we map links internal and external to their organizations. We then repeat the process with well-connected intermediaries between the firms. Finally, we conduct in-depth personal interviews with a sample of principals and intermediaries to gain insights into the dynamics of the network.

### **Results and Implications**

This theoretical and methodological outline represents the beginning of a broad research program focused on entrepreneurs and the networks they connect with. Our primary goal in our research is to study one network of entrepreneurs in one small, isolated community, and become acquainted with its characteristics. Then we plan to conduct similar research with larger, geographically dispersed groups of entrepreneurs.

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