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## **Enhancing Productivity through Effective Collaborations: The Barriers and Enablers of Collaboration within Geographic Bioclusters**

by  
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### *Background*

Increasing competition and specialization of firms in the life sciences industry has led to recognition of the need for collaboration. Bioclusters, the co-location of life sciences entities in a specific geographic area, have therefore emerged as a global trend. While it is assumed that such clusters allow stakeholders to realize synergies through participation and presence in the local area, the collaborative behavior within these clusters has yet to be explored.

### *Study Objective*

The goal of this study was to characterize the barriers and enablers of effective collaboration within bioclusters, and amongst their key stakeholder groups. This study directly compared the bioclusters of San Diego and Singapore to gain an understanding of their relative collaborative environments. San Diego, with cluster longevity of over 40 years, provided an example of organic growth, given its roots in entrepreneurial activities. The Singapore cluster, still in an embryonic state, has a history of organized growth due to the leadership, support, and funding of the Singaporean government. The study of clusters that differ in history of formation and longevity of presence provided the breadth of information needed for an effective comparison of their collaborative environments and approach to collaborative endeavors.

### *Methodology*

Key stakeholder groups, namely academia, industry, finance, and government, were identified and interviews within each cluster were targeted accordingly. Eighteen interviews were conducted in San Diego and sixteen in Singapore. Through literature review, design of a detailed questionnaire, completion of 34 interviews, and systematic statistical analysis of the resulting data, an empirical assessment of the environment for collaboration within each biocluster was performed.

Use of two scoring models provided an objective relative comparison of the clusters, serving as tools to view aggregated interview results. The first model measured the environment for and level of local collaboration and resulted in a Collaboration Score. The second model compared the process of engagement in collaborative endeavors, and resulted in a Formality of Approach Score. The scoring models were also used to compare the collaborative behavior of key stakeholder groups.

### *Key Findings*

Results from relative scoring models indicated a higher Collaboration Score for Singapore as compared to San Diego (p-value=0.0421), and a higher Formality of Approach Score for San Diego, trending toward significance. Aggregate analysis of key stakeholder groups found finance as the most collaborative, with a higher Collaboration Score when compared to industry, the least collaborative group (p-value=0.0189). A higher Formality of Approach Score was also seen for finance when compared to academia (p-value=0.0479). Other notable results include a greater degree of local competition within San Diego (p-value=0.0266) and a particularly low percentage of local industry collaborations in both bioclusters, when compared to academia (p-value=0.0002).

The enablers of collaboration in the San Diego biocluster were identified as the entrepreneurial culture and the existence of top research institutes, and barriers were found to be the high level of competition amongst cluster members and the lack of local venture capital presence.

The enablers in the Singapore biocluster were identified as the physical co-location of public and private entities in the Biopolis and the leadership and financial support provided by the Singaporean government. Barriers were the culture of risk aversion that exists in the cluster and the relatively few entrepreneurs, who often serve as a backbone for the creation of informal networks.

A model for the development of a biocluster was also identified through a comparison of the cluster formation history of San Diego and Singapore. This model needs to be refined and further tested for general applicability, but does suggest a promising start.

Collaborations are important for the continued cycle of innovation in the field of life sciences. Bioclusters provide a forum for these collaborations to occur. Promoting the enablers and removing the barriers increases the effectiveness of collaborations, enhancing the success of a biocluster and its member firms.

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