



University
of Glasgow



POLICY REPORT

Strengthening the Life Sciences in Scotland



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EXECUTIVE SUMMARY

The Scottish Life Sciences

- The Scottish Life Science sector has grown considerably over the last few years in terms of both new firm formation and employment creation.
- Against a historical background of over-dependence on foreign owned firms and declining manufacturing activity, it represents an important boost to Scotland's knowledge economy.
- It is one of the few sectors in Scotland to create highly skilled and professional jobs in recent years.
- Geographically, the sector is largely concentrated in the Central Belt, although it has developed importance sub-clusters elsewhere in Scotland (e.g. Aberdeen).
- The sector has proved itself internationally competitive and has strong international links, which are likely to grow as the sector matures.

The Benefits of Scotland

- Scotland has a strong science base producing a large number of graduates and high quality scientific research.
- There is strong public support, both for universities and directly to firms, from the Scottish Government and Scottish Enterprise.
- The business angel community is especially strong and dynamic.
- There is an integrated and distinctive healthcare system.
- There is also a strong clinical research sector.
- Finally, there is a global network of people tied to Scotland through the 'Scottish diaspora'.

What is Needed in Scotland

- Greater involvement from universities in innovation and greater engagement by firms in R&D.
- More consistent and coordinated public support along the whole value chain.
- More late-stage investment and 'lead investors' who can draw in the necessary financial resources from outside of Scotland.
- A less restrictive procurement and budgeting system in the NHS.
- Greater collaboration between the NHS and clinical research organisations.
- More people with business development / management experience and skills.
- More people with technical skills.

INTRODUCTION

This report comes out of a research project carried out by the authors. The overall aim of the project was to look at how less-favoured regions (LFRs) such as Scotland can develop, acquire and embed the right knowledge and technological capabilities to encourage the development of new sectors like the life sciences. The UK has one of the strongest life sciences sector in Europe and Scotland represents one of the UK's four major concentrations (Birch, 2009). Scotland is also a part of the UK that has suffered from significant deindustrialisation and uneven development over the past few decades, which presents a series of challenges for the successful and sustainable development of new knowledge-based industries. This report outlines the findings from the project by highlighting what makes Scotland distinctive as a place for life science firms and offers a series of practical recommendations to ensure continued progress.

BACKGROUND

This project sought to go beyond the existing emphasis on regional clusters and clustering effects to explore the importance of global relationships to the emergence of high technology sectors (see Birch, 2008). The global dimensions of the life sciences, for example, tend to be obscured in *cluster* analyses which emphasise indigenous capabilities as the source of innovativeness and competitive advantage, and, therefore, regional economic development. This means that less-favoured regions, which lack the skills, capital and structural advantages of faster growing regions, are given little help other than the exhortation to emulate the 'core' regions despite the inherent problems that such a policy would entail. For example, in the life sciences certain British regions have strong historical and institutional advantages which would be impossible to replicate in other places because of the resources necessary to emulate the capabilities of these regions. The South East of England in particular benefits at the expense of other UK regions from strong institutional support, including the location of the UK's leading universities, a highly skilled and educated workforce, the lion's share of investment capital and research and development activity.

PROJECT DESIGN

The project involved four main activities:

- Mapping the location of the Scottish life sciences
- Surveying Scottish life science firms to explore the extent of their organisational relationships
- Interviewing company managers to understand the role of different influences on their firm's innovation process, and
- Interviewing 'institutional actors' in Scotland to understand the particular strengths and weaknesses of the Scottish socio-economic environment in providing support for the sector.

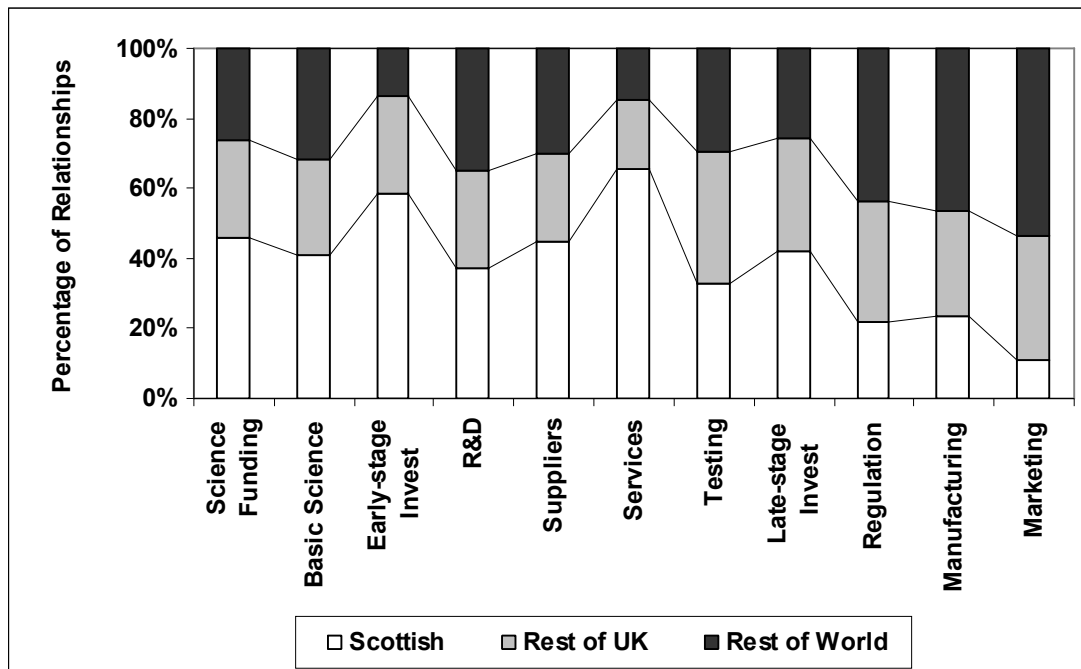
All 'core' life science firms in the *Life Sciences Scotland Sourcebook 2006/07* were sent a survey in 2008: the response rate was around 40% after follow-up phone calls. Subsequently, interviews with 19 managers / directors from life science firms and 13 'institutional actors' were carried out.

MAIN FINDINGS

Figures from the *Sourcebook* suggest that the expansion of the Scottish life sciences has been a success story in the context of broader industrial decline. According to the *Sourcebook*, there are around 600 organisations employing 33,000 people in the life sciences, which includes the academic research base (see **Map** below). Of these organisations, around 200 can be considered to be 'core' life science firms involved in developing products / intellectual property in sectors ranging from healthcare, diagnostics, agriculture, and environmental services. There is also a strong public research base and a large number of supporting organisations providing services or supplies to these firms. Most of these firms and organisations are located in the Central Belt around Glasgow, Edinburgh and Dundee. There are smaller sub-clusters around Aberdeen and Inverness.

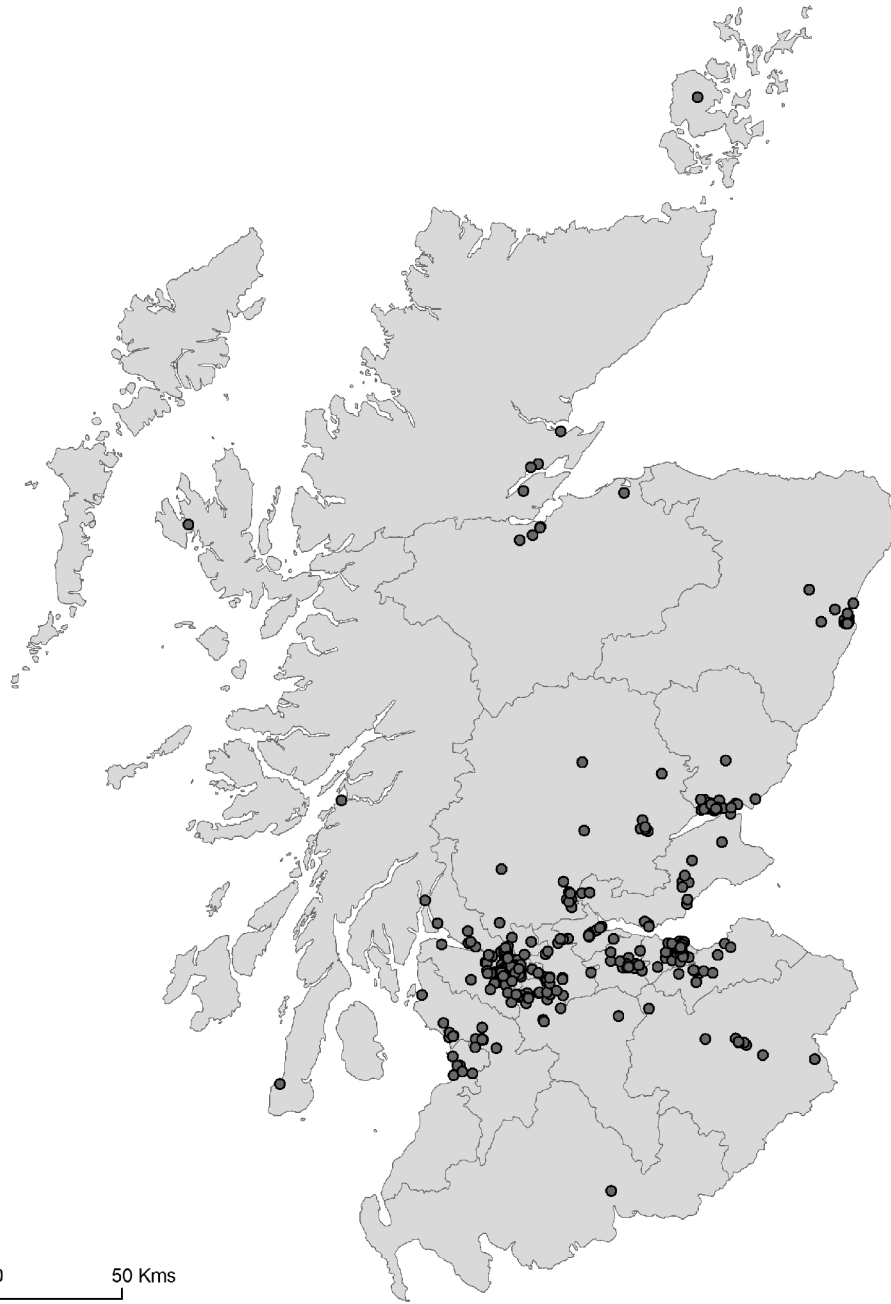
Whilst all of these firms and organisations play a vital part in the overall value chain, the role of national and international linkages is as important, especially as life science firms move closer to market with their products and services. The spread of these linkages is illustrated in the survey responses (**Figure 1**).

Figure 1 Life Science Firms: Relationships with Other Organisations by Place



Scottish Life Sciences

8



This survey data reveal four major findings:

- Firms collaborate more locally during the early stages of the value chain, but...
- ...as firms move up the value chain they collaborate more globally.
- In contrast to much of the claimed benefits of clusters theory, local inter-firm collaboration is very limited with only 4% of firms having a relationship with another Scottish life science firm.
- However, local linkages are important through the role of Scotland's public sector in anchoring life sciences, especially in terms of financial support and providing graduates and postgraduates for the workforce.

What is evident from the extent of the Scottish life sciences is the way that R&D and innovation is plugged into broader, global networks (Birch and Cumbers, in press). These include both international academic communities – relied upon for knowledge exchange, contacts etc – and links with transnational companies capable of financing clinical trials and a product's passage through the regulatory process. Although these global networks are crucial for Scottish life science firms, they are not sufficient in themselves. The interviews highlight the benefits and problems faced by firms in the specific Scottish socio-economic context. These are outlined below:

The Public Sector

Advantages

- Scotland has a strong science base producing a large number of graduates and world-leading scientific research.
- There is extensive public support for high technology industries. Rather than 'crowding out' the private sector (Birch and Cumbers, 2007), the Scottish Enterprise and the Scottish Government provide substantial support for these sectors through grant funding (e.g. *Proof of Concept*), co-funding (e.g. *Co-investment Fund*) and other financial schemes (e.g. *ITI Life Sciences*).

Issues

- For firms, universities are not always the easiest organisations to work with nor is it necessarily easy to access their resources (e.g. equipment). Services like *Interface* – which matches firms to university expertise – prove useful in getting past this problem, whilst restricting competition between universities when it comes to technology transfer would be helpful.
- Public organisations such as Scottish Enterprise can suffer from a lack of staffing continuity as well as some inconsistency between funding schemes (e.g. *Co-investment Fund* is at private investor discretion, whilst *Seed Fund* and *Venture Fund* are at Scottish Enterprise discretion). It would be helpful to coordinate these schemes so that there is always a similar type of support along the whole value chain.

Private Finance and Investment

Advantages

- The Scottish business angel community is very strong and dynamic, even in comparison with the USA. Partly the consequence of a lack of venture capital and institutional investors, the size and structure of business angel groups enable them to contribute significantly to the life sciences and the wider economy.

Issues

- There are limitations to the business angel community's ability to finance the growth of life science firms. The lack of large, long-term investment (e.g. 'patient money') is a disadvantage for Scottish firms because it restricts company growth strategies to the pursuit of trade sales: however, on the up side, this enables the re-investment of returns from these sales in Scotland.
- The limits of specifically 'Scottish' late-stage investment inhibit the achievement of a critical mass of medium and large firms which could provide the stability and market that smaller firms need. This is not so much a consequence of too few investors, but rather a lack of 'lead' investors who can draw in others from outside Scotland.

Regulation and Commercialisation

Advantages

- Most regulation is a reserved issue so Scotland does not provide any distinctive advantages. However, in terms of commercialisation Scotland has some unique features that are worth highlighting and offer potential for the sector. For example, the greater integration of NHS Scotland than other parts of the UK and the autonomy of the Scottish Medicines Consortium (SMC) from NICE could provide a benefit for both patients and firms if the procurement and appraisal of products were altered.

Issues

- The main issue for Scottish life science firms is that they need to be 'born global': their major markets are international, usually the USA, and not the UK (let alone Scotland). Thus small life science firms rely upon larger companies to meet international regulatory standards (e.g. GMP, ISO, FDA etc.), which can lead to a loss of value from Scotland as certain activities are moved overseas.
- The structure of NHS Scotland has also proved problematic for small life science firms as procurement rules and silo budgeting between departments –

e.g. treatment spend and nursing – inhibit the uptake of new innovative products / services.

- There are opportunities available to expand the number of clinical trials in Scotland by partnering life science firms with clinical research organisations (CRO) and public institutions (e.g. NHS, universities). Both the strength of the CRO community and the nature of NHS Scotland provide an opportunity to do this. The autonomy of the SMC could also be used to encourage the sale of cut-price products in Scotland in exchange for access to patients, clinical resources etc (it would also be helpful to incorporate medical devices into the SMC remit).

Labour Market

Advantages

- As mentioned, Scotland produces a proportionately larger number of graduates from its universities than other parts of the UK. The attraction of scientific talent to Scottish universities is a key advantage.
- There is also a wealth of experience and talent available as a result of the 'Scottish diaspora' that can be drawn on, not only through networks like *Global Scot*, but also directly through recruitment to firms. The skills and experience such returnees bring to firms are invaluable when operating in the global economy. Consequently the loss of Scottish graduates to other places need not be a problem as long as they can be attracted back later in their lives. Indeed such global labour flows helps in the process of sector regeneration and knowledge transfer.

Issues

- There are certain problems in the labour market, however, which result from the lack of 'critical mass' in the Scottish life sciences.
- Scottish firms have found it difficult to attract people with management experience, especially in business development (e.g. marketing and sales). The retention of people with this experience and skills is also problematic since Scotland can be seen as a backwater in the life sciences; too distant from places like Cambridge and Oxford, let alone Massachusetts and California.
- There are skills shortages in technical positions related more to the commercial scale-up of new technologies (e.g. manufacturing) rather than the basic research underpinning them.

CONCLUSION

Whilst *critical mass* may be a long-term goal as outlined in the 2008 *Scottish Life Sciences Strategy*, it might be difficult to achieve under current conditions. The tendency for private investment to exit through trade sales is unlikely to change in the near future, but such sales need not be problematic if the firm's activities

are retained and the financial returns are re-invested in Scotland. In the short to medium term it may be necessary to focus more on ensuring that Scottish firms can attract the right kind of talent and the right type of large firm investment that helps to retain capacity in Scotland and tie Scottish firms more closely into global markets and knowledge networks.

This report will end with a series of practical recommendations for how to ensure future progress in the Scottish life sciences.

- I. Co-ordinate public funding streams so that they have similar structures (e.g. discretion of private investors) whilst retaining an emphasis on promoting Scottish economic development.
- II. Strengthen and publicise university technology transfer schemes. It might also be worthwhile to coordinate or centralise technology transfer across all universities so they do not engage in wasteful competition with one another.
- III. Strengthen support for university teaching and research, especially in the pooling of expertise across institutions. Concentration in single institutions should be avoided as this could stifle innovation.
- IV. Support the business angel community and encourage the establishment of 'lead' investors in Scotland. It may be useful to ensure that EIS tax incentives are not lost for businesses collaborating internationally and set up some sort of 'lead investor' scheme.
- V. Supply regulatory advice services to small firms, especially for overseas markets. This is a major gap in most firms' capabilities which could be addressed across the board.
- VI. Encourage NHS Scotland to procure products / services from SMEs and to remove silo budgeting so that Scotland benefits from new innovations and so that firms have an outlet for their products / services.
- VII. Encourage NHS Scotland to collaborate more closely with clinical research organisations to promote the expansion of clinical trials in Scotland.
- VIII. Firms need to be encouraged to pursue university collaboration and increase their own R&D spend, alongside expanding in-house training in both management and technical areas.

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