Chapter 5
Contemporary Research and Innovation Policy: A Double Disservice?

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Introduction

Innovations that can make new and old companies prosper, invest, employ and hereby contribute to tax incomes and to a nations' growth – through solutions that at the same time can solve problems related to economic, environmental and social issues. In short, this is the contemporary political demand list on innovation. With the current societal challenges in mind, the governmental expectation on what innovation, supported by national innovation policy, can contribute with is undoubtedly high.

> Current economic and social challenges are enormous and often global in nature. Innovation can help accelerate the recovery and put countries back on a path to sustainable – and greener – growth. (Ministerial report on the OECD Innovation strategy, May 2010)[1]

That established and new companies will benefit from scaling up, and industrialising potential innovations is thus taken for granted. In fact, that the contemporary innovation policy will be beneficial for business renewal and business prosperity is both a basic assumption and a prerequisite for reaching the goals of growth, as well as new technological and organisational solutions corresponding to the great challenges of society, climate change, environmental problems, unemployment, health, etc.

> It [innovation] is a powerful engine for development and for addressing social and global challenges. And it holds the key, both in advanced and emerging economies, to employment generation and enhanced productivity growth through knowledge creation and its subsequent application and diffusion (Ministerial report on the OECD Innovation strategy, May 2010, pp. 1–2).

[1] http://www.oecd.org/dataoecd/51/28/45326349.pdf, p. 16.

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An important step in boosting the 'innovation engine' is to influence the creation and transfer of new knowledge from the university to the business world. This ambition does not only include the volume aspect but also the idea that research can, in beforehand, be steered towards the need of the business world. As the OECD (2010) innovation strategy continues:

> Criteria for evaluating research performance should be adjusted to reflect the multiple missions of research institutions, including knowledge transfer. Clearly defined expectations and boundaries for collaboration and well-trained technology transfer personnel are essential to achieve this goal (Ministerial report on the OECD Innovation strategy, May 2010, pp. 1–2).

That such a steering has severe consequences for content and direction of research has, with Slaughter and Leslie (1997) in the forefront, been discussed by scholars in a wide area of research field; STS included, and the societal consequences of this change is the main theme in the third and fourth section of this book. But what are the effects for business renewal – and for the policy support of business renewal? Is the contemporary innovation policy a door to renewal of the business landscape at large – or does it mainly lead to investments in *expectations* on innovation, with benefits for a rather restricted part of the business *and* the university settings?

The main research question of this chapter concerns the opportunities to support business renewal and growth through public-funded policy investment given the contemporary policy principles. In order to shed light on this question, the following aspects have to be considered: (a) the assumptions about innovation that the contemporary governmental commission rests upon and (b) basic characteristics of innovation outlined in process-oriented studies of the content and function of the business landscape.

The Policy Practitioners' Complaint: A Point of Departure

> We are mainly supporting research. We can hardly support renewal processes that are initiated by companies and carried out among companies anymore, even if we can identify significant industrial and economic benefits of such processes for the policy investing community.

The quotation above is a complaint concerning what the contemporary governmental innovation policy commission has meant for policy in practice, expressed by one of the participants in the so-called GLOVAL project. In 2008, the policy development project abbreviated GLOVAL, 'Global Value Chains as an Emerging Challenge for National and European Research and Technological Development Policies', got funding from the European Union's Seventh Framework Program and policy agencies from ten European countries participated in the project.[2]

[2] Initially, representatives from five European policy organisations took part in the project: The Swedish Governmental Agency for Innovation Systems (Vinnova), Austrian Research Promotion Agency (FFG), Institute for Promotion of Innovation by Science and Technology (IWT) Flandern, The Public Agency for Technology of the Republic of Slovenia (TIA) and the Scottish Enterprise. During 2010 five new partners joined the project: Ministry of Employment and Economy, Advancis, Finland; Pera, UK; Inno Group, France; Temas, Switzerland; and Forschungszentrum Jülich, Germany.

The funding included also external research on policy investments in a transnational business landscape, which the author of this chapter has been responsible for.[3]

The GLOVAL project was initiated by frustrated policy practitioners, and the main objection concerned how likely it was that the politically sanctioned innovation 'recipe' would result in the expected social and business benefits. Firstly, almost regardless of were in Europe their policy agencies were located, the policy practitioners were exposed to a similar political interpretation of where to find the main sources of innovation – in academic and other public research. Second, they were also exposed to the implicit assumption that such policy actions should result in economic benefits *within* the borders of the community that made the policy investment. The policy practitioners meant that they were squeezed between two rather different views of innovations: On one hand, they had to cope with a governmental commission saying that supporting certain kinds of research and technological development processes would lead to innovation, industrial renewal and growth *within* the policy-investing nation. On the other hand, in their practical work, the policy practitioners' were faced with companies that were embedded into complex patterns of interdependencies to counterparts that very often were located outside the borders of the policy-investing nation, and which were engaged in transnational technological development projects – often without direct involvement of academic research.

The experiences of the policy practitioners' in the GLOVAL project is the empirical point of departure of this chapter. The empirical data used is based on two types of sources: Firstly, between 2008 and 2011, the author took part in GLOVAL workshops and project meetings as a participating researcher in order to get a deeper understanding of the policy practitioners' experiences of the governmental commission they are exposed to, particularly their practical experiences of linking policy-supported projects with business development and renewal within the policy-investing communities. OECD and EU innovation policy documents were also utilised to shed light on this issue, as well as a specific policy agency's documents concerning funded projects. Secondly, empirical-based, process-oriented research on innovation was utilised to catch the characteristics of the contemporary business landscape, including the content and effect of interdependencies that stretch across company and organisational borders, across space and time, with the work carried out in the IMP setting as main source.[4]

[3] An extended report based on this research is available in Waluszewski 2011.

[4] The work of the informal research network labelled the IMP (Industrial Marketing and Purchasing) Group is based on a shared interest in the content and effect of interdependencies in the business landscape. The challenge of how to deal with an interdependent, interactive business landscape has, over the last decades, triggered a series of research projects where different aspects and effects of interaction and relationships came to the fore. The work of the IMP Group is reported in some dozen books, about 2,000 papers and more than 130 Ph.D. studies. For an overview, see, e.g. Håkansson et al. 2009 and www.impgroup.org.

The Innovation Policy Commission

The first impression of innovation policy principles, presented by OECD[5] and EU[6], does, however, not support the policy practitioners' complaint, but explicitly express an awareness of a 'globally' connected business world. This is mainly expressed through emphasising the importance of cooperation among different kinds of stakeholders, such as public authorities, users, regulators, industry, consumers and 'poles of excellence' (Lundvall and Borrás 2005; Eklund 2007; Elzinga 2004; Håkansson et al. 2009; see also the previous section of this book).

The innovation commission to public-funded policy agencies is certainly not only influenced by OECD and EU advice but is complemented by national political agendas where a number of different issues are added. However, the policy practitioners experience that the politically sanctioned tasks given to their respective policy agencies are rather similar and above all are rather similar to what is stated in OECD and EU policy documents has also been observed by researchers (Elzinga 2004; Eklund 2007; Elzinga and Jamison 1995; Lundvall and Borrás 2005). Under a surface of individual nations' policy agendas, there is, argue Elzinga and Jamison (1995), an overall international convergence, where OECD's policy advice has been an important source of inspiration. Or, to use Lundvall and Borrás' (2005, p. 602) wording: OECD has 'played a unique role among international organisations in the diffusion of ideas about innovation policy'.

Interestingly enough, the systemic aspects of innovation can be regarded as a common denominator in contemporary OECD and EU policy documents, where organised interaction and network building among different kinds of 'stakeholders' is appointed a key policy action. As it is expressed in the 2010 OECD innovation policy agenda:

> Innovation today encompasses much more than research and development (R&D), although R&D remains vitally important. Innovation rarely occurs in isolation; it is a highly interactive process of collaboration across a growing and diverse network of stakeholders, institutions and users.[7]

However, a closer look at the systemic aspect reveals that it only is considered on a high level of abstraction. The contemporary innovation policy, or what has been labeled 'the 1990s science and innovation policy doctrine' (Elzinga 2004; Elzinga and Jamison 1995) is resting on three basic ideas: that (a) knowledge development mainly takes places *outside the business landscape*, and (b) *organised cooperation* among the university, industry and government will create innovation and (c) development and economic utilisation of knowledge takes place in close *spatial proximity*.

Thus, the '1990s doctrine' does not only launch the idea that university and other research is a critical and most often underutilised source of innovation. It also stresses that a successful 'marriage' between science and industry spurs innovation

[5] See, e.g. http://www.oecd.org/department/0,3355,en_2649_34273_1_1_1_1_1,00.html.

[6] See, e.g. http://ec.europa.eu/enterprise/policies/innovation/future-policy/index_en.htm.

[7] http://www.oecd.org/dataoecd/51/28/45326349.pdf, p. 2.

and industrial renewal, and that such a marriage can be arranged through policy action. Last, but not least, it assumes that the economic and social benefits will occur within the borders of the policy-investing nation (Slaughter and Leslie 1997; Nowotny et al. 2001; Edquist 2005; Lundvall and Borrás 2005; Widmalm 2008; Benner and Sörlin 2008).

As been discussed by Magnus Eklund in the previous section, a number of sources of inspiration can be traced to the '1990s doctrine'. There are empirically observed changes in the business landscape, where company specialisation and outsourcing gave rise to a new and increasing number of *visible* alliances and partnerships across company, organisational and national borders (Elzinga 2004; Håkansson et al. 2009). Then there are the changes which all can be related to 'a more neo-liberal climate' and increased reliance on 'market forces' instead of governmental involvement in technological and industrial development (Högselius 2010). A first is EU legislation based on neo-liberal market theory which does not allow individual member states to 'favour' domestic companies, for example, as acting as supporting customers for new technologies (Högselius 2010; Edquist et al. 2000). A second, related change is the introduction of the so-called new public management, aimed at transforming the public sector to cost-efficiency, something that have encouraged universities to emphasise their role as suppliers of research results and potential innovations to industry (Bleiklie 1998; Olson and Sahlin-Andersson 2005; Nowotny et al. 2005). Finally, theoretical approaches on innovation and growth, with the common denominator that they are all close to the general market theory, has been an important source of inspiration (Slaughter and Leslie 1997; Waluszewski 2004; Håkansson et al. 2009).

Whether the policy interpretation of these theoretical sources, with the 'National Innovation System', the 'Triple Helix' and the 'Cluster' approaches in the forefront, is appropriate has been discussed among scholars behind them, but all of these are frequently referred to in OECD and EU policy principles.

The understanding that knowledge development takes place outside the business landscape is built on the 'National Innovation System approach' (Freeman 1982, 2002; Lundvall 1988, 1992; Nelson 1993). The idea that it is possible to outline and reinforce 'national innovation system' has been turned into something of a general policy action within the EU as well as within individual member states. The latter has inspired a number of measures, for example, the development of quantitative indicators of national innovation systems and advice on how to build general innovation systems as well as such for different industrial sectors. The core of this advice concerns how scientific and other new knowledge can actively be taken out of its 'isolated' existence at universities and other public knowledge producing units to contribute to innovation, industrial renewal and growth.

The idea that the state, the universities and the industry can benefit from an organised interaction among them as groups can, besides the National Innovation System approach, be traced to the 'Triple Helix', model, with the sociologists Etzkowitz and Leyersdorff (2000) in the forefront. The message from the Triple Helix model is that through an organised interaction among university-industry-government, the 'network drivers' act as 'stage keys' and create 'spiral movements' that 'lift' the

dynamic to new levels (Etzkowitz and Leyersdorff 2000). The authors do not go into exactly how these 'spiral movements' work or how the interactions contribute to transforming scientific contributions to innovations, but the policy interpretation is that it is possible to create a direct transfer of academic research results to industry through a governmentally organised interaction, where the governmental role is to create links among academia and industry (Etzkowitz and Leyersdorff 2000; Etzkowitz 2004).

The idea that the development and economic utilisation of knowledge takes place in close spatial proximity has, along with inspiration from the 'National Innovation System' and 'Triple Helix', traces from the 'Cluster' approach (Malmberg and Maskell 2002). Although the Cluster scholars' original attempt was to analyse the content and function of geographically defined clusters, it has been embedded into the commission of policy practitioners as a tool to possibly build clusters (Porter 1990, 1998; Powell 1998; Saxenian 1994; Lorenzoni and Baden-Fuller 1995; Malmberg and Maskell 2002).

Systemic Features Addressed: But Only on an Aggregated 'Group' Level

Although the '1990s policy doctrine', as well as its theoretical sources of inspiration, stresses the systemic features of innovation, it is mainly made on an abstract 'group level'. The focus is on the possibility to create processes among:

1. Nonbusiness knowledge producers as a group
2. Policy/transfer organisations as a group
3. Companies as a group

However, interdependencies and different rationalities within these groups are simplified away. Furthermore, a closer look at how companies as a group is understood reveals a rather traditional market model inspired view of the processes going on between companies, that is, companies are assumed to be independent (Wilk 1996; Marglin 2008). At the same time companies as a group are regarded as utmost important for the creation of national economic benefits of the policy investments. For example, although companies are assumed to acquire knowledge from external parties, they are also assumed to independently decide where to acquire this knowledge, how to use it internally, and if they do not find it useful, how to sell it in the market.

With this abstract view of the systemic features of innovation and the business world, it is easier to understand the complaints from the policy practitioners. The high level of abstraction and the focus on the systemic aspects between the groups 'science', 'government' and 'industry' works fine as a foundation for a governmental innovation policy commission to policy practitioners: It makes it possible to identify some important 'nodes' in 'science' and 'industry' in *beforehand*, which can be connected to industry through governments' policy commission. However, when

broken down to (a) national and regional programmes for innovation support and (b) evaluation criteria through which policy practitioners can analyse the expected outcome of RTD applications, there is a lack of awareness of and tools to outline how transnational interdependencies intervene in the ability to create national benefits (Waluszewski 2011).

Whether conscious or not, the above presented underlying assumptions colour the contemporary governmental commission on innovation policy and lead to a very narrow policy investment logic. The policy practitioners' experience is that they are not allowed to act on effects that cannot be directly estimated or that are assumed to appear in a long-term perspective. Thus, there seems to be losers in the wake of a contemporary commission on innovation policy. But then who are the winners?

Positive Effects for Academic Research: Engaged in 'Packaging' of Research Results

The contemporary governmental commission on innovation policy has some positive effects for academic research – at least for parts of it. In order to be transformed into a commercial resource usable for exchange at, as expressed by OECD,[8] the 'knowledge market', research results must be able to be 'packaged' and 'productified' in terms of patents, prototypes, etc. A first effect, which can be positive for researchers behind research results that can be 'productified', is that they acquire a shape that makes them visible and able to be sold to investing companies. A related effect, which can be positive both for the researchers behind a research result possible to 'productify' *and* for the academic organisations they belong to, is that such research results are easy to measure. Finally, if researchers are interacting with companies investing in the commercialization of research results, their ability to create research results capable of being packaged and 'productified' will probably increase. In total, this means that the contemporary research and innovation policy *creates advantages for particular academic research areas;* those in which research results can be packaged and 'productified' and that furthermore can be sold due to expectations that future economic benefits will appear shortly after their development.

Negative Effects for Academic Research: Engaged in Indirect Utilisation

The contemporary governmental commission on innovation policy also has some clear negative effects that will probably affect the main part of academic research. A first negative effect is that research that cannot be packaged, 'productified' and

[8] OECD 2010.

sold to commercial actors due to an expected ability to deliver economic benefits shortly after they were developed will have a lower priority, that is, research which effects on business or other parts of society is difficult to outline in advance. Research that, through learning and teaching is embedded into people and whose use is indirect, is hidden and appears in a different time, at a different place and in a different shape as compared to when it was developed, will not be supported. *Thus, research that cannot be adapted to the limiting requirements of a knowledge market cannot expect support from contemporary innovation policy*. This means that the contemporary governmental commission on innovation policy will negatively affect the variety of research, especially research that does not adapt to short-term interests.

Positive Effects for Business: Engaged in 'Betting' on Research

The contemporary governmental commission on innovation policy has some positive effects for business, at least for some parts of it. As soon as a research result has been 'productified', in terms of a patent, a prototype or a product, companies can invest in it – based on expected future economic benefits. One way for investing companies to economically benefit from research results is to 'bet' on it. For example, venture capitalists and other financiers can 'bet' on which company, commercialising which 'productified' research result, will yield a positive return on investment within a certain amount of time. This type of knowledge market is based on the first investor's speculation in the ability to be bought out by other investors. For example, if the 'productified' knowledge is embedded into a start-up company, an 'exit' can be created through an introduction on the stock market. Another way for economic actors to 'bet' on economic benefits of research results is through established companies' investments in 'productified' research results, based on the expectation that they will create future benefits in terms of new/renewed products, processes and/or services. Whether it is venture capitalists or R&D organisations of established companies that are buying research results, the common denominator is that they are acting on expectations of future innovations. This means that contemporary research and innovation policy *have positive effects for investors and/or established companies with such heavy economic 'muscles' that they can 'bet' on research results' ability to be transformed into innovations*.

Negative Effects for Business: Engaged in 'Muddling Through'

The contemporary governmental commission on innovation policy also has some clearly negative effects for the use of knowledge in business. If, as suggested by policy, the use of knowledge in business increasingly occurs through a knowledge market, the use will also be directed to a limited group of economic actors, those

who can 'bet' on or invest in 'productified' research results based on the expectations of future innovations and return on investments. Furthermore, when larger research fields are adapted to the requirements of research results able to sell on a knowledge market, it is a rather narrow group of economic actors that will influence what types of research results will be available in this market.

Perhaps the most severe negative effect comes from the contemporary governmental commission's limited understanding of the 'muddling through'[9] like processes that takes place in established customer-supplier relationships in transnational business networks. Consequently, companies in need of knowledge development starting out from established supplier and customer settings will not be favoured by the contemporary governmental commission. *Thus, companies that do engage in 'muddling through' instead of 'betting', and companies that do not have the economic 'muscles' to invest in 'locked' research results, but that have to start out from investments in place in the supplier and user settings to which they are related, have difficulties finding support from the contemporary innovation policy commission*. Thus, even if it is hard to imagine a company whose development efforts are not dependent on research of any kind – just try to imagine all research that indirectly is embedded into any company's IT solution and into the people working with it – this type of 'hidden' economic use of research does not matter when applying for policy support. If a company cannot present any direct link to newly developed research results and cannot account for any rapid economic effects within the borders of the applying company in terms of increased investments or employment, contemporary research and innovation policy will be of restricted help.

What Is Missing?

It is interesting to note that at the same time as increasing number of governmentally produced documents were presented, stressing that academic and other public research is an underutilised, direct source of innovation, process-oriented researchers engaged in studies of innovation and industrial renewal continued to witness about another pattern. The common message brought forwards by these researchers, representing disciplines as economic history, business studies, history of technology, history of science, sociology and anthropology however *does not* seem to have made any larger effect on contemporary policy. In short, this is that technologies development, innovation and industrial renewal is created in interaction among specific companies and/or organisations and that these interactions are not delimited to any geographical borders, neither to certain technologies (See, e.g. Rosenberg 1982,

[9] In two articles that are classic among researchers but seem to be forgotten in policy, 'The Science of Muddling Through' (1959) and 'Still Muddling, Not yet through' (1979), Charles Lindblom emphasised that realising policy is about endurance or taking many small incremental steps over a long period of time.

1994; Latour 1996; Håkansson 1987; Basalla 1988; Fridlund 1999; Sturgeon 2000; Grandin et al. 2004; Nowotny et al. 2005; Waluszewski and Håkansson 2007; Hoholm 2009; Ingemansson 2010).

A main observation is that the most important direct source of industrial renewal and innovation is established business relationships. This does not mean that research is an unimportant source of knowledge – but it is in general indirect, mediated through people, which makes the main contributions from academic research to business 'largely indirect and roundabout' (Pavitt 2004, p. 120). This means that the relationships among academic research results and the commercial utilisation of these mainly is an affair which stretches over time and space in ways which makes it hidden for others than those direct involved. Thus, that anything new has proved to be useful or even successful in an academic research setting is no guarantee whatsoever that it should be direct commercially useful in industry. In the latter setting, the commercial usefulness of something new is determined by what benefits it can create on all the organisational and technological investments already made, whether or not it is considered as breakthrough science (Waluszewski and Håkansson 2007). As Ingemansson (2010, p. 173) illustrates the different logics of academia and business:

> […] scientific and economic significance are not two sides of the same coin – they are not even values within the same currency.

Furthermore, empirical-based research on business renewal and innovation addresses a specific objection to the contemporary innovation policy commission's great trust in the markets' ability to transform direct nonbusiness research results to innovations which solve both societal and industry problems. Given an interdependent, network-like business landscape, material and immaterial investments in place will affect if and how anything new will be embedded in the business landscape – regardless of what economic or societal effects it is assumed to have when considered in itself. Thus, insights which some decades ago was common knowledge seems to have faded away in contemporary innovation policy; that technological and industrial development occurs in long-term interaction, and that strong, long-term oriented actors on the supplier and user side have a crucial role in mobilising support and direction of this process where the heavy costs appears long before economic benefits (Håkansson et al. 2009; Lundin et al. 2010; Grandin et al. 2004).

What these empirical-based research experiences further underlines is that governmental actors often has been involved in creation of support and direction of interactive innovation processes, for example, in terms of purchaser of civil or military technology. Both in the USA and in Europe, specific user-supplier interfaces developed in order to be beneficial for both industry and society emerged through a heavy state engagement – more or less visible or hidden in the background (Hughes 1994; Fridlund 1999, Sörlin 2004; Weinberger and Trischler 2005; Malerba 2002; Håkansson 1987; Håkansson et al. 2009; Lundin et al. 2010). However, in the interpretation made in the 1990s policy doctrine, the role of the state and governmental actors has, as Högselius (2010, p. 271) puts it, changed from being a 'competent buyer' to become much more 'indirect, abstract and nebulous' with activities as

creating a 'good business climate' in the forefront. A heavy reliance on the market has emerged: 'With the good conditions in place, the free market is then expected to do the rest…' (Högselius 2010, p. 271).

Innovation Takes Place in Relation to Specific Others

What type of business landscape is then any actor who has the attempt to support innovation facing? Although companies always have dealt with renewal issues in interaction with others, across company, technological and spatial borders, (Gudeman 2001), this pattern was reinforced during the last decades. Through specialisation and outsourcing, it is not rare that the cost for a contemporary end product to 70, 80 or 90 % stems from suppliers and sub-suppliers. This in turn means behind any new or renewed end product or service, there is a shared development responsibility which stretches over several tiers of related suppliers and sub-suppliers (Piore and Sabel 1984; Gulati 1998; van de Ven et al. 1999; Gudeman 2001; Håkansson et al. 2009).

In the contemporary business landscape, any attempt to create innovation and industrial renewal is to approach specific transnational network structures. It is to face that the benefit of a potential innovation is dependent on how it can be utilised by direct and indirect affected actors on a supplying and using side (Ford et al. 2003; Håkansson et al. 2009). Coping with innovation and industrial renewal means that a number of measures are undertaken in close interaction with specific counterparts on the supplier and user side – across spatial borders. And it means facing imprints on both the human and material resources involved that earlier interactions have created over time – in a way that will affect the content and direction of any attempt to create change, the space dimension included[10] (Håkansson 1982; Piore and Sabel 1984; Rosenberg 1982, 1994; Gudeman 2001; van de Ven et al. 1999; Ford et al. 2003; Baraldi et al. 2006; Håkansson et al. 2009).

What does then this empirical-based picture mean for attempts to support innovation? Firstly, is says that the business landscape is not neutral and that no potential innovation will meet a frictionless market, but an intricate pattern of investments in

[10] In traditional market thinking the market is assumed to be characterised by independency. This is due to that economic resources exchanged are considered as homogeneous. This means that the only necessary information the actors on the market need is the price of the resources. The problem of translating 'knowledge' to a homogeneity assumption has been solved with the assumption that the generation of knowledge is something that takes place *outside the economic world*, to be automatically absorbed by the economic actors when manifested in new economic resources (Wilk 1996). However, as soon as the development and use of resources is treated as an integral part of the business world, the homogeneity assumption has to be replaced by a heterogeneity assumption; that is, the value of resources is created in combinations and is unknowable in advance. The business landscape becomes characterised of interdependencies, which companies through interaction are assumed to try to benefit from (Penrose 1959; Ståhl and Waluszewski 2007).

place, stretching across company and national borders. This might sound both pessimistic and deterministic, but the empirical-based picture also witnesses about business landscape under constant development. This means that established paths can always give rise to new crossroads – as long as the new gets embedded into some change processes and gets direct interfaces with at least some existing resources on a supplier and user side. This also implies that the only general means to create change in an interdependent business landscape is interaction. For anyone that wants to support the embedding of something new in a large-scale commercial supply and use, it is necessary to get involved with directly or indirectly affected counterparts on the supplying and using sides (Håkansson and Waluszewski 2007).

Coping with the Different Economic Logic of 'Use', 'Supply' and 'Development'

If anything new never meets a claimless demand, but patterns of existing investments related and adapted on a day-to-day basis among specific companies and organisations, across many different types of community borders, then within what types of settings does the new have to get a 'life'? That is, what types of interdependencies does anyone who wants to support innovation have to be aware about? Based on their different kinds of economic logics, at least three types of related empirical settings can be outlined, where anything new must be embedded if it will result in a large and widespread commercial supply and use. This means that there are both opportunities and drawbacks in three different settings that have to be tackled in order for an innovation journey to succeed (Håkansson and Waluszewski 2007).

The Need for Benefits in a User Setting

If anything new ever will become a successful innovation, that is, contribute to 'black figures' for those engaged in its supply and development (and not end up as a short-term 'bubble', i.e. a firm investing, employing, purchasing, producing and delivering only as long as it has access to venture capital that can carry its costs), the end product has to be valuable within a commercial using setting, that is, an environment consisting of using companies, organisations and/or consumers (Håkansson and Waluszewski 2007).

In a user setting, a dominating economic question is how to utilise established products and product systems as efficiently as possible. Thus, for anything new to become an innovation, it has to, directly or indirectly, be embedded into a commercial product and/or service that has widespread use. This means that the new needs to get interfaces to a large number of already existing products and services in a user setting. Hence, existing investments in products and services are crucial for any potential innovation's ability to succeed. This can explain why the embedding in a

user setting is the 'Achilles heel' of the innovation journey; only a few of all new products and services survive this process (Waluszewski and Håkansson 2007; Tidd et al. 1997; von Hippel 2007; van de Ven et al. 1999).

Thus, one of the most critical parts of the innovation process is very hard to reach from the supplier side. A number of users must find it economically beneficial to engage in the creation of user applications. This might include an identification of what adaptations of related product systems already in use are necessary in order to embed the new solution, as well as a mobilisation of the suppliers and users behind them. Hence, for anything new to gain widespread use, interfaces between the new and a number of existing investments, in a supplier and a user network, have to be created. The more others than those directly related to the use of the new can take advantage of it, the larger the possibility that it will reach widespread use and become an innovation. Consequently, whether any new product, service or process will ever reach substantial use is largely determined by whether it will clash with or create new benefits to established material and immaterial investments in the user setting and by how much economic and political support can be mobilised (Håkansson and Waluszewski 2007; Bijker 1987; Gudeman 2001; Yates 2009).

The Need for Benefits in a Supplying Setting

The difficult step from a potential to a realised innovation is not only dependent on what benefits the new can contribute in a using setting but also in a supplying setting. Below we will take a closer look at what challenges the scaling up and embedding of something in a supplier setting implies (Håkansson and Waluszewski 2007).

In a supplier setting, a dominating economic question is how to utilise established facility systems (i.e. investments in place responsible for production, logistics, distribution, marketing, services, etc.) as efficiently as possible. For any new solution to be industrialised, that is, to be embedded into a number of related companies responsible for all types of human and physical resources necessary for taking it into a regular supply, it has to be beneficial for the main part of these existing investments. Thus, when something new is going to be embedded into a supplying network, it has to be 'locked' in terms of a new product, process and/or service. As discussed above, in the contemporary highly specialised business landscape, the trial-and-error-like process of locking a new solution into a product, process and/or service, and embed it into a supplying network, will never be an affair of one single company, but an issue carried out among numbers of related companies. Much of the end product will be supplied by others, not just the launching company, and how the end product will be locked will largely be defined by what others can supply, given that the new also has to add to their existing investments. What costs and benefits this can create will consequently have a great impact on whether a new solution will ever be locked in terms of a commercial product taken up into a large-scale supply (Gadde and Håkansson 2001; Ford 2001).

Hence, a critical question for those who struggle with getting a new solution embedded into a network responsible for its large-scale production and supply is

what adaptations are required by others, and furthermore, how much support for these investments can be mobilised. The more existing investments can be utilised without larger adaptations, the higher the efficiency. Consequently, whether any new product, service or process will ever be embedded into a large-scale production is largely determined by whether it will clash with or create new benefits for existing related investments.

Developing Settings Characterized by Search for New Functions

Regardless of how great a success something new seems, in an academic or business developing setting, it is not until it has been embedded into networks responsible for its large-scale supply and use that it becomes an innovation. And regardless of the type of *developing setting* within which a new solution emerges, this will create imprints on the new. Earlier investments in human resources, such as knowledge, skills, routines and experiences, and in physical resources, such as equipment, tools and methods, will create imprints on the new functionality. If the developing setting is very close to established supplier and user networks, if it, for example, consists of companies' R&D units and/or industry-related research institutes, the new solution will probably emerge in close relation to human and physical investments made in these settings, as well as in relation to problems and opportunities of the supplier and user networks. If the developing setting has only vague connections to future commercial supplier and user networks, if, for example, it consists of academic research milieux, the new solution will carry fewer imprints of earlier investments in supplier and user settings. However, there will always be some kind of influence from business, for example, in terms of a company's supply of research equipment and methods (Håkansson and Waluszewski 2007; Galison 1997).

When anything new is going to be embedded into commercial supply and use, it is never a solution in itself that creates benefits, but what effects it can create in combination with current human and physical investments. This means that uniqueness from a short-term economic perspective most often is a drawback. The more a new solution differs from related investments, the more difficult it is to combine, that is, the more difficult to find ways to create economic benefits. Even if a new solution can be regarded as an excellent scientific contribution in the academic setting where it was developed, and even if it seems to correspond to a specific demand, there is no guarantee that it will be possible to embed in commercial supplier and user networks where it has to interface with a number of investments (Håkansson and Waluszewski 2007; Hoholm 2009; Ingemansson 2010).

A Limiting Innovation Policy

One important consequence of a business landscape with the above-described characteristics is that no potential innovation, regardless if developed in a business setting or transferred from an academic knowledge producing setting, ever meet a claimless

demand. Any attempt to create change will always have wanted or unwanted side effects for a number of direct and indirect counterparts on the supplier and user side. The effects will be distributed among related companies and their technological and organisational solutions, that is, among directly and indirectly related interfaces, over time and space. Thus, these largely indirect effects can both support and kill an innovation journey, depending on what it will add to the others that it affects. This means that effects from public innovation support can 'gravitate' from – but also to – companies and places. Furthermore, it means that potential innovations can be transformed into solutions of quite different characteristics and effects than thought of initially (Håkansson et al. 2009).

From a national policy perspective, such an innovation pattern is not necessarily a problem. If the long and 'muddling through'-like process, where investments in development respectively investments in the embedding of new solutions in a large-scale supplying and producing setting are made within the same nation, and if the end product is met by the emergence of widespread use, this will certainly be beneficial for the community that made policy investments to support these processes. Instead, the great problem appears when the main public-funded investments in are made within the borders of one nation, and the main economic and social benefits appear outside these borders.

Hence, if we accept that the business landscape is characterised by interdependencies, that is, that it has network-like characteristics which stretches across national borders, and that the outcome of any research and technological development process, in order to contribute to innovation, has to find a 'life' in three related networks that are characterised by different economic logics, the contemporary governmental requirement on direct measureable economic and societal benefits within the borders of the investing community appears limiting. If the network characteristics of the business landscape are simplified away, neither innovation hindrances nor opportunities will be taken into consideration. Thus, given that a main characteristic of the business landscape is interdependencies stretching across company and spatial borders, there is a need for rethinking the innovation policy commission. In the next section, a suggestion for a reformulation is presented.

Rethinking Innovation Policy

Is an innovation policy commission a 'mission impossible', given a transnationally interdependent or network-like business landscape? Can public-funded policy project be designed in ways that is beneficial for company *and* societal renewal – and not only for actors engaged in 'betting' on research? If we take seriously the governmental ambition to reach national economic and social benefits through innovation policy, as well as the characteristics of an interdependent business landscape, then the agenda for how to reach this needs to be reframed.

Instead of starting out from the assumption that direct transfer of research results to business is a smooth way to boost innovation processes with economic and social benefits within the borders of the of the nation that made the policy investments, the

problems need to be reformulated. As underlined above, if the business landscape is network-like, then it is not neutral, but directs economic activities in a way which favour the main part of existing investments. Thus, if the business landscape has network-like characteristics, the governmental policy cannot rely on that, knowledge transfer will result in the innovations and industrial development needed to solve certain identified economic, societal and environmental problems. Two critical questions are instead how to:

1. Utilise the efficiency and innovativeness of networks forces
2. Create counter forces against the non-democratic and economically conservative forces of a transnational business networks

Thus, given that the business landscape is characterised by transnational interdependencies, a relevant starting point for the first question would be to ask (a) how governmental policy can act in order to support the renewal of resources available within the nation in a way that makes them into the policy-investing nations' contribution to specific transnational innovation forces and transnational supplier and user networks. Along with this reformulation goes the second question, the requirement on governmental policy commissioners to consider (b) what types of transnational innovation forces, involving what supplier and user networks, that policy investment should relate to – as support or hindrance. Should any opportunity for companies to deliver important contributions to transnational supplier and/or user networks be supported? Or should only projects be supported that are acceptable for environmental, political, and/or democratic reasons? Thus, given a network-like business landscape, a key question for policy actions can be formulated:

> What public policy measures are needed to renew resources available within the investing nation if the ambition is to make them to significant, stable contributions to transnational supplier and/or user networks?

With such a point of departure, policy in practice should be allowed to expand the perspective, from direct effects assumed to be created by a focal company and/or project to network effects that are likely to occur within and outside the policy-investing nation.

However, if governmental policy has the ambition to renew and relate resources available within national borders to transnational supplier and/or user networks, an analytical framework is needed that is based on the assumption of an interdependent business landscape, which allows an analysis of indirect effects, and especially of 'place opportunities'. For smaller nations in particular, a critical question is how to get not only the main cost but also benefits to appear within their national borders. Given a network-like business landscape, there is a great risk that benefits may 'gravitate' to other locations than intended, that is, that outcomes of smaller countries' research and technological development investments become ad hoc input to transnational supplier and user networks. Thus, a relevant governmental policy question concerns *how to make the outcome of public funding supported projects to become a particular place's stable contribution to transnational supplier and/or user networks*.

The basic demand on such an analytical framework is that it can provide the policy practitioners with the ability to investigate the direct interfaces, and the main indirect interfaces, on the supplier as well as on the user side, which the project is thought to affect or needs to create. What main developers, what main suppliers and what main users – their relationships included – are thought to be affected by the project? What does this mean for the space dimension? In the next section, we will discuss how such an analysis can be made and how space-related opportunities can be identified.

Opportunities to Renew National Developing, Supplying and Using Networks

The analysis below is based on the ARA model (Håkansson and Johanson 1992; Håkansson and Snehota 1995; Håkansson et al. 2009), which makes it possible to analyse the content and effects of the three important 'network layers': activity links, resource ties and actor bonds, and the distinction of three 'economic logics' which anything new has to be embedded in order to become an innovation (Håkansson and Waluszewski 2007).

The basic foundation of the ARA model is the assumption that interdependencies are dealt with through business relationships. The content and effect of these business relationships are analysed in terms of actor bonds, resource ties and activity links – which are assumed to have consequences that go beyond the specific relationship in which they arise. Thus, the model builds on the assumption that each of these three layers are interconnected and each affects and is affected by the constellation of resources, pattern of activities and web of actors in the wider network (Håkansson et al. 2009). Activity links may limit or facilitate resource adaptations over time and space, and resource ties may limit or favour the possibility of activity coordination over time and space, and actor bonds may open up the possibility of developing activity links and resource ties over time and space. This implies that through the ARA model, it is possible to take account of both direct and indirect interdependencies in the business landscape. Furthermore, the model makes it possible to investigate these different layers separately or in different combinations. It can, for example, be utilised in order to investigate if some main resource ties, stretching across certain nonbusiness and/or business organisations and over certain places, also are dealt with through equivalent actor bonds (Håkansson et al. 2009).

In the discussion of opportunities for policy to affect the resources ties, activities links and actor bonds, the model is used as following:

1. *Innovative forces* are reflected through an analysis of how *resources* are developed and combined within and across companies, within and across national borders.
2. *Efficiency forces* are reflected through analysis of how *activities* are performed and linked within and across companies, within and across national borders.

3. *Balancing of efficiency and innovation forces* is reflected through analysis of how actors are related and how actor bonds are developed within and across companies, within and across national borders.

Below we will take a closer look at how the model can be used to increase the awareness of what opportunities policy can work with given a network-like business landscape.

Opportunities to Renew Resources, Activities and Actors

A first question to outline is what *resources* that are involved in and/or affected by a policy-supported project and what could be added? Here, it is important to consider both what combinations of human and physical resources are already involved in the project, and what could be added. For example, are the resources that are involved in the policy-supported project representing mainly a nonbusiness developing setting, or are there also other resources, *representing a national supplying respectively using setting* involved in the renewal work? What resources need to be involved, renewed or developed?

A second question concerns what *activities* that are already involved in and/or affected by the policy-supported project and what could be added? Are the activities involved in the renewal work representing mainly an academic developing setting, or are other activities, *representing a national supplying and using setting also involved*? What activities need to be involved, renewed or developed?

A third question concerns what *actors* that are already involved in and/or affected by the project and what could be added? Are the actors utilised in the RTD work representing mainly an academic developing setting or are actors *representing a national supplying and using setting also utilised in the renewal work*? What actors need to be mobilised in the renewal work?

A deeper analysis of resources, activities and actors, in a developing, supplying *and* using setting, can outline weaknesses and opportunities for policy practitioners to influence the content and direction of a policy-supported project. Through such analysis (which never can be complete but more should be regarded as an 'awareness map'), an understanding of what resources, activities and actors are involved, need to be involved and need to be created in the renewal work can be outlined. Furthermore, such analysis will also provide a view of what role national resources will have in this process. Thus, hand in hand with the analysis of strengths and weaknesses of the policy-supported project, goes the outlining of opportunities for policy practitioners to act. The analysis of renewal opportunities can also be presented as in the following matrix, based on Håkansson and Waluszewski (2007) (Table 5.1).

The same data concerning renewal opportunities can also be presented as in a second matrix, which highlights the links among 'national' networks, that is, resources, activities and actors available within the national borders and transnational networks (Table 5.2).

Table 5.1 Nine related but different 'interface logics' that can contribute to 'diagnostics' of forces that shape and direct the outcome of policy-supported renewal projects

	Using setting	Supplying setting	Developing setting
Resource combinations (*innovation forces*)	*Renewal opportunities in relation to* product systems	*Renewal opportunities in relation to* facility systems	*Renewal opportunities in relation to* idea systems
Activity links (*efficiency forces*)	*Renewal opportunities in relation to* user networks	*Renewal opportunities in relation to* supplying networks	*Renewal opportunities in relation to* R&D networks
Actor bonds (*mobilising forces*)	*Renewal opportunities in relation to* user actor bonds	*Renewal opportunities in relation to* supplier actor bonds	*Renewal opportunities in relation to* R&D actor bonds

Table 5.2 Links among 'national' and 'transnational' networks

	'National' networks	Links between 'national' and 'transnational' networks	'Transnational' networks
Innovation forces	Resource combinations	*National-transnational* Resource combinations	Resource combinations
Efficiency forces	Activity links	*National-transnational* Activity link	Activity links
Balancing forces	Actor bonds	*National-transnational* Actor bonds	Actor bonds

A basic awareness concerning each 'interface logic' can be utilised to create an understanding of:

1. The idea that the policy support rest on and how far they have materialised, including at what places that are involved.
2. The supplying network that is necessary for taking the materialised idea to a large-scale production and supply, including at what places it is likely that this will appear.
3. The user network that is necessary for reaching the using volumes required for 'black figures' in the supplying setting, including at what places they are likely to emerge.

Thus, the analysis can provide at least a basic awareness about three related but, in terms of both technological, economic and spatial logic rather different networks, in which anything new has to survive to become a successful innovation.

The final question for the policy to consider is what projects are going to be supported, and how. Is it the application concerning projects that appear to have a good chance of being embedded in a using, producing and developing network, which to a large extent already exists within certain spatial borders, going to be prioritised? Or is it the application concerning projects that appear to meet severe difficulties in

one, two or all of these settings, but are important for a democratic, environmental or other societal reason and are considered as beneficial, that will be prioritised? And if it is the latter type of processes that is prioritised, where a long-term support is necessary for supplying and using networks to emerge, is the required policy involvement compatible with the contemporary EU legislation?

Regardless of the answer of the latter question, if the business landscape is network-like, with interdependencies stretching across national borders, then there is a need for a governmental innovation policy that takes the network forces into consideration.

Conclusion: The Need for an Innovation Policy that Addresses Network Forces, Which Have both Light and Dark Sides

If the business landscape had *not* had network-like characteristics, but had been close the how it is sketched in the market model, then the contemporary innovation policy principles could have worked. The basic policy commission to reduce all hindrances for keeping the *market vivid* and relying on the market mechanism to force companies to identify their competitors, analyse their characteristics and behaviour, and in the fight for a 'competitive advantage' in relation to others on the market, absorb new knowledge and technology, would have been relevant (Marglin 2008; Håkansson et al. 2009). Furthermore, if any interdependencies had mainly occurred among the knowledge producing setting and the business setting on a group level, then ideas developed among institutional economics[11] which, as a complement to the market model have added the assumption that the market has difficult to absorb certain types of knowledge, would be a relevant additional framework.

However, the main message of this chapter has been that if policy practitioners and the empirically based business researchers are right, that is, if the business landscape is network-like, with interdependencies stretching across direct and indirect related companies and organisations and across national borders, then it will never be neutral. Instead, the business landscape is characterised by network forces which can support innovation and industrial renewal – but in a direction which is beneficial for the main part of investments in place (Utterback and Abernathy 1975; van de Ven et al. 1999; von Hippel 2007; Håkansson and Waluszewski 2007).

This means that from a society point of view, network forces have both light and dark sides. The light side is that already made material and immaterial investments, related across time and space, will concentrate innovation forces. Furthermore, the interaction processes concerning material and immaterial investments in place is also a significant source of renewal. The dark side is that the already made material

[11] Some of the institutional economics-inspired approaches that provide interpretations of how transfer of 'innovation sticky knowledge' from a nonbusiness setting to a market can be organised have been mentioned above, that is National Innovation Systems, Triple Helix and Cluster.

and immaterial investments, related across time and space, will hinder innovation processes which threaten larger parts of these. Thus, given a network-like business landscape there is a need for a governmental innovation policy that takes both the light and dark sides of network forces into consideration. Below, this chapter will be concluded with a discussion of what requirement of governmental innovation policy a network-like business landscape addresses.

The light sides of networks which can be utilised by innovation policy are, as mentioned above, that the benefits of innovations are efficiently spread among companies and organisations that directly or indirectly are involved in renewal work. Governmental funded support for renewal work concerning, for example, a large-scale supply and use of a new product and/or service, would not only be beneficial for a particular supplier and user, but for a number of related companies and organisations on the supplier and the user side – within and across national borders.

However, along with the light side also comes the dark side of a network-like business landscape, which has at least three facets that need to be addressed by governmental innovation policy. A first dark side is that a network-like business landscape influences the direction of the innovation journey in an unequal way. Existing investments, including how they are related, are on one hand powerful in terms of giving the innovation journey a certain direction. But this also means that the innovation journey is far from fair or neutral; it is path dependent in that new crossroads are influenced by existing material and immaterial investments. Thus, the innovation journey is economically conservative in that it protects the main part of existing investments. This implies that support for innovation processes with the ambition to reach specific governmental goals, for example, concerning the environment, but which challenges a great part of investments in place, needs to be carefully considered (David 1985; Håkansson and Waluszewski 2002).

A second dark side that policy has to cope with is that a network-like business landscape not only spreads the benefits of innovations but also draws back in an efficient but unequal way. This aspect is often forgotten, but becomes visible as soon as an end product faces a crisis of any kind. When, for example, a successful innovation in terms of a new type of loan in the financial setting over time results in a crisis for some large financial actors, the disadvantages are effectively and unequally spread among both directly and indirectly related companies and organisations, across national borders. Thus, a network-like business landscape, where the resources of one company/organisation are embedded into other companies/organisations, does not stabilise the effects of different kinds of drawbacks, but rather increases their effect (Håkansson et al. 2009).

A third dark side that has to be addressed is that a network-like business landscape is unequal in terms of who has influence over the innovation journey. Networks are non-transparent. Networks have no intrinsic fairness. Networks do not operate in a common interest, and they do not provide the same opportunities to all those related to it, whether they are companies, organisations or individuals. This implies that a network-like business landscape is unequal in terms of who has influence over the innovation journey and, consequently, over how costs and benefits are shared (Waluszewski 2006; Hasselberg and Peterson 2006).

Hence, the final conclusion of this paper is straightforward: if the business landscape is network-like, there is certainly a need for governmental policy to intervene. If networks are not neutral, but direct the innovation journey in relation to existing investments, governmental innovation policy cannot rely on creating a transfer of certain kinds of knowledge to 'the market' and trust that this will result in the innovations needed for the identified economic, societal and environmental problems. Governmental innovation policy has to act as a counterforce against the non-transparent, nondemocratic and economically conservative forces of a transnational network-like business landscape.

Besides acting as a counterforce against the dark sides of networks, there are also a number of network opportunities that governmental innovation policy can help policy practitioners to support and utilise. However, if policy practitioners are going to be able to utilise network opportunities in developing, supplying and using networks, stretching across national borders, their governmental commissioners have to fulfil two main requirements: First, the policy involvement has to have *endurance*. The policy practitioners must be allowed to identify and engage in transnational network processes over time. Second, the policy involvement must be allowed to be *spatially dispersed*. The policy practitioners must be allowed to identify and engage in transnational network processes over space, that is, over national borders.

Thus, the policy practitioners must be supplied with a governmental commission which allows them (a) to analyse and utilise the innovativeness of transnational network forces and (b) to counteract against the economic conservatism of transnational business networks. Both of these two requirements are challenging to a governmental innovation policy commission that is based on an overdeveloped trust in the ability to reach rapid and direct measurable effects within narrow geographical borders – through adapting academic research towards in beforehand assumed needs of a limited group of economic actors.

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