Science and Technology-based Regional Entrepreneurship in the Netherlands: Building Support Structures for Business Creation and Growth Entrepreneurship

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Abstract

In this contribution we develop a theoretical framework derived from the national system of innovation literature and the subsequent criticisms voiced by regional scientists and industry/technology experts who emphasize the importance of the intermediate subnational and sectoral levels to analysing science- and technology-based regional entrepreneurship in the Netherlands. The national system of innovation of the Netherlands, and its specifics and peculiarities, and the country's general entrepreneurship policy, and the most important policy and support initiatives are subsequently discussed. Based on a desire to overcome the knowledge paradox between fundamental research and market needs and on the recognition that the Netherlands lags behind other countries when it comes to innovative entrepreneurship, various changes and initiatives were recently introduced in the Netherlands. The impresson is of an overambitious national government with numerous programmes, schemes and agencies involved, sometimes working with each other but at other times separately as well, and its effectiveness can be questioned. Serious paperwork and preparation is involved in the participation in most programes and, together with the complexity of these programmes and policies, small and young entrepreneurs are neither informed, ready or well-equipped; some of them are not even interested in participating in those schemes.

Introduction

In line with the EU's Lisbon agenda to be clearly among the world's scientific and inovative leaders by 2010, the Dutch government has also defined its strategic objective to make the Netherlands one of the five leading knowledge economies of the world. Over the years, a set of new policies, new institutions and alternative sets of instruments were developed and implemented, with the aim of encouraging universities, public research institutions and companies to adopt a more outward-looking approach, creating more agile and pro-active large firms and increasing the role of public-private partnerships in furthering research and innovation at the technology/industry levels and/or at the sub-national or regional levels. To streamline and upgrade the national economy, existing policies were adjusted to allow for higher investments in education and training, to build

more effective bridges between the public and the private sector and between academia and business and to empower public institutions like universities, leading technology institutes and applied research organizations. To realize all these objectives, an important new institution has been created, the Innovation Platform in which the key stakeholders in the areas of science, technology and institutional change are represented.

In this contribution, we focus on recent studies in the domain of national innovation systems and on the ongoing debate regarding the complementarities of regional and sectoral approaches to science-based and technology-based economic developments. More specifically, we zoom in on the Dutch idiosyncrasies with regarding the country's strategic objectives aimed at putting innovation on the policy agenda and in particular choices between centralized and decentralized/regional initiatives, and between public and private involvement, and the effective (re)structuring of the strategic interactions between the public and the private sector. Furthermore, we look at the various relevant support and policy initiatives aimed at stimulating high-growth entrepreneurship in the Netherlands, which are mainly initiated by the Ministry of Economic Affairs, sometimes in collaboration with the Ministry of Education, Science and Culture, the all-inclusive Innovation Platform (SenterNovem), a government agency involved in the implementation of the country's innovation and entrepreneurship policy measures.

In the first section, we present the theoretical framework, the national system of innovation literature and the criticisms voiced by regional scientists and industry/technology experts who emphasize the importance of the intermediate subnational and sectoral levels. The innovation systems approach accentuates the interaction between a variety of actors (e.g. universities, large and small firms, governments) in distinct domains (the national economy, the sector or the region/industrial district) and the various dimensions of innovation (from big science, higher education and vocational training to knowledge transfer and interfirm collaboration) transcending science and technology) and a variety of economic and institutional conditions (e.g. the international competitiveness of the nation's science and technology system, the style and structures of policy formation and implementation in the domains under investigation). An application of the National Systems of Innovation literature is provided in section two, along with an introduction to the Dutch science, technology and innovation policy, its specifics and peculiarities. In the third section, we address the country's general entrepreneurship policy and provide providing an overview of the most important policy and support initiatives. We close by discussing a number of initiatives in greater detail and evaluate the achievement of the science-based and technology-based regional entrepreneurship in the Netherlands.

Systems of Innovation: National, sectoral and regional approaches

In recent decades, the locus of science and technology, innovation and entrepreneurship - at least in the views of the leading policy-makers and analysts – has been positioned at the national level, where scientific and research priorities were identified and programmes aimed at stimulating scientific production, university-level training and the society-wide diffusion of innovation were developed and implemented. The dominant paradigm was, and to some extent still is, that the national environment, highlighted by

central government, national corporate champions, leading research laboratories and universities, and their strategic interactions, has played and will continue to play a major role in structuring scientific and technical activities and in all types of innovation. It is especially through comparative studies, particular national idiosyncrasies and dominant styles shaping invention, innovation and diffusion were identified by economists like Freeman, Lundvall, and Nelson: the internal organization and governance of firms, user-producer interactions and interfirm connections, the role of the public sector, the institutional structure of the financial sector, and the organization and intensity of research and development (R&D) in particular countries. Public and private organizations involved in the formation and implementation of these science-related and technology-related policies, including universities, research laboratories, large corporations, small firms and vocational training insitutions, operate in so-called 'national systems of innovation' (Lundvall, 1992; Nelson, 1992, 1993; Freeman, 2002). A national innovation system includes all the institutions and mechanisms that have a direct and indirect impact on the introduction and diffusion of new products, processes and systems in a given economy. In particular, national innovation systems are shaped by a number of specific factors, such as the size and available resources of the national economy and its stage of development (e.g. a high-tech versus low-tech focus, developed versus developing countries). Furthermore, differences in political circumstances, policy objectives and strategies effect the nature of a national innovation system (e.g. priorities with regard to education and training, defense and military R&D, public procurement and competition policy may vary).

The concept of national innovation systems was developed and used by policy-makers and political economists to compare and analyze the specific setting of scientific production, technological development and innovation management within countries, and to explain variations of growth rates and levels of competitiveness vary. It is a concept that covers the entire knowledge/innovation value chain, from knowledge generation to the commercialization of new knowledge and technologies into products and process innovations, and the way these research and production processes are organized and connected. The basic assumption of such a holistic and multi-layered national system of innovation is that interactive learning and coordination between the subsystems of science and research, business, and education and training takes place at the national level.

While it makes sense to approach the areas outlined above at a national level, there are also limitations: although there are differences in the way countries as a whole perform economically, there are also regional and/or sectoral differences within individual countries, because knowledge generation and production factors are not distributed evenly. Innovativeness and entrepreneurship are concentrated in certain leading geographical areas and attractive industrial sectors and technology domains. Regional economists have tried to complement existing literature on national innovation systems by looking at regional and/or sectoral differences in scientific output, in the way innovation is organized and in overall performance (Cooke, 1997, 2001; Braczyk, 1998). They have emphasized the importance of proximity and tacit knowledge, the existence of trust-based networks and strong cultures shaping the innovativeness in particular regions

and local clusters. In addition to referring to the social and cultural aspects of research and innovation in particular regions, they have also addressed the political competences regional authorities may or may not have when it comes to influencing and controlling strategic investments, with the aim of deepening and widening the public and private R&D, higher education and vocational training infrastuctures. While some regional authorities have been able to set up autonomous fiscal and investment programmes to promote innovation, without interference by the national government other regional authorities are limited by centralised taxation and spending structures. In addition, a region's cultural identity, close-knit and multi-level social networks and rich patterns of public-private interactions may give it a certain level of systemic potential and generate socio-economic momentum, for instance in the case of Catalonia in Spain (Urbano, 2006).

Another criticism with regard to the National Innovation System approach has been that it tends to overemphasize the activities of non-firm (i.e. public) organizations and institutions, and that it takes the national economy as its level of analysis. Malerba (2002; 2005) argues that innovation is an interactive and collective process that involves a variety of public and private actors, but also states that the national innovation system approach underestimates the power of private actors, with their different sizes, knowledge bases and corporate strategies, as well as the role of market structure and dynamics within sectors, specifying and shaping particular activities at a local or global level of innovation and producton. Various sectors may display differences in terms of basic technologies and available knowledge bases, demand characteristics (homogeneous/heterogeneous), the distribution of large and small firms, the collaboration/competition trade-off (e.g. user-supplier relationships, firm heterogeneity/homogeneity) and the distinct role that supportive institutions play in sector-specific knowledge production and learning (in terms of accessibility, opportunity and cumulativeness, and appropriability conditions). The area in which attempts are made to realize economies of scale depends, for instance, on the industry and technology in question: while in the case of aviation, it will predominantly be in the area of design and development, while the steel and semiconductor sectors will focus more on production and the food industry emphasizes the area of marketing. In the next paragraph, we apply the national system of innovation to the Netherlands. In addition, we take a look at recent trends and policy initiatives aimed at complementing the traditional approach, in an attempt to and show the relevance of the regional and sectoral approaches when it comes to innovation systems and collective learning.

The Dutch National System of Science, Technology and Innovation

The innovation policy of the Netherlands consists of two pillars: support for smaller and larger companies with a budget of about one million euro's supervised by the Ministry of Economic Affairs, and investment in science and education. also with a budget of about a million euro's, supervised by the Ministry of Education and Science (WRR, 2008). The Dutch approach to science, technology and innovation fits in the picture of the European knowledge paradox. Although the country has an outstanding reputation, both in terms of the quantity and quality of its scientific and technological research, it has a poor record

when it comes to commercializing its scientific output, putting knowledge to practical use and translating it into innovations the market needs. Most research in the Netherlands (58%) is carried out by the private sector, in particular by the seven large companies that account for some 50% of all business R&D. The country's higher education institutes (the universities and their academic hospitals) make up for 27%, while dedicated public research institutions are responsible for the remaining 15% (Ministries ECS & EA, 2004).

The public science and research community in the Netherlands consists of 14 public universities: nine general universities, three universities of technology, one agricultural university and the country's Open University. Dutch universities are funded in three ways: i) approximately 60-70% of all funds are provided by the national government; ii) approximately 10-15% is made available conditionally and competitively by the research councils (e.g. NWO and KNAW) in the form of grants and subsidised researchers and professors; iii) the remaining 25-30% consists of additional funds raised from public or private (inter)national sources, like companies, foundations and non-governmental organizations, and are made available in the form of contracts (Ministries ECS & EA, 2004). In addition to the universities, the Royal Academy of Sciences (KNAW in Dutch), the Netherlands Organization of Scientific Research (NWO) and the Netherlands Organization for Applied Research (TNO) also play a key role in the country's science and innovation system. KNAW's mission is to stimulate scientific research in general and in particular: i) to advise the government regarding science and technology policy; ii) to judge the quality and provide a forum within the academic community; iii) to act as an umbrella organization for 18 dedicated basic and strategic research institutes. NWO's aim is to raise the quality and innovative content of fundamental scientifc research at the country's universities and research institutes, by awarding grants for top-level research and research equipment, and by running nine specialised research institutes to carry out these activities. An organization related to NWO is the Technology Foundation STW, which funds excellent and relevant scientific and technological research carried out by the leading universities in the country. TNO, the semi-public Netherlands Organization for Applied Research, acts as an independent contract research organization for the public as well as the private sector. With its 14 institutes, TNO employs about 4,000 people involved in carrying out applied research. Although it was originally a government–sponsored organization, it now primarily acquires funding on the market (although the government continues to a represent a substantial portion of that market). In 2003, TNO took over the research laboratory of the national public telecommunications operator KPN and merged it with its own telecommunications and electronics R&D facilities.

In addition to the organizations mentioned above, there are a number of Large Technogical Institutes (GTIs in Dutch), Leading Technological Institutes (TTIs in Dutch) and Agricultural Research Institutes (DLOs in Dutch), which are involved in mission-oriented and fundamental-strategic research programmes. The Large Technogical Institutes consist of five organizations involved in applied research and related activities, such as advising industry and government in specific fields: the Netherlands Energy Research Centre (ECN: nuclear and other forms of energy, energy and the environment, and new materials), GeoDelft (highway and hydraulic engineering and soil), the Netherlands Maritime Institute (MARIN: shipbuilding, offshore technology and maritime

engineering), the National Aerospace Laboratory (NLR: aerospace engineering for civil and military purposes) and Deltares/WL Delft Hydraulics (shipping, ports, coast and water management).

The so-called Leading Technology Institutes were conceived in 1997 as virtual organizations in which companies and knowledge institutes (public-private partnership) participate (OECD, 2004). There are four institutes that operate in the separate areas of nutrition (WCFS), metals (NIMR), polymers (DPI) and telematics (TI). The goal of these LTIs is to stimulate R&D co-operation between public and private partners in important economic and social areas. The public research organization TNO is involved in all LTIs. LTI's are a succesful model for public-private co-operation. Most LTIs have a completely virtual organization, with a small central organization, while research is conducted by the partner organizations. The Agricultural Research Institutes used to be part of the Ministry of Agriculture, but became independent in the second half of the 1990's (the DLO Foundation) and merged with Wageningen University to form a knowledge and research centre (the university's name was subsequently changed to Wageningen University and Research Centre).

Recent changes in the Dutch science and innovation system

In the new millenium, Dutch policy-makers in the areas of science and technology, innovation and entrepreneurship started to worry about the country's relative decline in terms of innovation compared to other countries (Ministries of ESC & EA, 2004). In spite of the fact that the country's position in terms of the quality of scientific output, the level of patenting and rates of usage and access to ICT applications was above average, there were several structural problems that threatened its potentially strong performance. Among them the most important shortcomings in the Dutch science and innovation system are: i) a relatively passive business sector in terms of R&D and innovation activities; ii) an increasing shortage of highly educated people, especially those with a science and engineering profile; iii) a limited commercialization of scientific results, due to low levels of entrepreneurial activity and a limited availability of seed capital; iv) and a poor collaboration between knowledge institutions and the private sector. With other countries catching up, there was little room for doubt about the country's position in the international league of science, technology and innovation output: the Netherlands was losing momentum.

To address these shortcomings, the new Balkenende Cabinet decided in 2003 to establish a so-called Innovation Platform, which included members from government, business entreprises and knowledge institutes. The government is represented in the Platform by the Prime Minister, who chairs the Platform, and by the Ministers of Economic Affairs and Education, Science and Culture. In addition, the knowledge institutes are represented by research directors and presidents of universities and higher vocational education, while the private sector is represented by the CEOs of the country's larger multinational companies and innovative and fast-growing firms. The aim of the Innovation Platform is to develop a shared vision with regard to the advancement of the knowledge economy and to draw up plans to strenghten the innovative capacity of the Dutch economy

(Innovatieplatform, 2004). The Platform functions as a booster for innovation by stimulating businesses and knowledge institutes to work together and achieve tangible results. The overall objective of the Platform's activities is to ensure that the country will become one of the leading countries in the areas of innovation and the advancement of the knowledge economy by the year 2010. The idea of setting up an Innovation Platform was inspired by the relative success of the Finnish innovation system and an active public policy based on high levels of investment in R&D under the guidance of the Science and Technology Policy Council.

In 2004, in a period when public spending was being reduced elsewhere in Europe, the Balkenende Cabinet allocated €800 million in additional funds to education, research and innovation, providing the Dutch Innovation Platform with a substantial budget that enabled it to develop all kinds of new activities. The main elements in this plan were to stimulate a focus and mass in research, to reward excellent research groups, to promote the exploitation of research results, to focus attention on human resources in science and technology and to raise public awareness with regard to science and technology. Between 2003 and 2004, the Innovation Platform effectively managed to put science/technology and innovation policy on the political agenda, and with the help of the ICES/KIS-BSIK programme (a large government fund that came available after the windfall of the country's natural gas resources and major increases in worldwide energy prices), the active promotion of the knowledge society in the Netherlands was given a major boost (van Egten et al., 2005; Leijnse, 2007).

While the country kept performing will in areas like ICT-expenditures, broadband penetration and the quality/quantity of scientific production, some progress was also made in underperforming areas of science-related policy and innovation management, for instance interms of investments in education and R&D, the strategic collaboration between academia and business, the number of people with a scientific or engineering background and the lack of public-private mobility of researchers, and the diffusion of innovative entrepreneurship. As the WRR (the Scientific Council for Government Policy) stated in one of its recent progress reports on innovation policy, there is still a long way to go. According to WRR (2008), some of the main obstacles to a more open and dynamic approach to advancing science and technology are that a substantial portion of the available subsidies end up in the pockets of larger companies (at the expense of the smaller firms) and that extensive paperwork and red tape often make gaining access to the funds in question a complicated affair.

By acting as an ice-breaker, accelerator or catalyst, the Innovation Platform, especially with the new centre-left Balkenende II Cabinet in office, sought to improve the climate for innovation, entrepreneurship and knowledge exploitation by setting up a number of tangible projects and schemes and – not unimportantly - implementing them. Examples of these projects and schemes include: i) to set up an innovation voucher scheme to disseminate knowledge and stimulate interaction between the universities and research institutes on the one hand and proactive SMEs on the other; ii) to facilitate and streamline the admission of and the process of obtaining work permits for international scientists and PhD students; iii) to make a career in research more attractive and promote the world

of science and engineering in general. To stimulate private R&D, the existing WBSO scheme, jointly run by the Ministries of Economic Affairs and Finance, was stepped up. The aim of the Promotion of R&D Act (in Dutch: WBSO), which was originally passed in 1994, is to stimulate research and development through fiscal means, by reducing wage tax and social security contributions for companies that employ R&D staff. Another major project initiated by the Innovation Platform is the creation of a number of centres of excellence in strategic areas with a high innovation capacity (the so-called zones of opportunity), where academic excellence and industrial needs are combined and public-private R&D is carried out. In addition to offering ongoing support to the existing leading hubs in the country (Amsterdam Schiphol Airport and the Port of Rotterdam), six key areas were selected after a competive tender was launched: flowers and food, creative industries, high-tech systems and new materials, water technology, advanced chemical technologies for sustainability and pensions/insurance research. In those domains, successful public-private consortia had been set up and joint R&D programmes were developed and new top institutes were established (e.g. the Top Institutes Green Genetics, Pharma and Bio-Medical Materials (regenerative medicine) (75% of which is normally paid by the public sector and 25% by the private sector). In a next round, substantial funds were provided to the cities of the Hague (as Capital of Peace and Justice) and Eindhoven (Brainport with its new Holst Centre for Nanotechnology), and additional funds for advanced ICT research and energy transition were also made available.

More or less independently from the Innovation Platform initiative and its projects, the Dutch government also initiated side programmes aimed at promoting innovation, high-tech venturing and regional economic development. In the late 1990s and at the start of the new millenium, the Ministries of Economic Affairs and Education & Science targeted the emerging ICT and biotechnology sector through their ad-hoc Twinning and BioPartner policies, including a range of promotional activities aimed at stimulating the commercialization of invention, to enable technology transfer and facilitate the creation and growth of new and young ventures by providing them with easy access to incubation facilities, coaching networks and venture capitalists. When the BioPartner and Twinning programmes ended, the Dutch government came up with the TechnoPartner Programme, a generic programme that was developed to promote innovative enterpreneurship across all sectors and industries, and the ‘Peaks in the Delta’ programma, aimed at stimulating the particular strengths for innovation, knowledge development and commercialization in particular regions in the country.

Through the promotion of innovativeness and high-tech venturing, with more pro-active techno-starters and open-minded universities and other knowledge institutes, the government seeks to attack the aforementioned knowledge paradox. Newly developed technologies are often commercialized through licensing and new firm formation (i.e. spin-offs). This turns techno-starters into creative innovators and possibly fast-growing companies that boost job creation. In addition to the two traditional pillars of universities in the Netherlands, education and research, a new third pillar became increasingly popular at the end of the 1990s, namely a contribution or service to society, also known as knowledge exploitation or in EU-speak ‘technology valorisation’. Thus far, the country has experienced problems with knowledge exploitation: the extent to which the

results of scientific research are applied and/or commercialized is limited. In the past, Dutch universities have always been very productive in terms of the sheer quantity and quality of publications, but industry has made little use of (new) scientific knowledge. To this end, the Ministries of Economic Affairs (EA) and Education, Culture and Science (ECS) set up a new entrepreneurship stimulation programme: TechnoPartner, with the aim of improving the general techno-starter climate and offering a package of interrelated concrete activities. We discuss this program in greater detail in the section on the promotion of high growth entrepreneurship.

In addition to some shifts in science, technology and innovation policy towards subsidizing excellence in terms of promising research projects and sectors and connecting between academia, large business and small/young firms, a new approach was also adopted in terms of stimulating regional economic development. In the past, regional policy was aimed at reducing unemployment and protecting firms and industries in the regions that lagged behind the core of the Randstad area (the Amsterdam-The Hague-Rotterdam-Utrecht region), namely the North, East and South of the Netherlands. From 2005-2006 the new goal became less defensive and more forward-looking by targeting and boosting promising regional economic opportunities that have a national and possibly international importance. In its Peaks in the Delta programme, the Ministry of Economic Affairs (2006) unfolded a new and more pro-active approach by looking at scientific-technological challenges and chances in particular regions and industries in the Netherlands, driven by the motto: 'all over the Dutch delta economy, regional peaks of economic activity emerge'. Triggered by sluggish economic growth and an increasing risk of substantial business relocation and outsourcing to more competitive countries, the central government now embarked on a more customized approach, with an emphasis on adopting focus and creating mass: adopting a decentralized bottom-up approach whenever possible and a centralized one whenever necessary.

Six peak areas in the Netherlands were identified (the North, East, South-West and South-East Netherlands and the Northwing and Southwing of the Randstad area), all of them with a different set of potential strengths, strategic priorities and policy challenges. For instance, in the East of the Netherlands, the emphasis is agri-food (with Wageningen University at the core), health and bio-medical technologies (centred around Radboud University Nijmegen) and nanotechnology/mechatronics with Twente University (Enschede) as a hub, and building effective linkages and new combinations between these three regional areas and sectoral interests. In the South-East of the country, the strategic objective is to become a leading European knowledge and technology region (a so-called Brain Port), clustered around Eindhoven University of Technology and the Philips High-tech campus, with a focus on the areas of high-tech sytems (nanotechnology and micro-electronics), food and nutrition, and life sciences/medical technology. One of the targets of this region is to have 10 knowledge institutes, to have 100 leading large companies, 1000 committed SMEs and young firms, and 10,000 new jobs by 2010.

Entrepreneurship policy in the Netherlands

The Global Entrepreneurship Monitor (GEM) is an international research project involving over 40 countries worldwide. GEM presents an annual national-level assessment of 'early-stage' entrepreneurial activity and institutional conditions in a large number of countries. In the GEM Adult Population Survey, the early-stage entrepreneurs (nascents and owners/managers of young businesses) are asked whether they expect to employ 20 people or more in five years time (as a proxy of measuring potential high-growth firms), in an attempt to provide an indication of *high-expectation entrepreneurship*, defined as the percentage of early-stage entrepreneurs (nascents and owners/managers of young businesses) of the adult population (people aged between 18-64 years) who expect to grow substantially within five years time. According to this measure, 0.3% of the adult population in the Netherlands was involved in high-expectation entrepreneurship in 2005, which was relatively low compared to the average of 0.6% of all the OECD members that took part in the survey in the same year. At a European level, 0.5% of the adult population expects to employ 20 or more people within five years after starting a company. Countries that are very entrepreneurial, like the US and New Zealand, have a higher share of potential fast growers in the adult population (in both countries, the share is 1.4%). Because the Dutch government has become more aware that the percentage of fast-growing companies in the Netherlands is low compared to other countries, a number of new initiatives were developed to give the development and support for high-growth companies a high priority. Many of the new firms established in the Netherlands are basically self-employed individuals who continue with the same activities (mainly in the construction and services sectors) that they were previously engaged in as employees. Additionally, they are weak in their ambition to innovate and lack a growth orientation, and hence may need specisfic support and guidance to move away from self-employment towards fast-growth entrepreneurship. In the period 2000-2003, for example, only 8% of all companies were fast-growing companies, against 24% in the United States and 19% in the United Kingdom (Gibcus, 2006). From an economic viewpoint, high-growth companies are very important to a national economy. They create many jobs and are often highly innovative. A study by Deloitte (2004) showed that fast-growing created one third of all new jobs in the Dutch economy between 1997 and 2001.

The Dutch Government tries to come up with generic policies that benefit all entrepreneurs equally. It wants to develop an entrepreneurship policy that first of all encourages people to engage in entrepreneurship. In addition, there is a clear focus on the quality of entrepreneurship. To achieve these goals, an Action Plan for entrepreneurship has been developed that applies to all the stages of a firm's life cycle (Ministry of Economic Affairs, 2004b). According to this action plan, there are specific target groups that deserve extra attention. Three sub-goals have been specified with regard to new or nascent entrepreneurship. Firstly, the policies will try to encourage different groups of potential entrepreneurs, focusing, for example, on female entrepreneurs, older entrepreneurs and ethnic entrepreneurs. These three target groups will be approached with general information and personalised advice. Family-owned businesses will also obtain additional support during the business transfer stage. Furthermore, entrepreneurship will be promoted in education. To that end, the Ministries of Economic Affairs (EA) and of Education, Science and Culture (ECS) together have founded the

Partnership for Entrepreneurship and Education and established a subsidy program challenging the country's (higher) educational institutions to embed entrepreneurship firmly into their educational programmes and academic activities. To ensure better and more innovative start-up companies, a special programme was developed for so-called 'techno-starters', i.e. an interesting group of promising high-quality entrepreneurs putting their new ideas into innovative products: the TechnoPartner Programme (which we discuss in greater detail below). This programme became operational in mid-2004 and is aimed at promoting knowledge exploitation and spin-off creation by the research institutes and universities, and attacking the financial and information-related gaps these techno-starters face (i.e. improving the markets for seed and early stage financing and offering specific information and advice for the starters participating in that programme). Thirdly, the government aims at stimulating research and development by innovative SMEs. To that end, the government is investigating how the American SBIR scheme (Small Business Innovation and Research scheme) can be applied in the Netherlands in an effective way. In November 2004, the Ministry of Economic Affairs launched a pilot that involved contracting out of innovative R&D to SMEs. The SBIR scheme subsidises the development of innovative ideas and the development of the prototype, providing an official quality endorsement at the moment of the commercialization of the product. Thus far (Spring 2008), it is not known whether the SBIR scheme will be implemented or not.

In addition to stimulating incumbent small and medium-sized firms, the Dutch government aims at creating fast-growing companies, with a specific focus on cutting down on unnecessary or conflicting legislation and regulations in an attempt to reduce the administrative costs for entrepreneurs. Furthermore, innovative companies are supported through financial incentives, including information and advice, subsidy schemes and financing instruments, in the hope of increasing the number of rapid growth companies. Various studies have indicated that such companies find it hard to acquire funding, which limits their growth. For this reason, the government is investigating whether existing financial instruments can also be targeted at rapid growth companies. Furthermore, some key aspects of the TechnoPartner Programme have become operational, in particular the Knowledge Exploitation and Seed Facility (Ministry of Economic Affairs, 2004a).

The promotion of high-growth entrepreneurship

Policy initiatives in the domain of entrepreneurship are often generic; there are not many specific programmes for start-up and fast-growing companies in the Netherlands. In order to stimulate innovations in the Netherlands, the government has studied fast-growing companies, and found that they experience additional bottlenecks above the 'normal' bottlenecks facing all firms, e.g. administrative complexities. In particular, fast-growing companies are more likely than other companies to encounter the following bottlenecks (EIM & Ministry of Economic Affairs, 2006):

- they have difficulties in finding qualified employees. The employees have to function effectively in a very dynamic environment. It also takes more time and effort to acquire and dismiss employees;

- they have difficulties in obtaining funding or capital against reasonable conditions. Banks are distant, because they perceive a greater risk. It is also not always clear which subsidies and regulations exist for and can benefit the target group;
- they are more likely than other businesses to encounter difficulties with the adjustment of processes and systems (knowledge management, customer relationship management (CSR) to new circumstances.
- finally, fast growth companies experience, more often than other companies, difficulties in the field of management and organization. The division of tasks is often unclear, which makes it hard to delegate tasks.

These findings have led the government to take some specific actions in order to stimulate and upgrade (potential) fast-growing entrepreneurship in the Netherlands. These actions encompass four areas: (1) awareness raising, (2) supporting managerial capabilities, (3) improving public services through Enterprise Zones, the objective is to create genuine 'hot spots' that will attract (foreign) knowledge intensive companies to a particular region/area, and (4) improving financing. In order to cover these areas, the policy initiatives mainly provide *financial support*, *advice* and *networks* to support the high-growth firms. In the next subparagraphs these policy initiatives are being discussed in more detail. Some of these initiatives are explicitly targeted at high-growth firms, but most of them are targeted at 'high potentials', i.e. innovative small firms and techno-starters. Most initiatives are being supported by the Ministry of Economic Affairs, and executed by a government agency. The most important government agencies in the Netherlands targeted at high-growth are TechnoPartner, Syntens and SenterNovem.

Financing facilities and subsidies

The TechnoPartner (TP) Seed Facility is the most specific financial support initiative aimed at high-growth companies. The TP Seed facility aims at promoting and mobilizing the bottom end of the Dutch venture capital market in such a way that high-tech start-ups are able to satisfy their capital requirements, and at stimulating venture capitalists to invest in fast-growing technological companies, as this is seen as a high risk investment. Technological start-ups that are financed by venture capitalists get 50% more funding by lending from the Seed Facility. This reduces the risk for venture capitalists. Another financial facility provided by TechnoPartner is the TechnoPartnerLabel, the main aim of which is to make it easier for new technology-based firms and other high potentials to obtain a bank loan. The label implies that the Ministry guarantees 80% of the financing of high potentials. There are several other financial support initiatives that provide funding for technological innovative firms, most of which are regional, like the South-Holland Investment Fund (ZIF) and the Techno-starter Fund North- and East-Holland. These regional initiatives are carried out by regional agencies, in which municipalities (or provinces) and banks participate.

Besides funding, there are some schemes that subsidize knowledge exploitation. The TechnoPartner Knowledge Exploitation Subsidy Arrangement (SKE) encourages the utilisation of publicly financed scientific knowledge by businesses. Two facilities available within this scheme are a pre-seed facility and a patent fund. The pre-seed

facility provides pre-seed capital to high-tech start-ups prior to their actual start. The patent facility makes funds available to public knowledge institutions to finance the costs associated with patent applications. The Subsidy Regulation Infrastructure Techno-starters (SIT) is the best known initiative. This initiative provides subsidies to knowledge institutions for their support to new technology firms. Furthermore, there is a fiscal regulation which makes it more attractive for entrepreneurs to conduct Research & Development. This well-known and much-used initiative amongst techno-starters is the Techno-starter Regulation, as part of the larger WBSO scheme of SenterNovem. Finally, the Ministry of Economic Affairs has started an initiative to subsidize Master classes for high-growth firms. The organization of these master classes is carried out by government agencies or management centres. The master classes are targeted at incumbent growing firms as well as young innovative firms with the ambition to aim to grow. Also worth mentioning from the portfolio of schemes of the Ministry of Economic Affairs in this respect is the Programme for Companies Entering Foreign Markets (PSB), which supports ambitious start-ups and small and medium-sized firms in their internationalization effort. The PSB, which is run by the EVD (export and trade agency of the Ministry of Economic Affairs, seeks to help firms with the structuring of their plans and strategies to go abroad and providing them with a range of small subsidies (for instance co-financing visits to trade fairs and missions, etc.).

Advice

As mentioned earlier, one of the main aims of the government is to reduce the administrative burdens for entrepreneurs. In order to achieve this, the government tries to create more opportunities for starting and fast-growing companies. The Ministry of Economic Affairs has therefore created literally zones of opportunities called Enterprise Zones, specifically for technology based fast growth firms. The zones of opportunities are meant to bring down the administrative burden of firms caused by government regulation. These zones are located near the three Universities of Technology in the Netherlands (Delft, Eindhoven and Enschede-Twente). In each of these zones, a formula manager helps start-ups or fast-growing firms free of charge with problems regarding regulations, subsidies and licenses. Furthermore, the formula manager provides other kinds of advice and coaching. Eventually, the firms that make use of these zones should experience lower taxes and less regulation, without the government directly having to reduce taxes for this specific target group.

Another initiative by Syntens, together with SenterNovem, is the Innovation Relay Centre Netherlands (IRC), which provides information and personal advice. More specifically, it facilitates and supports the technology transfer on European level for stimulating innovations in Dutch manufacturing, e.g. by linking firms from different countries. CUBE and YES!Delft are two regional public initiatives that provide business locations to techno-starters. In addition to this physical facilitation, both initiatives try to provide relevant information and advice to techno-starters. The Information Point TechnoStarters (IPTS), another public initiative in the province of South-Holland, provides general information and advice aimed specifically at technological start-ups. New Venture, an initiative of some private companies, is a nation-wide business plan

competition aimed at developing innovative idea into successful business plans, accompanied by coaching, advice and specialist consulting. Furthermore, the participants are provide with free access to seminars and get feedback on their business plan by venture capitalists.

Networks

First of all, the master classes mentioned above provide a possibility for fast-growing firms to network with each other. Syntens provides an innovation network for entrepreneurs, together with advice. Because most innovative firms tend to be fast-growing firms, Syntens tries to connect innovative firms with each other to achieve synergetic advantages. A concrete example of this activity is Syntens' involvement in the new *RAAK* (Regional Attention and Action for Knowledge Circulation) programme aimed at improving the interaction and exchange between SMEs and higher vocational education institutes. Another initiative from Syntens, in association with Shell, is LiveWIRE, which focuses on providing support to innovative firms by providing personal coaching and a professional network. Furthermore, the LiveWIRE Young Business Award is given each year to a high potential on the basis of the growth potential according to an innovative business plan. Periodically, LiveWIRE organizes network meetings and innovation meetings. Together with the Dutch financial newspaper '*Het Financieele Dagblad'*, the Ministry of Economic Affairs organizes a multimedia event called FD Gazelles for fast-growing companies. At this event, rewards are given to the fast-growing companies per region. Deloitte Technology Fast 50, provided by Deloitte in cooperation with other sponsor partners, also rewards and promotes high-growth firms, but focuses specifically on technological firms. Furthermore, regional round tables are organized in the context of this initative, in which fast growers can share their experiences.

Three agencies at work: TechnoPartner, SenterNovem and Syntens

In developing the TechnoPartner Programme, the Dutch government has taken the above-mentioned bottlenecks into account. This programme has brought back the numerous former instruments and schemes to one initiative, consisting of the following pillars:

- *TechnoPartner Seed Facility.* As mentioned earlier, especially new and (potentially rapidly) growing firms are having difficulties with obtaining capital. This will be made easier by implementing a Seed Facility, which makes it more attractive for venture capitalists to invest in techno-starters, as their risk decreases. Technological start-ups that are financed by venture capitalists get 50% more funding by lending from the Seed Facility. In practice, this means that these start-ups have to obtain 'only' 50% of their required risk capital, as the other 50% is funded by the Seed Facility. Venture capitalists will perceive a reduced risk when it comes to investing in techno-starters.
- *TechnoPartner Knowledge Exploitation Subsidy Arrangement.* This regulation has been developed in such a way that scientific knowledge will be easier to exploit by techno-starters. It is both meant for spin-offs and new independent start-ups. A pre-seed facility provides the opportunity to techno-starters to spend more time and effort in the stage

before the actual start. A patent facility makes it possible for the knowledge institution to professionalize the internal patent policy. Large companies and knowledge institutes can, as a consortium, obtain 50% funding for initiatives that create technological start-ups based on these research programmes.
- *TechnoPartner Platform*. This platform is aimed at increasing the number of (potential) innovative start-up firms and address the bottlenecks that block the start and early growth of technology entrepreneurs. This will be done mainly by providing and exchanging information. The platform will also follow techno-starters for feedback.
- *TechnoPartner Label*. Another financial facility provided by TechnoPartner is the TechnoPartner Label, which is actually an extension of the regular guarantee facility of the Ministry of Economic Affairs for all start-ups. The TechnoPartner Label provides an additional facility to technological, high potential start-ups, because the Ministry puts guarantees 80% of the funding through a loan. The risk for the bank providing the loan will be reduced, but the bank will have to pay a risk premium.
- *Business Angel Network Programme*. This programme provides information to innovative entrepreneurs as well as business angels, with the aim of achieve a better match. Business angels are informal investors that provide capital, knowledge, management experience and coaching to (starting) entrepreneurs.

SenterNovem is a government agency of the Ministry of Economic Affairs that pays special attention to innovations and sustainability by subsidizing innovative and sustainable companies. SenterNovem was created in 2004 as a joint venture of the former government agencies Senter and Novem. SenterNovem advises, informs and provides networks and subsidies to innovative and sustainable ideas or companies. In many cases, these companies have the potential for fast growth. SenterNovem has developed support services for innovative entrepreneurs with a high potential. These services are mainly financial in nature:

- *Small Business Innovation Research Programme (SBIR)*. First of all, SenterNovem carries out the pilot of the Small Business Innovation Research Programme (SBIR). The SBIR Programme is an American programme in which the government contracts out innovative research with a societal relevance to SMEs. SBIR consists of three phases: feasibility, development and commercialization. Multiple companies can submit proposals for phase 1 and phase 2. The best proposals are selected. The first two phases are fully funded by the government. The SBIR programme has run for over twenty years in the USA and can be considered a good practice. In the pilot investigates how a similar programme can be implemented in the Netherlands. With the SBIR pilot, the Ministry of Economic Affairs aims to stimulate start-ups, young fast-growing firms, and SMEs and to challenge them to perform ground-breaking research. With SBIR the Ministry intends to promote the innovativeness of SMEs and the importance of commercialization of knowledge.
- *Technostarter Regulation (WBSO)*. This regulation is the most well-known and most used regulation by starting technological enterprises. In order to stimulate innovative renewals, the government provides fiscal benefits to (starting) technological enterprises. This regulation is meant for all enterprises that carry out R&D, experiences bottlenecks and resolve these by themselves. They get discount on tax and national insurance

contributions for those employees that are involved in research and development activities.
- *Subsidy Regulation Infrastructure Techno-starters (SIT).* In order to stimulate the creation of new technological firms, this regulation pays attention to the infrastructure that is needed for techno-starters. Knowledge institutions, including universities and other research organizations, can apply for subsidy for their cooperation with and support to techno-starters. This can vary from renting equipment to hiring professionals.
- *Innovations Stimulation Regulation Overijssel-region (ISO).* This regional regulation is aimed at stimulating innovative SMEs by providing subsidies that can be used to hire consultants and carry out research and development projects. An extra subsidy is available for techno-starters, new firms, IT firms and sustainable firms.
- *Innovation Relay Centre Netherlands (IRC).* Together with the government agency Syntens, SenterNovem has set up the Innovation Relay Centre Netherlands. This initiative comes from the European Commission and consists of a network in 33 EU countries. The Centre facilitates and supports the transfer of technology at a European level to stimulate innovations in Dutch manufacturing. Furthermore, entrepreneurs can obtain general information as well as specific contact information with other attractive potential partners through networks and events.

Syntens is another independent government agency, whose main aim it is to support innovative successful entrepreneurship. Special attention is paid to techno-starters and high-growth companies. They are supported by Syntens, as they are confronted with opportunities and brought into contact with knowledge institutions and other companies that can help them realize the opportunities. The support provided by Syntens has three main focus areas: detailed information about (successful) innovation, digital innovation advisors and a network for potential partnerships. Furthermore, Syntens organizes workshops and meetings for innovative entrepreneurs. Most meetings are organized on a regional basis. For young and innovative firms with the ambition of growing fast, Syntens will organize a Masterclass. Another Masterclass, named Fast Growth, is organized by Growth Plus and De Baak Management Centre. Currently, the most important initiative that Syntens carries out in corporation with the Ministry of Economic Affairs, De Baak Management Centre and Port4Growth for fast-growing companies is the Mastering Growth programme, an initiative mainly consists of masterclasses called Mutual Learning Circles in which companies that are in the same growth stage participate. These interactive masterclasses focus on the entrepreneur’s role and influence on the growth of his company. Finally, together with the Buys Ballot Fund, Syntens has set up the Buys Ballot Fund for Knowledge-intensive Starters in the province of Utrecht, an initiative that provides venture capital to local knowledge-intensive starters.

Concluding remarks

In this chapter, we have presented the activities of the Dutch government concerning its science, technology and innovation plans and high-expectation entrepreneurship policy. Based on a desire to overcome the knowledge paradox and on the recognition that the Netherlands lags behind other countries when it comes to innovative entrepreneurship various changes and initiatives were introduced in the Netherlands in recent years. The

impresson is of an overambitious national government with numerous programmes, schemes and agencies involved, sometimes working with each other but at other times separately as well, and its effectiveness can be questioned. Serious paperwork and preparation is involved in the participation in most programes and, together with the complexity of these programmes and policies, small and young entrepreneurs are neither informed, ready or well-equipped; some of them are not even interested in participating in those schemes. This is one of the reasons why the innovation and entrepreneurrship subsidies do not end up in the pockets of the smaller and younger firms (which are more or less explicitly targeted by some of these programmes). In addition to an hyperactive government acting as a broker and financier amidst the small and bigger players in the field of innovation and entrepreneurship, we have seen that dedicated agencies like SenterNovem, Syntens, EVD and TechnoParner, operating at arm's length of the Ministry of Economic Affairs, complement the Ministry in terms of operating and running these programmes. In the final section we have discussed these activities and divided them into two categories. The former category involves support initiatives that offer a broad range of advice, training and mentoring, the aim of which is to improve the entrepreneurial and managerial capabilities of the firms involved. The latter category involves initiatives that aim at catalyzing the provision of (financial) resources and business services for growing entrepreneurial firms.

Besides empowerment, there is another shift in the approach of the national government, with attention shifting from 'picking winners', which is at odds with the unpredicatability of future success, to a more portfolio-based strategy of backing those (possible) winners that have successfully demonstrated their viability in the market. For instance, we have seen a combination of a bottom-up tender process followed by a top-down selection for a number of Top Technology Institutes. A similar pattern was found when looking at the regional support activities of TechnoPartner, which contributed to the formation of effective local public-private partnerships of indigenous universities, businesses and regional authorities. Instead of running academic entrepreneurship programmes out of the administrative centre with a major overhead in The Hague, the more than twenty or so regionally empowered TechnoPartnerships networks now run their own programmes (additionally fed by the regional development funds from the Peaks in the Delta programme). With some of their projects and processes financed through the various TechnoPartner schemes, the programmes can be tailored to match their regional and/or sectoral strengths.

Besides a shift in the government, universities in the Netherlands are also changing. Although the quality of scientific research and education over the last decades has invariably been high, the link with the private sector and the application of knowledge by businesses was often lacking. Like so many European countries, the Netherlands suffered from a phenomenon that is often referred to as the 'European Paradox'. In addition to their two common missions, education and research, universities and other knowledge institutes took on a new third mission involving knowledge exploitation. This triggered the universities to open up their organization and put an infrastructure in place for knowledge commercialization and new firm formation, and establish strategic partnerships with investors, larger companies, business service companies and local

governments. Summing up the empirical contribution and relating it to the (national) system of innovation literature, we have noticed that, around 2000-2005, a shift took place in the Dutch science, technology and innovation system from top-down and national (country-wide) policies to a more balanced approach where there is room for bottom-up initiatives and where regional and/or sectoral public and private actors (universities, local government and business) work together to develop tailor-made solutions in their promsing backyard far away from The Hague.

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