

White Paper: “High-Tech Business Clusters”

Prepared for the Biocluster Business Development Sub-Committee

By

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Synopsis

The purpose of this document is to provide a *brief* overview of “business clusters”, why they have strategic value and their role in the development of a competitive regional economy. While the conceptual framework (as used in today’s economy) is still being developed, the generic notion of clusters is supported by a rich body of literature and substantial research (see, for example, Porter, 1998). In brief, “business clusters” have been demonstrated to support productivity, innovation and business growth. Ultimately it is posited that clusters are extremely important in today’s economy and that the Rochester metropolitan area could benefit tremendously by purposefully supporting its “biotech cluster” as part of a strategic alignment of local resources. Within the Rochester biotech cluster there exists the potential for a vibrant pharmaceutical sector operating as a virtual drug development company.

What is a Cluster?

Superficially the notion of a “business cluster” is intuitive and self-evident. In the simplest scenario it would represent a collection of businesses with similar objectives (e.g. a “farmers market”; “jewelry row”; “manufacturing centers”). These types of “clusters” share certain characteristics: the cost of labor is paramount, the objectives of these organizations are relatively simple and their products have immediate and material value. It is clear also that clusters can take several forms. For example, they can be:

- Groupings of companies working in similar areas but not formally associated with each other;
- Networks of interdependent companies forming a critical mass from components which, individually would be less viable;
- Business organizations.

The world is becoming more complex, knowledge-based and dynamic. “Business clusters”, particularly for high-tech firms, are very much in vogue. In this context the standard notion of “clusters” is difficult to apply. Operationally high-tech “clusters” seem to generally include networks of interdependent firms, linked by processes that add value. While these organizations may be geographically proximate, and associated in a particular field, they can comprise companies that are either in competition with each other, or complementary, or even both. They can use collaborative approaches to allow businesses and local regional interest groups to develop greater speed, quality, innovation and critical mass. Empirical evidence suggests that successful “high-tech clusters” focus

on strategic regional alliances between universities, research institutes, consultants and private companies.

Why the Emphasis on Clusters ?

Historically clusters have developed by default, for example through the logical geographic association of interdependent companies. Objective analysis of this observation suggests an economic axiom – long-term determinants of regional productivity are rooted in the microeconomic conditions of that economy. In the “manufacturing economy”, the close relationship of the participants of the supply chain is intuitive and supported by the need to control costs.

Alternatively, as noted, the Western economies are shifting into an economic model that is increasingly complex, knowledge based and dynamic; modes for survival must adapt accordingly. The intellectual complexity (including the impact of telecommunications) of the new business models assumes that businesses grow in particular regions for reasons other than the cost of labor. Clearly, the existence of business clusters suggests that “something”, some external forces, obviously can foster growth in targeted industries. It may seem to be an anachronism in a high- tech culture – but regions (micro economies) may bestow specific, tangible benefits that distant rivals cannot reproduce – perhaps it is as simple as relationships, common motivations, and shared knowledge.

“Business Clusters” vs. “Business Incubators”

To facilitate the development of the appropriate solution, it is critically important to distinguish between a “business cluster” and a “business incubator”. Admittedly the literature is replete with examples of authors using the terms “incubator” and “cluster” interchangeably. However, the blurring of definitions does not yield clarity. For the purposes of this discussion, the term “incubator” will be reserved for organizations that provide a means to foster and launch new businesses; alternatively the term “cluster” will be used to refer to groups of companies and related organizations that collaborate to grow their businesses. The latter is consistent with the focus of the research being done in this field and will serve as the operative definition of “cluster” in this review.

In brief, the “incubators” are a requisite resource for young companies where a principal objective is preservation of capital, whereas clusters should be thought of as providing for a larger, regional, objective. In this context, as companies grew they would leave the “incubator” and develop a formal role in the “cluster”.

These issues may prove to be pivotal as the “biotech cluster” attempts to grow and include companies at different levels of maturity and size.

“Business Clusters” – Examples

“Clusters” have made appearances in multiple locations and at different times. A cursory internet search reveals many web sites for clusters and these are associated with counties, cities, and regions, even countries. What causes confusion is that members of clusters can exist in different phases in their respective lives – embryonic, growing, mature and declining. Nonetheless, examples are obvious and numerous:

- “Silicon valley” and the electronics industry
- Detroit and the automotive industry
- Hollywood and the entertainment industry
- New York and finance
- Bangalore (India) and global software
- “Madison Avenue” and advertising
- Vigevano (Italy) and shoe manufacturing
- Boston and biotechnology
- California and the wine industry
- Flowers and Netherlands
- New Jersey and pharmaceutical manufacturing

Strategic Concerns and Competitive Advantages

Again, in the high-tech arena clusters have become very prominent. Yet caveats must also be considered – they are not “silver bullets”. How can investors and potential participants be sure that this is not simply a passing fad, a craze to embrace until a more fashionable idea emerges?

A synopsis of this literature suggests that clusters are comparable to a survival mechanism of competitive species in a biosphere. While it appears to be counter-intuitive, businesses in a cluster can compete and collaborate simultaneously. On a micro-scale this suggest that the pressures of the local competition force the participants to be more innovative, competitive and profitable.

Alternatively, on a slightly more macro scale, -- to borrow a phrase – “the whole is greater than the sum of the parts”. In practice, this type of regional planning translates into the possibility for a scale of operation that would not have been possible without the “cluster”. Specific innovations in a specialized area can clearly yield a global reach and conversely a global awareness of a “cluster” in a specific region. Ultimately significant evidence suggests that companies sharing business interests will migrate to regions (in part or whole) that allow them to leverage the benefits of a relevant cluster and enjoy a competitive advantage. As these companies grow, they become more interdependent with the communities in which they are located. Hence, success is also contingent on community history and current economic conditions.

Obviously the definitive support required for an analysis of the strategic advantages of a cluster transcends the purposes of this document, and the reader is referred to the extensive literature available on the topic.

Can Clusters Be Built?

Intuitively it is difficult, but not impossible, to build a cluster from scratch – however, experience suggests two factors that must be balanced as the “cluster” issue is debated:

- 1) it is hard to build synergies even in areas with established businesses

- 2) in knowledge intensive fields regional policies may enhance cluster development.

Fortuitously, in the aggregate, biotech is still manifestly small firms who share a need to tap into venture capital, public research budgets and support from “big pharma”. Another distinguishing feature is the tendency to co-locate near “sources of knowledge” (universities). Success will require linkage between industries, institutions, universities and governments such that a region will develop a competitive advantage.

The Pharmaceutical Industry in the Rochester Area

Rochester has a population of relatively small companies that individually comprise a microcosm reflecting most of the components of “Big Pharma”. Drug development in the area has the potential to be driven by discoveries at the University of Rochester and other colleges, product development in start-up companies focused on limited numbers of projects, Information Technology at RIT, Pharmaceutical Development catalyzed by the future Department of Pharmacy at St. John Fisher College, contract manufacturing in local companies, etc. Rochester also has a Biocluster within the HTBC organization, with interests in pharmaceuticals, biologicals, devices, and more, providing a business organization to which approximately one-third of these companies (etc.) belong. The R & D component of the pharmaceuticals sector of the Biocluster is drawn in the diagram appended. This defines, in fact, an embryonic “virtual” pharmaceutical company right here in Rochester, capable of taking an idea to market. The diagram has at its central core a definition of the pharmaceutical R & D process – boxes indicate identified areas of competence needed and some organizations and companies, some of them already members of the Rochester Biocluster, which have these competencies. Empty boxes are for readers to add companies that should be included – the authors would be glad to hear of such additions. Similar diagrams could be drawn for other sectors. The challenge for Rochester and its Biocluster is to be a community and an organization which fosters collaborative work among its members, and to have a business organization to which all of the relevant companies wish to belong.

Conclusion

The Rochester economy, reflecting changes observed throughout the country, is experiencing precipitous change. Obviously local industries are making significant adjustments, such as strategically aligning products to compete in the “knowledge economy”. Clearly the emphasis is the production of “value-added” products and services – i.e. emphasis is on the application of intellectual capital. Further, Rochester has the attributes required for “high-tech clusters”, especially in the area of Pharmaceutical R & D.

We conclude that “biotech cluster” is viable idea for the Rochester metropolitan area and worthy of regional support.

References

Porter, M.E. (1998). Clusters and the new economics of competition. Harvard Business Review. Pgs. 77 –90. (Reprint 98609).

Yoong, P., and M. Molina (2003). Knowledge Sharing and Business Clusters. 7th Pacific Asia Conference on Information Systems, July 10-13. Adelaide, South Australia.

Cooke, P. (2001). Clusters as key determinants of economic growth: The example of biotechnology. Cluster Policies – Cluster Development? Edited by Age Mariussen. Stockholm. Nordregio Report: 2). Pgs. 23-38.

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