

Region-Specific Technology Policy in Belgium: The Significance of New Technology Based Start-ups

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ABSTRACT. Since the beginning of the 1980s, strategic regional technology policies have been adopted in Belgium. A number of NTBFs are emerging in generic technology industries such as micro-electronics, biotechnology and information technology. These industries are particularly conducive to the formation of NTBFs since the advancing new technologies are constantly creating new and specialist product-market niches. High technology product groups are selected/supported in the fields of aerospace, medical technology, robotics and office automation, agro-business and energy.

The regional dimension of technology policy raises the question whether a relationship can be established between strategic technology policy and New Technology Based Start-ups in Belgium. An outline of the current situation in Belgium (Flanders and Wallonia) provides an answer to this question.

1. Introduction

In terms of emphasis from the 1980s onwards, strategic technology policies emphasize the selection and support of generic technologies and high technology product groups. There is an increased emphasis on NTBFs and on interfirm collaboration (Oakey *et al.*, 1988) and on strategic (technology) partnerships (Contractor and Lorange, 1988; Knight, 1989; Syed Tariq, 1991). There is little disagreement on the critically important growth role small firms in general and NTBFs in particular play. NTBFs can grow rapidly and through dynamic complementarities with other

organisations (i.e., universities, other small — new technology based — firms, large firms), they can generate regional growth. However, their innovatory potential varies between sectors and across the industry cycle as does their growth creating potential (Rothwell, 1990).

2. The regional dimension of NTBF-formation and growth

It is accepted that the regional economy, no less than the national or international economy, needs a continuous process of technical change and innovation. The dynamics of this process will vary between regions (Paraskevopoulos, 1974; Oakey, 1984; Thwaites and Oakey, 1985; Storey, 1985; Donckels and Bert, 1986; Sweeney, 1987; Miller and Côté, 1987; Van Der Knapp and Wever, 1987).

The technology acquisition behaviour of local enterprises, their sources of supply and modes of access to technology will reflect the unique research and technology development environment of the region. But, improvements in the quality of this environment for local enterprises, either in local research and technology development generating capacity, or in the technology transfer and assimilation capabilities of the region will, *ceteris paribus*, help the economic performance of local enterprises and hence improve regional and national economic performance. The economic performance of a region is, therefore, a reflection of whether its enterprises are technologically innovative and dynamically growing, or technologically backward and declining (N.B.S.T., 1987).

Rothwell and Zegveld (1982), Oakey *et al.* (1988) and Roure and Keely (1989) distinguish between a number of factors which encourage

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high rates of NTBF-formation and growth. They are:

- market opportunity (innovation-demanding domestic market);
- access to seed and venture capital;
- entrepreneurship;
- regional infrastructure;
- technological availability;
- a fiscal framework to encourage the flow of private risk capital into new ventures;
- the assistance of an active market for trading of shares in new ventures;
- high mobility of individuals between academic institutions and private industry;
- the behavioural and attitudinal character of scientists, willing to establish their own business to exploit their technical knowledge;
- an active government expenditure programme which provides significant opportunities for NTBF endeavour, particularly through government procurement programmes;
- strong belief in the importance of small, independent companies;
- level of R&D support;
- complementarities between large and small firms;
- relatively strong university-industry linkages.

Until recently, most of these factors were more or less unique to the USA. Since 1980, however, a number of governments in Europe have taken steps to stimulate NTBF-formation. A recent study of the strategies, commitment to R&D and economic performance of 12 leading technology based firms in four European countries between 1983 and 1986 illustrated the important economic role that NTBFs can play (Dodgson and Rothwell, 1987).

3. Region-specific technology policy in Belgium: The significance of new technology based start-ups

In Belgium, the regional governments of Flanders and Wallonia are each responsible for regional economic development. Since 1982, both regional governments started campaigns to prepare the Belgian industry for the impact of the new technologies (Segers, 1987). These region-specific

technology policies are primarily aimed at the diffusion of new technologies in the fields of micro-electronics, biotechnology, new materials, robotics and information technology.

In *FLANDERS*, region-specific technology policy places emphasis on the creation of infrastructures to promote and provide information on the importance of new technologies for industrial development (N.B.S.T., 1987). In 1982, the regional government of Flanders initiated the *Science and technology programme 'Dirv'*, Third Industrial Revolution in Flanders (Thirf), the purpose of which is to create an environment suitable for the mobilisation of all innovative forces in the region and to attract foreign investment. The focus of the 'Dirv'-programme was initially on micro-electronics. In the spring of 1991, the 'Dirv'-programme was replaced by three new science and technology programmes (S&T) in the fields of biotechnology, environmental technology and new materials. Additional S & T-programmes are foreseen for the near future in other fields of generic technologies. A Technology Assessment Programme will be added to all existing and future S & T-programmes.

The Flemish government follows a sectoral strategy for technological innovation, which reflects the desire to establish industries in sectors which allow interfacing university and technological research with the needs and/or the potential of the industry.

Also in 1982, the regional government of *WALLONIA* started the '*Opération Athena*'. Recognising the importance of diversification of its industrial fabric, the Walloon region-specific technology policy has been organised around two focal points, i.e., the existence of a high potential for research in its universities and the support for technological innovation by a vast number of small businesses, which evolved around the traditional industries of the Walloon region (coal, steel, engineering and chemicals).

Instrumental in all the regional technology schemes are:

- stimulating and assisting new technology based start-ups locally;
- providing a local capacity for technology transfer and application;
- retaining and attracting skilled manpower;

- improving national and international research and technology development linkages;
- mobilizing regional research and technology development resources.

Regional public authorities in Flanders and Wallonia have created a wide range of *incentives* for stimulating the diffusion of technological innovation and for assisting New Technology Based Start-ups locally (De Batselier, 1991). These measures towards small businesses in general and NTBFs in particular can be divided into the following categories (if not indicated, the incentive applies to both Flanders and Wallonia):

General

- A specific regional small business policy and regional technology policy.

Financial

- Financial and fiscal incentives including soft loans, capital grants and state guarantee.
- Venture capital (take-off fund, seed capital fund, startersfund).
- Fund for Industrial Research: finances pre-competitive and competitive research in Flanders.
- Development credits: prototype development aid, interest subsidies for R&D-loans.
- Equity finance.
- Accelerated depreciation.
- Technological Research Aid (Wallonia).
- Technological Innovation Manager (Wallonia).

Technical

- Technological advisory and stand-by services.
- Government-supported laboratories and industry-specific collective research centres.
- Infrastructural incentives.
- Support for selected technologies.
- Patents and licensing (limited).

Market

- Public sector procurement.

As a special aspect of region-specific technology policy, science parks (see Gibb, 1985; Smilor and

Doud Gill Jr., 1986; O.E.C.D., 1987) have been created in Belgium throughout the last decade. More specifically, a small number of innovation and incubation centres have been created for stimulating and assisting university spin-offs and university based NTBFs.

According to Oakey *et al.* (1988), NTBFs are instrumental in stimulating the emergence of 'new wave' industries. Following the strategic regional technology policies which have been adopted since the beginning of the 1980s in Flanders and Wallonia, a number of NTBFs have emerged in generic technology industries such as micro-electronics, biotechnology and information technology. These industries are particularly conducive to the formation of NTBFs since the advancing new technologies are constantly creating new and specialist product-market niches together with opportunities for specialist sub-component manufacture. With this in mind, high technology product groups have been selected/supported in the fields of aerospace, medical technology, robotics and office automation, agro-business and energy.

To support this process, the private sector in Flanders created the following support network of high technology product groups:

- FLAG — Flemish Aerospace Group;
- MEDITEK — Flemish Association of Medical Technology Industries;
- AGRIV — Association for Agro-Industry in Flanders (*see the case of Plant Genetic Systems below*);
- FLORA — Flemish Organization for Robotics and Automation;
- ENERGIK — Flemish Organization for Rational Energy Consumption and Alternative Energy.

Each of the above technology groups is a cluster of companies of different firm size which are subcontractors to national, European and international science and technology programmes.

The regional technology programmes 'Dirv' and 'Opération Athena' provided a important initial stimulus for a number of New Technology Based Start-ups in the biotechnology, micro-electronics and information technology industries in Flanders and Wallonia, as is clear from Table I. The emerging biotechnology industry in Belgium is an excellent example of the importance of

TABLE I
Examples of Belgian NTBFs

<i>Name</i>	<i>Region</i>	<i>Industry</i>	<i>Initial incubator</i>
Plant Genetic Systems	Flanders	Biotechnology	Academic
Eurogenetics	Flanders	Biotechnology	Academic
Innogenetics	Flanders	Biotechnology	Business
Phytotec	Wallonia	Biotechnology	Business
Ire-Celltarg	Wallonia	Biotechnology	Business
Ire-Medgenix	Wallonia	Biotechnology	Business
Interuniversity micro-electronics centre — IMEC	Flanders	Micro-electronics	Academic
Mietec	Flanders	Micro-electronics	Business
Alcatel	Flanders	Information Technology	Academic
Softcore	Flanders	Information Technology	Academic

strategic (technology) partnerships for the start-up of some Belgian NTBFs. The basic inventive activity occurs mainly in small, new companies which are spin-offs from university research centres performing state-of-the-art research. Large international chemical or pharmaceutical corporations are increasingly stepping into strategic partnerships with small biotech firms and venture capital companies.

Examples for the *Flemish region* are:

- Plant Genetic Systems (Bel) (Biogen (Swiss) & Japan Tobacco);

- Corvas International (Bel) (Plant Genetic Systems (Bel) + Corvas (US));
- Innogenetics (Bel) (Yamanouchi + Nomura (Japan)).

Examples for the *Walloon region* are:

- IRE-Celltarg (Bel) (The Liposome Cy (US));
- IRE-Medgenix (Bel) (Bio-Assay Systems (US));
- Phytotec (Bel) (Native Plant International (US)).

Table II shows some strategic (technology) part-

TABLE II
Strategic partnerships involving Belgian NTBFs

<i>Belgian NTBF</i>	<i>Technology</i>	<i>Strategic partner(s)</i>	<i>Initial NTBF-incubator</i>
Plant Genetic Systems	Biotechnology	Corvas (US)	Academic
IMEC	Micro-electronics	Teknekron (US)	Academic
Devlonics	Information Technology	Saab Instruments (Sweden)	Business
Softcore	Information Technology	Apple (US)	Academic
Delphi	Information Technology	Develonics (Bel) Philips (Belgium)	Business

nerships in the biotechnology, micro-electronics and information technology industries in Belgium.

In Figure 1, a model is presented that summarizes the concept of region-specific technology policy in Belgium with respect to NTBF-start-ups and that is instrumental in explaining the growth creating potential of NTBFs (Donckels and Segers, 1990). Many new discoveries and advances in science occur in universities and government laboratories, while the application of this new knowledge to commercial and useful public purposes depends largely upon action by large and small — new technology based — firms. The model is illustrated by the following case study of one of Europe's leading biotech-firms, Plant Genetic Systems, and by Figure 2.

4. The case of plant genetic systems

Plant Genetic Systems is a Belgian NTBF working on the leading edge of the new wave biotechnology industry. Plant Genetic Systems N.V. (PGS) based in Ghent, Belgium, is Europe's leading agricultural

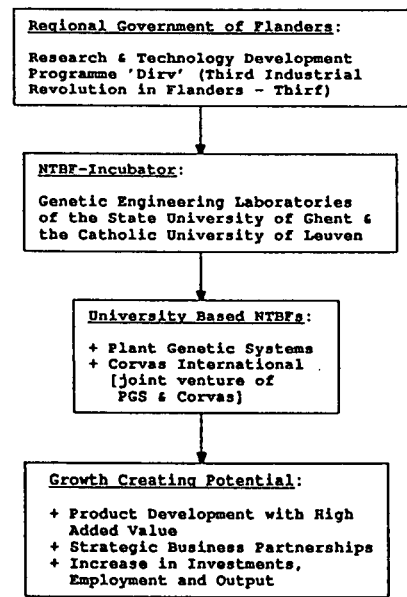


Fig. 2. The case of plant genetic systems.

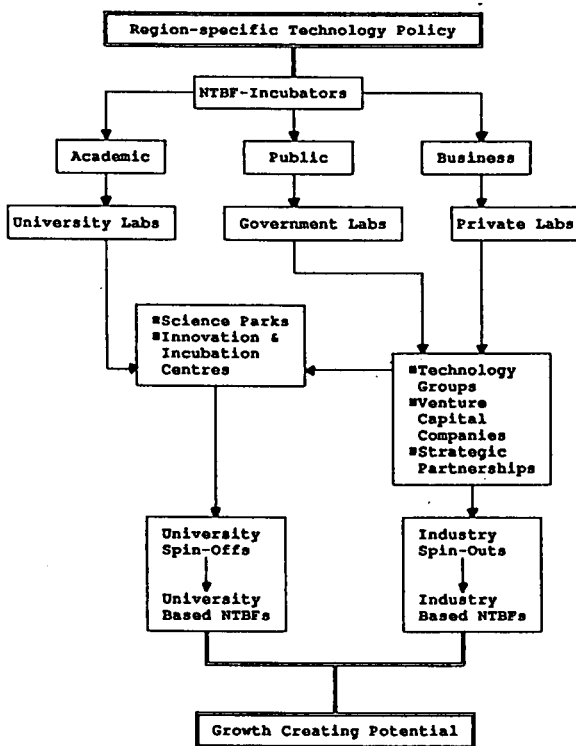


Fig. 1. The growth creating potential of NTBFs.

biotechnology company, renowned for its product development capabilities.

PGS was founded in 1983 to develop new plants with high-added value traits. PGS is a privately held company that employs over 120 people. Through genetic engineering the company "designs" plants that offer major economic benefits to the food, feed, pharmaceutical and chemical industries. PGS' business strategy is to secure its position as a major supplier of these plants through extensive patenting of its commercially important technology. The company opens marketing channels for its engineered plants by establishing joint ventures, co-marketing agreements and licensing arrangements with select seed companies. PGS presently has various joint ventures and licensing agreements with leading U.S., European and Japanese companies.

In 1987, PGS signed a licensing agreement with Hilleshög A.B., the largest plant breeding and seed company in Europe. Benefits include access to markets for production that reach the commercialization stage. In April 1989, PGS announced a major strategic partnership with Japan Tobacco, Inc., a 22 billion dollar corporation with interests in agribusiness and pharmaceuticals. Japan Tobacco currently owns 11% of PGS stock. Also in 1989, PGS signed a joint venturing agreement

with the French seed giant Clause. In April 1991, PGS entered into a joint venture with the Californian biopharma company Corvas. This way, PGS seeks to strengthen its position in the market niche of biotechnological pharmaceuticals, one of the direct opponents being Genentech.

5. Conclusions

From the beginning of the 1980s onwards, strategic regional technology policies have been adopted in Belgium, starting with the 'Dirv'-programme in Flanders and the 'Opération Athena' in Wallonia. The basic purpose of these region-specific technology policies is to mobilize regional research and technology development resources in order to stimulate self-generating regional growth. In terms of emphasis, these strategic technology policies emphasize the selection and support of generic technologies and high technology product groups. There is an increased emphasis on NTBFs and on interfirm collaboration and on strategic (technology) partnerships.

The regional dimension of technology policy raises the question whether a relationship can be established between strategic technology policy and New Technology Based Start-ups in Belgium. From the outline of the current situation in Belgium, we learn that a number of NTBFs and strategic (technology) partnerships involving Belgian NTBFs have emerged in generic technology industries such as micro-electronics, biotechnology and information technology, due to an initial stimulus by the regional technology schemes.

The lack of a comprehensive national technology policy has nevertheless led to the situation that two regions (Flanders and Wallonia) within a small country (Belgium) have initiated potentially complementary technology policies. In other words, interregional dynamic complementarities in terms of talent, technology, capital and know-how are not exploited in an optimal way.

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