

Not enough biotechs, and what government can do about it

While financial markets may believe there are too many biotechnology companies in the world, research suggests that the opposite is true.

Kevin Bazley

From the perspective of a government, or for that matter an individual taxpayer with only a passing interest in or knowledge of biotechnology, the biotech sector seems an unpromising area for investment. Biotech as an industry is barely breaking even. The vast majority of biotech companies each employ at most a few dozen people, and the success rate in terms of getting new products to market is not particularly good. A huge financial investment is required to fund a firm's existence for years just to determine if the firm is on the right track to success.

Indeed, with capital resources for biotech seemingly more constrained than ever, it would seem that there are too many biotechnology companies in existence. Certainly, from a North American perspective, it is easy to argue that enough companies exist to take forward a substantial percentage of the most promising technologies. Europeans might argue that the US lead in biotech is insurmountable; to invest in biotech now would be a case of too little, too late.

Why more companies?

However, there is one simple reason why the world needs more biotechnology companies: Biotechs are still a critically important vehicle through which to exploit basic science and technological innovation. Among EU countries, there are over 200 universities and research institutes with major research programs in life sciences, as well as a substantial number of institutions whose work impacts on life sciences. This represents a vast pool of technology and expertise, the majority of which is at least partly supported by public research funds. Having funded this research, it

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is in the taxpayer's interest to ensure that it has the best possible chance of successful exploitation. After all, if the 200 largest institutions in Europe generate an average of ten patentable ideas per year, the pool of intellectual property generated would far exceed the technology portfolio of all but perhaps a few of the world's major pharmaceutical companies.

The challenge for companies and investors alike is to ensure that leading-edge science generates leading-edge products. Over the past decade, changes in both university and government policies in the US have created a system that encourages and rewards those in academia who take steps to see that important basic research has the opportunity, at least, to have a commercial impact. In Europe however, the academic reward system and prevailing attitudes among researchers still promote the idea that exploitation of technology is somehow of lower value than fundamental research. There are encouraging signs, though, that the European scientific community is recognizing that the ultimate achievement is seeing a scientific breakthrough translated into a therapeutic or environmental benefit—and that to achieve this, the commercialization process must be embraced.

The biotech argument

For an individual scientist, as for an institution, a variety of potential routes are avail-

able to enhance the likelihood of successful commercialization of a new technology or key scientific discovery. The preferred option of many research institutions when faced with a potentially valuable piece of intellectual property in the life sciences area is to license it to a large pharmaceutical company. In the best case, this can be the fastest route to commercialization, and may be the most likely to generate substantial financial return for the institutes and individuals concerned. But it is also possible that turning to an existing small biotech, or creating a new venture

to commercialize new technology, may more likely achieve the optimum result.

Certainly, licensing a promising technology to a biotech company, whether existing or new, is neither easy nor low-risk, but it can prove to be a more efficient means to commercialize the technology, and ultimately to maximize returns. Pharmaceutical companies have been known to undervalue intellectual property, particularly when it comes from an academic institution or when it relates to research that is slightly off the mainstream of internal research programs. Thus, a university does not always obtain the best value for its intellectual property by licensing it to a larger, rather than smaller, company.

Conversely, it is almost invariably the case that the less technology a company owns, the more important any new technology becomes to the future of the company. Equally important is the perception of funders, whether venture capital or the public equity markets: a single patent may not perceptibly affect the stock price of Glaxo Wellcome, for example, but the same patent could easily account for a doubling in value of an early-stage biotech company. As a result, intellectual property owners, i.e., academics and their universities, should be able to negotiate better terms, particularly over the long term, from biotechnology companies than from large pharmaceutical

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REGIONAL DEVELOPMENT

companies. As a corollary, because a small biotech company relies on a smaller technology portfolio, it is likely to be more focused on developing the technology quickly, in some cases even being desperate to do so.

Pharmaceutical companies are also looking at biotechnology companies as an important source of innovation, and perhaps even as a cost-effective intermediary in developing new technology into leading-edge products. Often, as a relatively small initial investment, a pharmaceutical company can get an early assessment of a technology's value without having to make a long-term commitment in terms of internal staff resources. Contracts laden with milestones put much of the risk of early technology development on the shoulders of the biotech company, though conversely, the rewards for the biotech company can often be larger in the long run as a result of bearing a disproportionate share of the early risk. Nonetheless, this equation offers benefits for all three parties—the university, the biotech firm, and the pharmaceutical company.

From a government's economic development perspective, one can list other benefits. For example, on a relative basis, biotech companies grow fast and have substantial long-term potential to add value to the economy. Cumulatively, the impact of a local biotech industry can be significant, certainly in terms of growing gross domestic product, if not in absolute employment. Experience from a number of regions suggest that entrepreneurial biotech companies are a factor in attracting venture investment, sucking in funding from outside the region that may ultimately broaden to support other sectors. Even small numbers of such companies can quickly influence how regions are viewed by outside investors, as demonstrated by the fast growing biotech sectors in Finland, Scotland, and a number of German regions.

The necessity for biotech companies to think and act globally almost from the day of inception can also have a positive effect on the surrounding area: serving a global market seems less daunting if the company next door is already doing so, and for most biotech companies, anything less than a global approach may significantly reduce growth potential. The experience of companies such as Quantase, in Perth, Scotland, whose neonatal diagnostic products are being sold in 12 countries less than a year after startup, are more common in biotech than in almost any other industry.

The role of government

If the premise that emerging biotech com-

panies are a positive force for the development of economies is accepted, then what should be the role of governments and their agencies in facilitating such startups? The immediate issues to be addressed include whether a short-term or long-term view is most appropriate, whether government actions should be hands-on or hands-off, and whether the role should be restricted to facilitation or should extend to proactively working to start companies. The often-expressed view that entrepreneurs start companies, while governments get in the way, should always be kept in mind.

A clear lesson can be learned from the development of biotech clusters in a number of areas; government intervention can—and does—fuel growth in the biotechnology sector, but only if other factors are in place. These factors vary, but might typically include the availability of

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support mechanisms, venture capital, and professional advice, as well as a positive attitude to both technology and entrepreneurship.

Research Triangle Park in North Carolina is a good example of patient intervention over a long period leading to the establishment of a self-sustaining cluster of biotechnology companies. Even San Diego would not have developed so far so fast without the impetus provided by government intervention to counter the effects of declining defense contracting. Perhaps the clearest example of successful government intervention is Saskatoon, Canada, where a decision by the Provincial Government to build an agricultural biotechnology cluster has led, over a decade of development, to a vibrant industry employing several thousand scientists and support staff and a reputation as one of the capitals of the agricultural biotechnology world.

The most appropriate form of government intervention is a matter for continuing debate, though it seems clear that steady support for high-quality basic research remains critical to long-term development. Other key interventions include identifying and alleviating constraints on the development of startups, whether related to availability of funding or skills, infrastructure issues, or technology transfer mechanisms. Actions to mitigate

risk for both entrepreneurs and funders are also appropriate.

Biotech in Scotland

Some possible approaches are well illustrated in the Scottish model. The biotech industry in Scotland is growing steadily, with around 50 biotech companies employing 3,600 individuals, a similar number of supply or support companies, and around 15 research institutions with significant life sciences programs. The vast majority of activity is highly geographically concentrated in the Dundee/Edinburgh/Glasgow triangle.

Scottish Enterprise, the government's economic development agency, established a biotechnology team in 1994, and has pursued a focused policy of developing the biotech cluster on a number of fronts. The Scottish Enterprise model has involved supporting research institutions in their efforts to attract commercial research and to familiarize academic researchers with the requirements and rewards of working with company funding as opposed to government funding. In addition, Scottish Enterprise supports the technology transfer infrastructure by identifying promising technologies within the academic institutions and developing exploitation routes for these technologies.

In terms of supporting startups themselves, the agency has helped provide infrastructure, both in terms of property and networking and mentoring support. Perhaps most importantly, it has helped mitigate risk through such strategies as carrying out market research both before and after company formation; by reviewing business plans at an early stage and continuously thereafter until the company is established; and in some cases by investing alongside the private sector as a means of sharing investment risk. Provision of financial guarantees to landlords or leasing companies is also starting to occur as a cost-effective means of helping early-stage companies with no track record. This approach is starting to pay off, as demonstrated by the sustained growth occurring today in the Scottish biotech cluster. We expect our rate of success to accelerate as the benefits of various programs feed through.

Conclusions

Clearly, Scottish Enterprise and similar agencies in a number of countries have recognized that startup biotech companies have a great deal to offer both in economic growth potential and in facilitating the exploitation of research. Such recognition is a prerequisite, but positive action to facilitate development and, even more, the removal of obstacles to growth, can have substantial benefits in the long term. //