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**INTERNATIONALISATION OF
RESEARCH AND HIGHER EDUCATION
EMERGING PATTERNS OF TRANSFORMATION**

Åse Gornitzka, Magnus Gulbrandsen and Jarle Trondal (eds.)

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© NIFU – Norwegian Institute for Studies in Research and Higher
Education, Hegdehaugsveien 31, N-0352 Oslo, Norway

Preface

This report represents the first publication of the 2002–2004 Strategic Institute Programme (SIP) at NIFU. *Internationalisation* – of higher education, research and innovation – is the programme’s theme; it has received funding from the Research Council of Norway. This report partly presents the overall themes and issues raised in the programme, and partly identifies the state-of-the-art in existing bodies of literature. There are three main themes. First, what major research questions should be posed and emphasised with regard to the internationalisation of research, innovation and higher education? Second, what are the main theoretical puzzles and conceptual lenses that should be highlighted and analysed? Finally, what is the state-of-the-art in the empirical documentation of internationalisation of the domains in question? The report adds value both by posing vital questions, by highlighting theoretical puzzles and by giving several empirical synthesising analyses from different domains.

Several people have contributed with comments and suggestions to previous versions of the texts presented here. We are particularly indebted to Nicoline Frølich, Liv Langfeldt, Peter Maassen, Bjørn Stensaker and Randi Søgne. Research Council of Norway professionals have also given valuable comments to earlier versions of the programme proposal document, mainly reflected in this report’s introduction and conclusion.

Oslo, August 2003

Petter Aasen
Director

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Summary

In this report, we give a broad overview of theories and empirical data on the internationalisation of higher education, research and innovation. Our report does not only reflect the political and more popular interest in the theme, but also an increasing academic awareness of it. This surge of interest may lead us to believe that internationalisation is a relatively recent phenomenon, but this is not the case. Science, education and scholarship have always had “international” characteristics, but at the same time also been essential parts of national identities and policies. This duality or tension continues to this day, and while knowledge production and dissemination may have become less national the last decades, the *goals* of these activities have perhaps become even more rooted in policies of national growth, improvements and competitiveness.

Our aim has been to shed light on some of the various definitions and theories of “internationalisation” and conceptual neighbours like “globalisation” and “regionalisation”, and we ask if these terms have changed their meaning over time. In addition, we have described theoretical and empirical puzzles and findings on internationalisation in several different areas: policies, research work and practices, higher education institutions, and industrial research and development (R&D).

Chapter one gives a **conceptual, theoretical and partly historical background** to the study of internationalisation, including a definition of the central terms:

- *Internationalisation* – between nations – is initially defined as becoming (more) “international”. The term has a nation-state centred perspective, as the concept presupposes the existence of countries and nation-states as (relevant) entities. Internationalisation of research, innovation and higher education implies that the borders of nation-states are increasingly bypassed and become less important for the energies, activities, interests and loyalties of researchers, students, universities, research institutes and companies. This can be further tied to:
- *Denationalisation*, which is related to processes by which nation-states lose parts of their significance. *Transnationalisation*, on the other hand, states that transnational actors like multinational firms and non-government organisations increase their importance.
- *Globalisation* refers to worldwide phenomena that make the world more interconnected, e.g. increased trade and travel, sharing of values and information due to new technology etc.

- *Regionalisation* is about regionally delimited internationalisation or to processes in parts of nation-states that do not cross national borders, while *Europeanisation* refers to internationalisation within Europe.

We find that despite the long history of internationalisation of research and higher education, the processes that extend these activities across national borders have changed. The patterns and properties of change are different, the pace of change has quickened, and more domains are affected. A distinction can be made between *traditional* and *emerging* patterns of internationalisation.

The traditional patterns are particularly related to the mobility of students and academic staff, trade balance and exporting activities. These activities are relatively weakly tied to formal institutions but in some cases strongly tied to more “informal” institutions like scientific disciplines. The underlying rationales are academic, economic, military, social or cultural. Relevant objects for study are individuals, established research policies and the marketing strategies of companies. Emerging patterns of internationalisation, on the other hand, are more routinised, institutionalised and formalised at many different levels. There is a national adaptation to and influence of international and supranational institutions and regulations, and the institutions in research and education systems develop more top-down internationalisation strategies of their own. The economic rationales and market control mechanisms are also more dominant. Still, we find that the emerging patterns of internationalisation do not supplant the existing ones, but come as an addition and may accelerate the traditional patterns.

At the end of chapter one, we discuss some general theoretical perspectives that may be used to shed further light on internationalisation of research, innovation and higher education: neo-institutional theory, network theory and the national innovation systems model. In addition, we describe how empirical studies can benefit from looking at the macro, meso and micro levels of analysis.

Chapter two deals with the **Europeanisation of research and higher education policies**, and asks to what extent EU policies affect national policies. It is argued that the Europeanisation of research and higher education mirror two interrelated processes: the emergence of supranational policies at the EU level and the domestic convergence towards these policies. Four hypotheses on policy convergence and divergence between EU and national policies are put forth:

H1: Europeanisation due to policy differences: Policy convergence reflects real and perceived differences between domestic and EU policy, accompanying domestic adaptational pressures.

- H2: Europeanisation due to institutional linkages: Policy convergence reflects institutional linkages across levels of governance.
- H3: Europeanisation filtered: Policy divergence reflects policy path-dependencies.
- H4: The virtual reality of Europeanisation: Policy divergence reflects policy de-coupling accompanying mere symbolic policy convergence.

Empirical observations from Norwegian higher education and research policies point at a moderate level of convergence, which, it is argued, reflect moderate institutionalised linkages between Norwegian ministries and agencies and the European Union, moderate adaptational pressures and institutional path-dependencies.

Chapter three tries to capture and explain the increase and changes in the **internationalisation of research**. To understand the recent changes and current situation, an analytical distinction is made between driving forces of internationalisation, the response to these forces and the implications of the response. However, empirically these distinctions are not easy to maintain as all these factors are highly interwoven. The chapter describes internationalisation of research as an interplay between internal and external driving forces and the responses made to those forces at the institutional and individual level within the research system. Among the driving forces external to research system are the globalisation of the economy, various political initiatives, new possibilities to communicate and a strengthened recognition of knowledge as an important production factor. On the other hand, it is also important to be aware of possible obstacles to the internationalisation and of its' negative consequences. Internationalisation of research is on the output side e.g. manifested in an increase of internationally co-authored publications and patents, international conferences and research programmes and projects, as well as contacts between individuals, institutions and states. The focus in the literature on internationalisation of research lies on mobility studies and bibliometric studies, while there is less literature that explicit concern the driving forces and the effects of research policy on internationalisation.

The chapter discusses the (possible) universal character of academic knowledge, followed by a presentation of three general models depicting mechanisms involved in internationalisation: the hierarchic model (centre-periphery-model), the network model and the market model. Current concepts of the "knowledge based society" like "Mode 2-science", the "Triple Helix" and "National innovation systems" are parts of the conceptual approach. In addition, the authors point to consequences for the relationship between industrialised countries and between industrialised and developing countries. More policy-driven activities like large-scale research co-operation and validations of output through evaluations, statis-

tics and benchmarking are elaborated next. During the last 15-20 years a whole new research field has developed reflecting the increased focus on science and technology. Both the supply of and demand for quantitative indicators is increasing. In the chapter, this new field of research is examined to see how it is part both of the driving forces and of the feedback mechanisms. At the end, some questions for further research are put forth.

Chapter four presents and discusses studies of **internationalisation of higher education**, and identifies major characteristics of this literature, and the topics that are raised. Practically all aspects of higher education can be said to contain an international dimension. The chapter focuses on a limited set of issues ranging from issues such as policy, mobility, teaching and learning, internationalisation and development, and the growing international market for higher education and transnational education.

Over a decade ago it was predicted that internationalisation would become one of the core themes of higher education research and in higher education policy. In terms of policy interest and attention, this prediction has not been far off the mark, at least in most countries in Western Europe. The high policy saliency of internationalisation is not yet matched by equal importance as a research field. Especially in terms of theory-driven research and the development of analytical frameworks the research field has not excelled. Furthermore, studies have tended to focus on the most visible aspects of international processes and activities.

Research on the internationalisation of higher education is dominated by policy-oriented descriptions that are of value as attempts to record emerging trends. This research has a focus on single nations or single programmes. There has been quite a prolific literature on some issues such as national policies for internationalities and student mobility. There is also a growing interest in the literature in looking specifically at the institutional level and the ways that universities, colleges and other providers of higher education act to internationalise their activities and to answer the challenges posed by the growing international market for higher educational delivery. There are fewer studies published that take an analytical interest in qualitative aspects, especially the basic processes of higher education, such as the internationalisation of curricula and the learning experience. Consequently, the international dimension of higher education offers a range of interesting, and so far un-investigated, areas of study. There is also a need for further conceptual elaboration and development of theoretical frameworks for studies in this area, that can contribute to an understanding of the driving forces and consequences of internationalisation of higher education. Chapter four concludes by pointing to some specific issues that seem important to address in future studies.

Chapter five deals with the **internationalisation of industrial R&D**. It is noted that many investigations have found that industrial research and development activities are increasingly carried out in other countries than the “home base” of the companies. This is a general trend, although there are differences between nations and industries in the degree of internationalisation and the degree to which they are “hosts” or “homes” to business R&D in/from another country. The U.S. is emerging as the most important host country. Around 15 percent of Norwegian companies’ R&D expenditures went abroad in 1999. Most of the empirical studies focus on formally established foreign R&D units, of which we can distinguish several types. There is a lack of investigations of other types of internationalisation, e.g. international university-industry collaboration and recruitment of scientists and engineers in an international labour market. We generally know little about how companies gain access to other countries’ national innovation systems, and if this poses particular problems.

If we make a distinction between research and development, it can be claimed that research activities are increasingly carried out at a few worldwide locations, often close to “industry-friendly” elite universities, which implies a *regionalisation* of industrial research. Development activities, on the other hand, follow previous investments in marketing and production units. Behind this we find technology-related, market-related and organisational driving forces. It is important to be aware that there are also forces that *reduce* the degree of internationalisation, e.g. the benefits of concentration and the strength of ties with national innovation infrastructures.

Internationalisation of industrial R&D is furthermore relatively strongly influenced by other processes than aiming at the most efficient R&D organisation. Examples are industrial restructurings (takeovers, mergers etc.) and the hunt for cheap production facilities and access to large markets. A distinction can be made between empirical studies that originate in management and organisation fields, and those that represent the economics of technological change and innovation. Learning, R&D intensity, export intensity and products customised for certain markets are key words in the former. The latter studies, not least when taking the “national innovation systems” approach, is more related to theories of “path dependency”. This strand of literature often emphasises how firms are embedded in local contexts and are somewhat “forced” into adapting to changing global competitive environments and changed business climates.

All types of internationalisation, but perhaps the establishment of foreign R&D units in particular, poses challenges for management. Two clusters of problems are discussed in the literature: increasing tensions, e.g. between concentration and decentralisation and between autonomy and control, and co-ordination problems. Solving or “balancing” these tensions

often imply a restructuring of a company's total R&D organisation by linking R&D units closer to business divisions and/or by strengthening foreign research and development units. Further studies of Norwegian companies will still need to focus on the why, the how and the implications of internationalisation. Of particular interest is to look at other types of internationalisation than establishing foreign R&D units, and to incorporate both factors that lead to "more international" and "less international" private research and development activities.

In the final chapter, we return to our initial observation that although knowledge production and dissemination may be going through a strong and partly new internationalisation process, the goals of research, innovation and higher education are perhaps more than before linked to national needs. This paradox, along with similar dilemmas discussed and presented in the empirical chapters, lead us to a preliminary conclusion that the core dimensions of internationalisation can best be described and studied in the form of *tensions*. The report is concluded with five such tensions that seem essential to many different aspects of internationalisation of research, innovation and higher education:

- **Co-operation vs. competition:** Is internationalisation mainly based on a need for sharing costs and workload in contemporary knowledge production and higher education, or is it mainly due to increased competition in the private sector, as well as increased competition in the sectors of research and higher education?
- **Convergence vs. divergence:** Do research/innovation/higher education systems become more similar in different countries? Do countries increasingly adopt/imitate policies for R&D, innovation and higher education that have been "successful elsewhere"? Or do systems move in different directions (regardless of a possible policy convergence)? Does internationalisation lead to increased differentiation and specialisation?
- **Determinism vs. control/influence:** Is globalisation/internationalisation a "survival of the fittest" game in which small countries need to adapt to changing circumstances beyond their control? Can small countries influence the direction and nature of processes of internationalisation and globalisation?
- **Substitution vs. synergy:** Is there a perfect overlap between policy goals and initiatives and the actions of individuals and institutions (i.e. the activities would have been carried out in any case)? Do individuals and organisations act in a manner that is contrary to goals of internationalisation? Do policy measures release an "extra effort" in institutions (e.g. private companies), or is this merely a substitution for private efforts?

- **Benign consequences vs. malign consequences:** Does internationalisation mainly have positive consequences? Some examples are quality control of knowledge production, increased efficiency in research and higher education systems, improved sharing of workloads, better functioning competition. Or, on the other hand, does internationalisation mainly have negative consequences? Some examples are lack of political control over research and higher education systems (and e.g. multinational companies), threats of major industrial movements and restructuring.

Later reports from the internationalisation research programme will return to these tensions and to the rest of the framework and empirical documentation presented in this report.

1 Conceptual Lenses

*Jarle Trondal, Åse Gornitzka and
Magnus Gulbrandsen*

In this chapter we first describe the different concepts that are explicitly and implicitly part of investigations of the internationalisation of research, innovation and higher education. These conceptual lenses derive from the empirical proxies applied to measure internationalisation as well as from the theoretical perspectives suggested for explaining different aspects of internationalisation. From these definitions and perspectives follow a discussion of whether internationalisation is something different now from what it was some decades ago. At the end of the chapter we also give a summary some relevant theories and levels of empirical analysis.

1.1 Introduction

Internationalisation is not a new phenomenon, but it is increasingly described and discussed in the popular and academic media worldwide. This attention reflects new patterns of internationalisation that circumscribe a lot more than academic interests and endeavours. Despite being an old phenomenon in society, the emerging patterns of internationalisation affect new actors and institutions, are driven by new forces and activate new tensions between co-operation and conflict, convergence and divergence, nationalisation and supra-nationalisation, and cultural and economic motivations for governance. We argue that internationalisation today represents novel patterns of transformation but also that these processes are mediated and modified by existing national institutions, policies and practices.

Different conceptual lenses lead observers to seek distinct information and to assess the degree of change differently. What seems like fundamental transformations from the perspective of individual actors may appear marginal from a system perspective (Knill and Lenschow 2001:188). To avoid such conceptual pitfalls and biases, we study internationalisation of research, innovation and higher education in different empirical domains (different case studies) and on the basis of different theoretical approaches. We also study processes of internationalisation at various levels of abstraction (micro, meso and macro levels). In sum, this report aims at providing a multi-dimensional picture of internationalisation in research, innovation and higher education. This introductory chapter introduces

both internationalisation as a field of research and the value added by studying it at different levels of abstraction and from different theoretical perspectives. We also give a conceptual introduction to the term internationalisation.

The contents of the rest of the report, where we utilise various elements in the conceptual repertoire to analyse various aspects of internationalisation, are as follows. Chapter 2 analyses the Europeanisation of policies, chapter 3 takes on the internationalisation of research, chapter 4 deals with higher education, while chapter 5 covers industrial R&D. Finally, in chapter 6, we draw several tentative conclusions based on the theoretical and empirical sections, both with respect to general trends, the empirical validity of different theories, and the prospects for future studies. The reader should bear in mind that the conclusions are preliminary. Our goal with this report is foremost to identify the current state of the art in the study of the internationalisation of research and higher education, not to offer new empirical analyses.

1.2 Internationalisation – bricks in the conceptual wall

Higher education and scientific work has been strongly internationally oriented since medieval times. International mobility of students and scientists was one of the generic and quintessential features of the first universities in Europe. After the Second World War, the international mobility of researchers and students has increased substantially, especially within Asia, North America and Western Europe. This report thus emphasises both what we call the *traditional patterns of internationalisation* of research and higher education and what we see as *emerging patterns of internationalisation*. This chapter discusses both these patterns of internationalisation and indicates how they shed light on important trends of transformation of research and higher education.

As we aim to demonstrate in this report, research and higher education have been subject to a blurring of the distinction between national and international dynamics of change. For example, the higher educational policies of Norway and that of the European Union have increasingly co-evolved and converged during the 1990s (cf. chapter 2). Moreover, processes of internationalisation have become more complex and ambiguous, thus it is harder for observers to identify important trends of change and continuity, to measure these trends empirically, to assess the degree and importance of change, and to identify and verify the different pathways to internationalisation theoretically.

We underscore that processes of internationalisation have changed with respect to the core properties and patterns of change, the sheer vol-

ume and pace of change, the domains that are affected, and the major driving forces of change. All these aspects are discussed briefly in this introduction. Moreover, each of the forthcoming chapters addresses these questions in greater detail and contextualises the analysis by referring to particular domains of research and higher education.

Research and higher education are both objects and subjects of internationalisation. On the one hand, companies, research institutes and universities receive and adapt (as objects) to international trends, networks, regulations and actors. According to a top-down concept of internationalisation, research and higher education institutions are primarily seen as objects that adapt to environmental demands and standards of various sorts. On the other hand, these institutions are themselves actors internationally and contribute to the emergence of new international orders of research and higher education, new R&D networks etc. According to a bottom-up concept of internationalisation, research and higher education institutions are themselves subjects of change that actively contribute to processes of internationalisation. Companies, research institutes and universities are both affected by and contribute to processes of internationalisation.

The term internationalisation is widely used and encompasses a range of different interpretations. It belongs to a family of related concepts that are partly overlapping and partly referring to different phenomena. In the following we give a brief introduction to the ‘terminology of internationalisation’, and we point to some issues that are relevant in a conceptual discussion.

1.2.1 Internationalisation

Being ‘international’ is a quality that objects or matters can possess to varying degrees. ‘Internationalisation’ may be defined as becoming international or more international, whereas international, in its strict sense, means that it involves more than one state. More specifically, internationalisation may include cross-national co-operation or mobility, to establish activity abroad or to adapt to international environments, international treaties or international bodies. This report puts primary emphasis on the outcome of internationalisation, and we search for the core properties of internationalised actors, institutions and policies.

Goldman (2001) points out that internationalisation implies the existence of a nation-state. If the notion of nation-states is no longer valid it will be meaningless to talk about internationalisation. According to Goldman, studying internationalisation is exploring a process defined in terms of distinctive units losing their distinctiveness. Moreover, Goldman finds it useful to differentiate between internationalisation of problems, of societies and of decisions. First, the *internationalisation of problems* on the

political agenda refers to political problems becoming internationalised when matters subjectively defined as problems are increasingly affected objectively by conditions and events abroad. Second, “*internationalisation of societies* comprises the intensification of all kinds of human relations across nation-state borders” (*ibid.* p. 12). Third, *internationalisation of decisions* refers to changes in the way strategic and political decisions are made both with respect to an increase in the degree of ‘internationality’ of decision-making and the proliferation of international decision-making to new areas (*ibid.* p. 15). All of these notions are, as we shall see, salient in research and higher education. For example, the pursuit of knowledge is seen as inherently borderless and universal and the social organisation of the academic community reaches across national systems with an increasing international dimension to decisions about research and higher education.

The concept of *denationalisation* has been used to describe similar processes to that of internationalisation. Yet, this term carries with it a sense of nation-states losing their significance as transactions transcend state borders and with a rise of organisations at the sub-national level and international/transnational level. Consequently the term denationalisation refers to interstate and intrastate decentralisation – or what others have called transnationalisation (e.g. Esmark 2001; cf. below).

If we were to use the term denationalisation in research, innovation and higher education, we would easily be led into deceptive conclusions. In this field, the national patronage and constituency is still strong and one could argue that processes of internationalisation co-exist with a firm national emphasis on higher education activities. In this sense, internationalisation does not rule out the role of the nation-state.

Wallace (2000:371) argues that denationalisation should not be taken as part of any given definition – such phenomena should be proven rather than assumed. It could even be argued that increased transaction beyond national borders is made possible through the consent and active encouragement of nation-states. At any rate, the study of the internationalisation of research and higher education should benefit from taking as a starting point that it does not *necessarily* entail the disintegration and the hollowing out of the nation-state (March and Olsen 1998). A more promising point of departure is to study how cross-border interaction contributes to transform, redefine and reorder existing institutions, networks and nation-states. It is not a fruitful starting point to assume that internationalisation is displacing and overriding domestic processes and institutions. Despite the many references to the universal and borderless character of knowledge, it is a paramount feature of modern science and higher education that it is closely linked to the nation-state. To a great extent, its institutions and systems depend on state patronage; in this respect we

assume that cross-border interactions are significantly a phenomenon “*inter nations*”. Even multinational companies with highly internationalised manufacturing and marketing units may depend heavily on knowledge inputs from relatively few and (at least partly) nationally funded sources (cf. chapter 5).

Transnationalisation is an established term within political science. It first gained attention through the work of Keohane and Nye in the late 1970s. They focused on the increase of and importance of non-governmental actors and issues that criss-crossed existing nation-state borders (Keohane and Nye 1977). Triggered as a critique of the realist tradition in the study of international relations, the authors established “Complex Interdependence” as a supplementary conceptual device to the hegemonic intergovernmental theory of international relations. With reference to the importance of transnational actors, particularly transnational non-governmental organisations (NGOs) and multinational companies, they highlighted the importance of viewing international politics as non-hierarchical and segmented, in which foreign and security policy was not hierarchically prior to other policy areas such as trade policy, or research and higher education for that matter.

The scholarly discussion of theoretical approaches in the study of international relations is beyond the reach of this report. Yet the term transnationalisation is highly relevant also in the study of internationalisation of research and higher education. In general this term has come to signify the type of internationalisation that involves private sector and non-governmental actors and issues (Goldman 2000:20). Transnationalisation has become a salient term that signifies the emergence of international markets for higher education delivery and services, with new, often for-profit, actors entering the arena and often acting outside the reach of the regulative control of the nation-states and inter-governmental agreements. We will return to this issue in chapters 4 and 5.

1.2.2 Globalisation

Globalisation has been a faddish term both in academia and in popular discourse in the 1990s. Still, the concept is poorly understood. It is often used to describe an economic phenomenon – where it refers to the latest stages of capitalism in which national economies are more and more interconnected and mutually interdependent (e.g. Ohmae 1995). Yet among economists the term globalisation and the particular economic phenomena it usually refers to are contested (Tranøy and Østerud 2001). Globalisation is also used to denote *cultural equalisation* through diffusion of specific lifestyles, consumption patterns, dissemination of rationalism, instrumentalism and ways of organising society associated with these ideas and values (Goldman 2001:18). Globalisation also has to do with

speed and fluidity of ideas, money, norms and values. The connotations of globalisation also lead us to think of organisations as temporary arrangements that form, evolve and disintegrate, almost organically. Undoubtedly, the term globalisation has clear connotations of global and system wide transformation. By contrast, internationalisation does not need to have global presence but may be highly regional in character. In a recent treatment of globalisation, Held and colleagues (1999) sum up the definitional state of the art in the study of globalisation:

What is globalization? Although in its simplest sense globalization refers to the widening, deepening and speeding up of global interconnectedness, such a definition begs further elaboration. Despite a proliferation of definitions in contemporary discussion – [...] – there is scant evidence in the existing literature of any attempt to specify precisely what is ‘global’ about globalization (Held et al. 1999:14–15).

Hence, globalisation is a poorly understood phenomenon. According to Held et al. (1999:17) there are four dimensions that drive the processes, or what they call *historical forms of globalisation*. These four dimensions include:

- the *extensity* of global networks
- the *intensity* of global interconnectedness
- the *velocity* of global flows
- the *impact propensity* of global interconnectedness.

All of these, with a possible exception for the first, are relevant dimensions of internationalisation also in research and higher education, yet we cannot posit all dimensions to be present in order for us to talk of internationalisation.

Many think of globalisation as something beyond the reach of national control, possibly beyond the reach of *any* control, i.e. a tidal wave phenomenon: “once the genie of global information flow really gets out of the bottle (...) there can be no turning back” (Ohmae 1995:vii). Internationalisation, on the other hand, refers to processes that spring from the national context, and is thought of as the *response* of countries to globalisation. Especially in the higher education literature several authors look at the difference between internationalisation and globalisation in this way (see chapter 4). We do not share this view on the distinguishing features of internationalisation versus globalisation. We believe that this distinction leads us into a conceptual conundrum; such a definition of internationalisation would rely on the concept of globalisation. We view the

concept of internationalisation as independent from the concept of globalisation and thus as an alternative or supplementary concept.

Trying to make a distinction between the two terms, our major point is that internationalisation does not have the implicit references to economy-driven processes as globalisation tends to have, or to processes with a worldwide scope. However, internationalisation may have very positive, even overly positive, connotations, at least in research, innovation and higher education. The term internationalisation is semantically more akin to a nation-state centred perspective and lingo – as mentioned, it presupposes the existence of countries and nation-states as entities.

Globalisation is perhaps the most relevant term in the study of the growth of multinational companies, especially as these organisations try to create a more ‘global’ or highly diversified corporate culture and are able, at least technically, to move knowledge resources easily across national borders. A related issue is the growth of more or less global systems for the protection of intellectual property, cf. the discussion about patent rights and generic drugs aimed at markets in poor countries with weak purchasing power.

1.2.3 Europeanisation and regionalisation

As we shall elaborate on below, the term Europeanisation denotes internationalisation within the European regions. The concept of regionalisation should be seen as part of the same conceptual family as that of Europeanisation. For example, the Nordic arena (Scandinavia, Finland and Iceland) that is institutionalised within the Nordic Council and the Nordic Council of Ministers, is one locus of regionalisation. The increased interaction in the Asian region under the ASEAN agreement may also be labelled regionalisation, which can be seen as internationalisation that involves a more restricted geographical area. However, regionalisation does not necessarily have anything to do with internationalisation; interaction within a region does not inevitably cut across national borders. Furthermore, regionalisation does not necessarily entail co-operation between entire nation-states even though it involves cross-border activities, such as the cross-border co-operation in parts of the Netherlands and Germany.

The study of Europeanisation has emerged as a specialised academic research field (e.g. Goetz and Hix 2000). This concept is of particular relevance for chapter 2 in this report. Olsen (2002) argues that this term is far from universally accepted as a common analytical template. Researchers disagree on the empirical proxies of Europeanisation, its major driving forces as well as the conditions under which different aspects of Europeanisation are likely to materialise. Some depart from a rather simple definition of the concept, seeing Europeanisation as “change that is European in scope, no more no less” (Goldman 2001:19). Others advocate more

complex multi-dimensional perspectives on *what* Europeanisation is. According to Olsen (2002:3–4), Europeanisation implies (i) changes in external territorial boundaries, (ii) the development of institutions of governance at the European level, (iii) central penetration of national and sub-national systems of governance, (iv) exporting forms of political organisation that are typical and distinct European beyond its territory, and (v) a political project aiming at a unified and politically stronger Europe. Olsen’s concept of Europeanisation is thus quite broad. Moreover, as he (2002:2) points out, it is not very analytically useful to reserve this term for the EU in post-war Europe: “Rather, Europeanization is conceptualised in a way that makes it (in principle) possible to compare European dynamics with the dynamics of other systems of governance.”

Olsen emphasises that the EU is not the only “political order” of interest in studies of Europeanisation:

Certainly, European transformations are not limited to the EU and its member states or to Western Europe. Cross-border relations have been, and are, managed through a variety of transnational regimes and institutions besides the EU. [...] Therefore, an adequate understanding of the ongoing transformations requires attention to other European transnational institutions, regimes and organisations as well as non-member states (Olsen 2002:6)

Wallace (2000) uses a similar conceptual understanding, arguing that Europeanisation is not a process confined to the EU member states or to the EU as a political order. Nevertheless she leaves no doubt about the centrality of the EU as “the predominant contemporary choice that has been made to address European interconnectedness and channel Europeanisation” (Wallace 2000:376). Her “minimalist definition” of Europeanisation is thus relatively open, covering “the development and sustaining of systematic European arrangement to manage cross-border connections, such that a European dimension becomes an embedded feature which frames politics and policies within the European states” (p. 370).

Although governance and government within the EU is the core reference for most studies of Europeanisation, we do not need to reserve the term for phenomena that are ‘institutionally’ defined. In the areas of R&D and higher education, Europeanisation is better understood as including varieties of ways in which problems, institutions and decisions become internationalised within Europe as a geographical entity. This report will paint a picture of Europeanisation as encompassing a range of processes and developments that take place within Europe as a geographical entity. Our understanding of Europeanisation thus incorporates an all-European dimension that comprises supranational institutions, intergovernmental organisations as well as non-governmental associations and actors.

1.2.4 Preliminary conceptual conclusion

Summing up this section, the following remarks should be made:

- *Internationalisation* may be defined as becoming international/more international. This term has a nation-state centred perspective, as it presupposes the existence of countries and nation-states as entities. Internationalisation of research, innovation and higher education implies that the borders of nation-states are increasingly bypassed and become less important for the energies, activities, interests and loyalties of researchers, students, universities, research institutes and companies.
- *Denationalisation* is related to processes by which nation-states lose part of their significance.
- *Transnationalisation* denote processes by which transnational actors (as non-government organisations and multinational firms) increase their importance.
- *Globalisation* refers to worldwide phenomena that make the world more interconnected. It includes a number of trends, e.g. increased international trade and travel, and increased sharing of values and information due to new technology (telephone, TV, the internet etc.).
- *Regionalisation* may refer to regionally delimited internationalisation or to regional processes that do not cross national borders.
- *Europeanisation* refers to internationalisation within Europe.

These definitions are tentative. The above paragraphs show that the conceptions are ambiguous and overlapping. Many, or most, phenomena relevant to our subject matter may be denoted by more than one of these terms. Our main intention has been to develop an awareness of the many faces of and labels attached to internationalisation. The current rough terminological overview has at least made us comfortable with using the term internationalisation as an umbrella for the many different, yet possibly related and interconnected, phenomena and processes covered in this report and in our general research programme. However, we do not need an overarching and all-inclusive definition of internationalisation beyond the simple notions outlined above. Our conclusion from the above conceptual overview is that for the present purposes, sticking to the simple and open concept of internationalisation as our focus of attention is well advised.

There is still a lot of conceptual work to be done to further clarify, concretise and operationalise internationalisation as a phenomenon and as a conceptual device. In the concluding chapter of this report we return to these conceptual images to reconsider and redress our understanding

of internationalisation and its relevance for analysing different aspects of R&D and higher education. Moreover, the next section suggests a distinction between traditional patterns of internationalisation and new patterns of internationalisation.

As a starting point for a research programme, internationalisation seems to be the most flexible term, one that prevents us from getting locked into one single line of investigation. One should, however, bear in mind the conceptual relatives that we have briefly touched upon in order to specify the many faces and facets of internationalisation in the area of R&D and higher education. They direct our attention to various potentially important research questions, analytical vantage points and factual issues.

1.3 Traditional versus emerging patterns of internationalisation

As we have seen, the concept of internationalisation is multifaceted. The literature on internationalisation is large, fast growing and fragmented with respect to definitions of the core aspects of this phenomenon. This report emphasises two different conceptual clusters. The first is labelled ‘traditional patterns of internationalisation’ and emphasises persistent and ‘old’ patterns of international co-operation and competition in research and higher education, such as student and research mobility, large-scale research collaboration and conventional export/import relations. The second concept is labelled ‘emerging patterns of internationalisation’ and emphasises new trends of internationalisation that partly challenge and partly supplement the traditional patterns.

However, traditional and emerging patterns of internationalisation share some common ground: increased contact, imitation, activity and networks that cross national borders. In general, then, internationalisation implies that the borders of nation-states are increasingly bypassed, becomes less vital politically, culturally and economically, and becomes less important for the energies, activities, interests and loyalties of researchers, students, universities, research institutes and companies. This report underscores that processes of internationalisation of research and higher education contribute to transformational changes of government institutions and policies (chapter 2), research practices and organisations (chapter 3), higher education institutions and their surroundings (chapter 4), and industrial R&D and innovation activities (chapter 5).

1.3.1 Traditional patterns of internationalisation

International migration of scholars is a phenomenon as old as universities themselves (Schuster 1994:437)

For many centuries the itinerant scholar, like the wandering minstrel, has been a recognised motif in literature ... (Welch 1997:323)

The internationality of higher education is not new. Universities have developed historically as international institutions. At the cradle of European culture stood the Greeks who travelled the Mediterranean area ... (Bechem 1991:297)

These quotes are a few examples of an almost standard phraseology of books and articles that deal with internationalisation of research and higher education, i.e. pointing to the long traditions of international activities in these areas. In line with these quotes, we argue that traditional patterns of internationalisation should chiefly be understood as cross-border contact patterns and mobility between individual researchers, students, universities, companies and government actors.

Moreover, patterns of cross-border contact and mobility are *initiated and pursued* by individual researchers, students, universities and nation-states. For example, a focus on exports and export share has been the traditional road to internationalisation for companies. This has entailed foreign sales organisations and in many industries also foreign manufacturing facilities. More recently, we see that the R&D function, traditionally the business function that has been the most deeply rooted in national contexts, is also increasingly international. Although this may not be a very new phenomenon, an increased focus on R&D costs and efficiency, as well as a clustering of R&D activities around worldwide centres of excellence, can now be seen not only in the multinational firms. Overall costs and risks are judged with generally less emphasis on national contexts and systems (cf. chapter 5). Even though sponsored professorships, undirected basic research funds etc. are quite common, the result may be reduced 'obligations' or 'responsibility' for the research sector in the host country as such. This example illustrates that the traditional concept of internationalisation puts strong emphasis on aspects of self-governance and on purposeful choices with respect to cross-border activities.

According to the traditional conception of internationalisation, this phenomenon is affected less by governmental policies and initiatives, and also less by international and supranational organisations like the OECD, the WTO and the EU than by autonomous initiatives by single actors. Processes of internationalisation are neither supported nor effectively hindered by government actors and policy schemes, nor by international and

supranational organisations and agreements. Thus, traditional patterns of internationalisation are weakly institutionalised at the local, regional, national and international levels. Few financial instruments and regulatory measures are available to governmental actors to promote or hinder individual actors (like students, universities or firms) becoming more or less internationally oriented. Accordingly, traditional patterns of internationalisation happen on the basis of nation-state sovereignty and on the basis of independent choices by corporate universities, individual students and individual firms.

This mode of internationalisation reflects a century-old mode of adaptation toward foreign and neighbouring countries, universities and corporations. Due to lack of trial-and-error learning *across time*, actors often search for learning *across space* –internationally – in order to reach desired goals. One example might be Norwegian authorities' current reform of their grade and degrees structures in higher education largely by adapting the degree system in other European countries (Master and Bachelor) and the European Credit Transfer System (ECTS).

It should, however, be added that the traditional mode of internationalisation is not purely a phenomenon at the individual level, especially in research. Well-known examples are the so-called “big science” installations like CERN and later the ESA and the EMBL, and also organisations somewhat more oriented towards policy, like the OECD. The logic here is one of international cost-sharing and top-down planning, rather than market control and a strong involvement of independent institutions of research and/or higher education. In addition, much of the public R&D efforts of countries all over the world have been tied to particular national needs of defence, energy, telecommunications, space exploration etc. Deregulation and the opening up to international competition of energy, telecom and other research-intensive infrastructure-type sectors is part of the “new internationalisation patterns” of research, as is the diminishing importance of military R&D in many countries.

1.3.2 Emerging patterns of internationalisation

We are witnessing “the incipient breakdown of the differentiation between foreign affairs and domestic affairs” (Lindberg 1963:80)

“[I]ntegration in the true meaning of the term, depends on the alteration, not the aggregation of, preferences” (Eriksen and Fossum 2000:16).

Despite the heritage of internationalisation, we suggest that its emerging patterns have become more important relative to the traditional aspects. These new patterns challenge and supplement the traditional ones. The

distinction is, however, more a continuum than two clear opposites. It may be difficult to classify particular events as either traditional or emerging types of internationalisation. As mentioned, we stress that the emerging patterns supplement the traditional ones and do not replace them. In sum, we are thus witnessing an increasingly complex, multifaceted and ambiguous picture of internationalisation of research and higher education. Increasing the conceptual complexity, however, does not solve the factual complexity.

Based on the ideal distinction between traditional and emerging patterns of internationalisation, we see the traditional patterns as largely the result of non-institutionalised processes. By contrast, the emerging patterns reflect more institutionalised, market-controlled, technology dominated and rule-driven processes, not least in higher education (these are longer trends in research). We suggest that the new patterns resemble multi-level systems of governance that supplement and partially challenge existing national institutions and policies. Multi-level governance implies that power, competences and resources are shared across different levels of government (local, regional, national, inter-/supranational). These patterns of internationalisation are greatly influenced by the technological development, particularly of the information and communication technologies but also of other technologies, and by strong trends in research, innovation and education systems. One example is the decline in the highly national military R&D that can be seen in Europe and other parts of the world (cf. Larédo and Mustar 2001). More precisely, our report defines the new patterns of internationalisation as:

- The routinisation, institutionalisation and legalisation of international and supranational co-operation and competition in research, higher education and innovation at local, regional, national and inter-supranational levels.
- The national adaptation to (top-down processes) and influence of (bottom-up processes) international and supranational institutions and regulations among individual researchers, universities, colleges, companies and government actors.
- The ever greater dominance of economic rationales for public support for research and higher education.

During the 1990s, the Norwegian governments strengthened its emphasis on the internationalisation and Europeanisation of its system of research and higher education. Processes of adaptation towards international and supranational institutions go hand in hand with efforts at influencing these institutions. However, adaptation towards EU standards and international agreements does not contribute to the hallowing out of national

particularities in higher education. Processes of international standardisation, harmonisation and convergence are also affected significantly by existing national systems, so that the emerging processes reflect a blend of international, supranational and national/local institutions, rules, policies and established practices.

The general justifications that support research and higher education nationally and internationally are mixed – they can be *academic*, *cultural*, *political* and/or *economic*. In the 1990s, the economic rationale (contributions to innovation) of public R&D support has probably been the strongest one. Economic rationales have always been important in research and higher education, however. On the other hand, the Humboldt tradition has put primary emphasis on the importance of academic independence and university autonomy and the cultural rationale. By contrast, the New Public Management reform ideas that spread throughout the OECD area during the 1980s and 1990s had a primary emphasis on effectiveness and efficiency (Christensen and Lægveid 2002). A recent example is the discussion in the WTO on applying the General Agreement on Trade in Service (GATS) to higher education. This initiative, originating in the USA and Australia, illustrates that the emerging patterns of internationalisation may further strengthen economic rationales at the expense of ‘pure academic’ ones (if they exist). Hence, the overall rationale for academic life may differ somewhat between the traditional and the new notion of internationalisation.

In order to sum up: the traditional patterns of internationalisation in higher education were to a large extent governed by local initiatives and based on academic rationales. National interests were the driving forces in military research and research on energy (particularly nuclear energy) and the societal infrastructure. Industrial R&D was often centred in one laboratory serving the company’s needs worldwide, often modelled on university or national laboratories. The traditional patterns of internationalisation penetrated only certain aspects of academic life, notably the mobility of students and researchers, as well as recruitment of personnel and payment of memberships fees to big science facilities.

By contrast, the emerging patterns of internationalisation have become a more generic characteristic of research and higher education. Processes of internationalisation now penetrate core aspects of research, innovation and education systems – from government policies to university strategies. One common trait is the importance of market control, e.g. through the deregulation of energy, telecommunications and other sectors and the emergence of a commercial university sector. Moreover, the emerging patterns of internationalisation are more complex with respect to forces of transformation and levels of governance. Finally, processes of

internationalisation buy into the New Public Management concept of efficiency and effectiveness with respect to process and outcome.

1.4 Theories that may shed light on internationalisation

Students of research, innovation and higher education have primarily documented various aspects of internationalisation (cf. chapters 2–5), most of them more concerned with empirical descriptions than with theoretical explanations. Most studies also focus on what we have called the traditional patterns of internationalisation, such as student and staff mobility and foreign investments in R&D. There seems to exist few cutting-edge theoretically informed empirical studies of the internationalisation of innovation, teaching, learning and knowledge production within a common analytical framework.

The literature hints at a range of possible drivers of internationalisation. They include mechanisms such as technology, culture and ideas, regulations, economic resources and incentives etc. We stress, however, that traditional and new forms of internationalisation reflect different dynamics of change and may thus be best explained by different theoretical tool-kits. This report identifies and analyses several drivers of internationalisation that are highlighted in existing bodies of literature. These drivers are examined at different levels of abstraction, that is, within supranational institutions, national governments, companies, research institutes, colleges and universities, as well as in their technological and economic surroundings.

1.4.1 Neo-institutionalism

Martin and Simmons (1998) argue that studies of (world) politics should increasingly emphasise observable implications of alternative theories of institutions. A first theoretical argument that guides this report is the neo-institutional perspective in organisational analysis (e.g. DiMaggio and Powell 1991, March and Olsen 1989). This account focuses on decision-makers, researchers and students as organisationally constrained and constituted actors. Individuals are institutionally embedded in several organisations, some local, some national and some inter-/supranational. According to the sociological neo-institutional perspective, processes of internationalisation reflect adaptation towards international and supranational environments, broadly speaking. Moreover, these adaptation processes are filtered, modified and biased by organisational inertia and path-dependent developments at the national and local levels. Internationalisation processes thus reflect environmental standards of good governance, supranational regulations, and local routes and roots. Henceforth, proc-

esses of internationalisation consist of rule-driven processes at local, national and inter-/supranational levels that constrain and constitute actors, institutions and policies (Schneider and Aspinwall 2001).

As mentioned, this report strongly underscores that processes of internationalisation are modified and filtered by national organisations, policies and established practices. Prior studies have demonstrated that processes of adaptation are shaped by historical decisions and events (i.e. *path-dependent*) and are subject to inertia and resistance, especially if the transformational pressure and demands for change are strong, and the existing systems of research and higher education are weakly integrated and institutionalised (cf. Cowles, Caporaso and Risse 2001, Knill 2001, March and Olsen 1989). Consequently, from a neo-institutional perspective one should analyse the extent to which, how and under what conditions research and higher educational policy, politics and institutions follow path-dependent roots and routes and the extent to which research and higher education policies and institutions converge towards international and supranational standards and rules.

In some studies of internationalisation, the rational choice approach may also be useful. In this perspective, internationalisation reflects deliberate choices made by purposeful actors in order to reach optimal solutions. Internationalisation is the result of initiatives and motivations among individual researchers, students, university/college/business leaders and central political-administrative leaders. Thus, international research cooperation, student mobility and R&D initiatives are largely non-routinised processes governed by the mobilisation of individual actors. Entering or exiting such processes is more based on cost-benefit calculations than on institutionalised rules and norms. Given the complexity of decision-making processes, we should assume that such choices are made under conditions of risk, uncertainty and possibly also conflict. Despite the potential lack of information, time, energy and attention among actors, which make them largely bounded rationally, their choices are often directed towards strategic satisfaction (Simon 1957).

1.4.2 A network approach

A considerable number of contemporary studies of internationalisation apply a *network approach*. “Network analysis is based on the belief that a policy is framed within a context of relationships” (Ugland 2002:25). Network approaches have for example lead researchers to model the EU system as a multi-level system of nested institutions, or as a “marble cake that consists of penetrated systems of governance” (Kohler-Koch 2002:5). Different network approaches are basically products of empirical observations of the increasingly blurred boundaries between the public and private sectors, and between national and international institutions and deci-

sion processes. Network approaches model empirical patterns of interaction between national, international and supranational institutions, processes and actors. These empirically derived models portray more or less tightly integrated and institutionalised communities and issue constellations. The international research system can be visualised as a communication system through which information obtained at certain nodes is transmitted to other nodes, be they individual researchers, research groups, business communities, national politicians etc. (Ziman 1996). In a sense, networks are seen as transmission belts for the international dissemination of ideas, norms and rules (Kohler-Koch 2002:10).

A network approach implies a focus on social exchange at different levels. At the meso and macro levels, 'social capital' is now used as a concept crucial to the understanding of the dynamics of trust and social relations (e.g. Coleman 1988, Putnam 1993, Fountain 1998). The existence of trust in informal networks across national borders may be a necessary element in an effective process of internationalisation. Network perspectives furthermore incorporate notions like strong/weak ties and structural holes. In a network with strong ties, changes at one node will ultimately produce changes at other nodes as well, and vice versa.

Taking network models as our mode of approach, we may expect internationalisation processes to be 'segmented' – more or less clustered around certain actors, specific skills and worldviews. These networks might include or exclude government actors, hence both the traditional and the emerging patterns of internationalisation could be segmented around selected samples of actors and institutions. The internationally oriented networks are also expected to be only in part mutually coordinated, hence processes of internationalisation are described as loosely coupled processes whose outcomes are likely to support existing patterns of sectorisation of research institutions, universities and government institutions (Sverdrup 2000). Taken together, network approaches to internationalisation find complex processes that combine elements of the traditional and the emerging patterns of internationalisation. It can be added that a partly conflicting and partly complementary perspective can be found in various *centre-periphery* models, which are discussed further in chapter 3.

1.4.3 National innovation systems

The currently most widely used theory of innovation is probably that of *national innovation systems* (NIS). Some authors have traced this theory (strictly speaking, it should perhaps be called a model) back to Adam Smith and Friedrich List, but its modern version emerged in the late 1980s with the work of economists like Freeman, Dosi and Lundvall. It is often linked to the perspective of evolutionary economics. The most cited work

seems to be the large-scale international empirical study edited by Nelson (1993), of which Larédo and Mustar (2001) is a follow-up. The NIS perspective has caught on in science and innovation policy; the OECD has been a vocal proponent. The likeliest reasons for its popularity are that the concepts are relatively easy to understand, that importance is assigned to the national level at a time when much hinges on globalisation, regionalisation etc. and that more mainstream macroeconomics has failed to come up with a good explanation of the factors behind international competitiveness and economic growth.

Essential to the NIS model is that innovation, defined as the processes by which firms adopt product designs and manufacturing processes that are new to them, is a key factor in determining a country's competitiveness. Innovation, in turn, is a complex interplay between various national institutions that together form a more or less efficient system. There are broad and narrow definitions of institutions, but most authors seem to agree that private firms and their R&D units are the most essential units of the national innovation system. Universities and colleges play a major, albeit most often indirect role, particularly by training much of the workforce involved in innovative activities. Some also point to 'national' characteristics such as culture and language, policies and programmes, legal systems and so on as aspects of the NIS.

In the NIS literature, the term 'national' is probably the most widely debated and also the most interesting basis for discussing internationalisation. Many authors argue that innovation systems are not as national as they were some decades ago, particularly because of the growth of various types of technological communities. Despite these developments, it is still argued that NIS is a fruitful term and perspective, not least as long as nation-states remain political entities (e.g. Lundvall *et al.* 2002; cf. also Shinn 2002).

Empirical NIS studies have indeed shown that the process of knowledge production is becoming ever more international. There is more collaboration between companies in different countries, increasing numbers of companies with no or multiple 'home countries', more purchases made by businesses of R&D from foreign sources, and a general expansion of technological communities to countries the world over. Yet it can be argued that the *goals* of knowledge production are increasingly *national*: oriented at creating 'national competitive advantages' and innovations that produce economic or social benefits for the country in question. This apparent paradox can be found in many aspects of internationalisation; we will return to it particularly in chapters 4 and 5. Chapter 5 also includes writings on innovation from other perspectives, particularly organisation/management studies where e.g. the distinction between centrifugal and centripetal forces is a major theoretical tool.

1.5 A multi-level approach to internationalisation

Above we have modelled two ideal patterns of internationalisation. These patterns can be studied at three levels of aggregation: the political-executive level (macro), the organisational level (meso), and the individual level (micro). The explanatory factors suggested above concerning the degree of institutional embeddedness of internationalisation processes, their degrees of rationality, and the network modes of interaction, may be studied at all three levels.

1.5.1 The macro level

The study of internationalisation of research and higher education should focus heavily on the political-executive level. Above all, this is the meeting place of the long-term planning and execution of policies for research, innovation and education – all parts of the system of knowledge production and dissemination. We pose questions such as: Are the Research Council of Norway and the ministries of Education and Research, and of Industry, involved in international and supranational networks? Do these actors adapt to international and supranational structures, norms and codes of conduct? How do they perceive their opportunities for influencing processes of internationalisation? Macro-level studies include analyses of organisational, legal and normative transformations at the international and supranational levels on the one hand and national policy reforms and structural changes on the other, i.e. organisational deregulation, governmental funding, etc. Examples of such analyses are provided in chapter 2 which studies the emergence of supranational policies of research and higher education at the EU level and the partial adaptation of the corresponding Norwegian policies.

1.5.2 The meso level

Assuming that processes of internationalisation are loosely coupled processes (from the macro level), one should also examine to what extent, how, and under what conditions individual companies, research institutes and institutions of higher education engage in various international endeavours, such as joining international and supranational networks and bilateral or multilateral co-operative ventures. Moreover, one should take an interest in how such involvement affects processes of adaptation to international and supranational rules and practices within the individual units. A related question is whether there are different patterns of international activities in different fields of learning. Studies of internationalisation at the meso level are discussed in chapters 4 and 5.

1.5.3 The micro level

Finally, assuming that education and research institutions are internally loosely coupled organisations, processes of internationalisation of individual researchers and students are loosely coupled from governmental policies and university strategies. Several questions are important concerning internationalisation at the micro level: What are the motivations and the individual characteristics of researchers and students 'going international'? Are they in particular types of institutions or in particular disciplines? Are processes of internationalisation at the individual level governed from the centre or initiated and controlled from below? Micro-studies of internationalisation go into such topics as student mobility, staff mobility, individual network participation and labour market adaptation. Examples of internationalisation at the micro level are provided in chapters 2 and 4.

The following chapters look at traditional and emerging patterns of internationalisation at the three mentioned levels. It should, however, be borne in mind that not all questions raised in this introductory chapter are answered thoroughly in the following chapters. The overall goal is to establish a state-of-the-art profile as seen from different domains of research and higher education and to identify important knowledge gaps that can spur further studies. As mentioned, the profiles identified in the chapters ahead give special emphasis to these three questions: (i) what are the important research questions; (ii) what theoretical puzzles and approaches can fruitfully be applied to these questions; and (iii) what empirical observations are available for shedding light on different patterns of internationalisation of research and higher education? By dealing with these questions we hope to contribute to advancing the conceptual and theoretical clarity in the study of internationalisation generally and more particularly in topics in the field of research and higher education.

2 The Europeanisation of research and higher education policies: convergence or divergence?¹

Jarle Trondal

This chapter poses the following question: to what extent do EU policies affect national research and higher education (R&E) policies? R&E policies are largely neglected in the literature on European integration and Europeanisation. I will argue that Europeanisation of R&E really comprises two interrelated processes: the emergence of supranational policies at the EU level as well as domestic convergence towards these policies. The empirical scope of the chapter is the relationship between R&E policies in the EU and similar policies in Norway. Our empirical observations, based on documentary data and existing bodies of literature, suggest that the emergence of supranational R&E policies at the EU level has led to only moderate transformations of the corresponding Norwegian policies. This moderate level of convergence, I will argue, reflects a mix of moderate institutionalised linkages between Norwegian ministries and agencies and the European Union, moderate adaptational pressures on Norwegian R&E policies from the EU, and institutional path-dependencies with Norwegian R&E policies.

2.1 Introduction

The impact of Europeanisation on the nation-state has become a laboratory for the study of conditions for organisational and policy transformation generally (Knill 2001, Knill and Lenschow 1998, Olsen 2002) and the Europeanisation of government institutions (polity), decision-making processes (politics) and policy outcomes (policy) (particularly Olsen

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2002). Drawing on insights from studies of the Europeanisation of policy, this chapter poses the following question: To what extent do EU policies affect domestic policies? We will compare the degree of convergence or divergence between EU policies for research and higher education (R&E) and the corresponding Norwegian policies. It will be argued that we need to go beyond comparing different national policies towards analysing the vertical integration, fusion and penetration of policies across levels of governance, and that the Europeanisation of policy reflects two interrelated processes: the emergence of supranational policies at the EU level as well as the domestic convergence towards these policies. The value added by this focus is basically that it allows us to highlight middle-range hypotheses on policy convergence *across levels of governance*. This chapter suggests and discusses four hypotheses on policy convergence and divergence (cf. below). An empirical analysis reveals that the emergence of an increasingly supranational R&E policy at the EU level has brought only moderate transformation of Norwegian R&E policies.

Higher education has been of crucial importance to the nation-building process in most European nation-states (Rokkan 1987). I will suggest that policy convergence towards the EU constitutes a special challenge to existing domestic R&E policies; hence, this chapter studies the Europeanisation of R&E at the macro level (cf. chapter 1). Since the Second World War, the level of international R&E co-operation has increased substantially among European scientists, universities and nation-states. This chapter analyses trends of Europeanisation of Norwegian R&E policies at the edge of 2000. During the late 1990s and in early 2000, the Europeanisation of Norwegian R&E policies has moved from being largely occasional, non-routinised, non-institutionalised and intergovernmental processes towards becoming increasingly routinised, rule-driven, institutionalised and supranational. The Europeanisation issue is given increased priority in Norway, as can be gleaned from recent government Green and White Papers. Still, I would suggest that the policy convergence towards the EU is only partial.

Despite the fact that the EU has weak legal and financial instruments and that EU governance of R&E rests on the principle of subsidiarity, we are witnessing a strengthened *de facto* willingness and capacity in the EU to act in the field of R&E. Processes of Europeanisation seem more institutionalised, routinised, rule-driven and legalised at a supranational level than 'traditional' forms of internationalisation (cf. Jacobs 1998:712, Olsen 2001),² which are less rule-driven and have greater emphasis on elements

² The same is not the case as to institutional convergence across levels of governance. There exists no 'EU model' of public administration or best practice in institutional terms towards which national bureaucracies can converge or from which they can diverge (Spanou 1998).

of voluntariness and unilateral adaptation among national government institutions (Egeberg and Trondal 1997, Sandholtz and Stone Sweet 1998). Hence, the concept of Europeanisation applied in this chapter represents a conceptual operationalisation of the ‘emerging patterns of internationalisation’ presented in chapter 1.

The integration among EU countries has traditionally been stronger economically and legally than politically, culturally and socially (Olsen 2001). Higher education is a recently emerged field of close and deep cooperation at the EU level (de Wit and Verhoeven 2001:178). The first intergovernmental meeting of the EC ministers of education was held in 1971. The first Commissioner for education was appointed in 1973 (Beukel 2001). On the basis of new legal capacities, the post-Maastricht area has witnessed increased EU initiatives within this policy field (European Commission 2000a). This chapter suggests the following four hypotheses on policy convergence and divergence between EU and national policies:

H1: Europeanisation because of policy differences: Policy convergence reflects real and perceived differences between domestic and EU policy, accompanying domestic adaptational pressures

H2: Europeanisation because of institutional linkages: Policy convergence reflects institutional linkages across levels of governance

H3: Europeanisation filtered: Policy divergence reflects policy path-dependencies

H4: The virtual reality of Europeanisation: Policy divergence reflects policy de-coupling accompanying mere symbolic policy convergence

The argument is developed in four sections. The first section outlines an empirical proxy of Europeanisation: policy convergence. Next, I suggest four partly conflicting and partly supplementing hypotheses on policy convergence and divergence. The baseline theoretical model integrating these four hypotheses is the sociological institutionalist approach (cf. chapter 1). This institutional perspective is outlined to link the field of R&E to the more general field of Europeanisation as well as to guide our empirical discussion. Next we examine the data and methodology that underpin this chapter; I will suggest that the Norwegian case is a ‘least likely case’ for studying processes of Europeanisation of R&E policies. Finally, the empirical analysis shows a patchy picture of Europeanisation of R&E policies. Based on existing bodies of literature and official documentation from the EU and Norway this analysis illuminates creeping supranational EU policies of R&E and that Norwegian R&E policies converge moderately towards these policies. This moderate level of adaptation, I will suggest, reflects a mix of moderate institutional linkages across

levels of governance, moderate adaptational pressures from the EU and policy path-dependencies.

2.1 Europeanisation operationalised

How do we operationalise Europeanisation? We will suggest that Europeanisation equals transformational change in general and with respect to government policies in particular. Transformational change denotes both the emergence of new supranational policies at the EU level and the national adaptation to these policies. Together, these aspects are phrased policy convergence. Policy convergence is measured and identified by “decreasing variations in relevant indicators” of EU and national policies (Martin and Simmons 1998:753). Far-reaching convergence implies the replacement of existing national policies with a comprehensive new Community policy. More moderate convergence implies a merger or integration of Community and national policies (Héritier 2001:44). The opposite trend is labelled policy divergence. Policy divergence is measured and identified by increased variation in relevant indicators of policy, hence the distinction between policy convergence and divergence refers to the degree to which policies are, or become more, similar to EU policies. This distinction has to do with the degree to which different policies appear like images of one another (policy isomorphism; Bennett 1991). Convergence is often seen as a fixed state of affairs, denoting policies ‘being more alike’. However, the concept of convergence also has a dynamic element of ‘becoming more alike’ (Bennett 1991:219). This latter concept does not, however, imply unidirectional or linear processes of convergence. This chapter thus suggests explicit and exclusive distinctions between what is considered Europeanisation and what is not (Radaelli 2000).

Different yardsticks might measure Europeanisation (Olsen 2002). Scholars measure Europeanisation by focusing on particular processes of policy shaping, policy-making, policy implementation and policy reformulation at the EU and the national levels of governance (e.g. Rometsch and Wessels 1996). Other scholars emphasise particular institutional and constitutional traits of the EU together with aspects of institutional adaptation at the national level (e.g. Egeberg 2001, Knill 2001). This study, however, measures Europeanisation mainly by particular aspects of policy output (e.g. Gram 1997). The degree of Europeanisation is measured by assessing the degree of convergence in policy content across levels of governance (Kjellberg and Reitan 1995:21). The content of politics refers to the problems to be solved, the general or more specific objectives to be reached, the normative basis for politics, as well as to the instruments applied (Bennett 1991:218, Kjellberg and Reitan 1995). The

Europeanised policy, as operationalised above, is seen as synonymous with the *convergence* of policy content across levels of governance. Non-Europeanisation is viewed synonymously with *divergence* in policy content across levels of governance. Moreover, our assessment of policy convergence and divergence derives from official policy documents, not from legal texts. Overall, the Europeanisation of national R&E policy goes largely beyond legal harmonisation. Policy convergence in this chapter has more to do with the advent of similar policy goals and policy rationales across levels of governance.

2.2 Four hypotheses on policy convergence and divergence

Different scholars have different conceptions of Europeanisation based on competing ontological and epistemological stands and different empirical laboratories for study (Olsen 2002, Radaelli 2000). Conceptual disagreements also reflect different levels of abstraction (Knill and Lenschow 1998). While some scholars conceptualise Europeanisation basically as European integration, others see this phenomenon as national adaptation towards EU norms, rules, interests and institutions (Bulmer and Lequesne 2002). This chapter applies both these concepts of Europeanisation by focusing on the emergence of independent supranational policies of R&E and subsequent national convergence towards these policies. Moreover, Europeanisation is studied at the mid-range level. This section suggests a general institutionalist account of policy change and derives four middle-range hypotheses from this.

The question of policy convergence or divergence in the context of the EU is a question of policy integration across levels of governance. Moreover, it is a question of what happens when pre-established national policies become part of another larger policy-making system, like the EU, which have more or less corresponding policies (Olsen 2001). According to Schattschneider (1960:71), EU policies contribute to a “mobilization of bias” of domestic policies when these policies ‘meet’ EU policies. New-institutional perspectives in organisational analyses present several causal mechanisms of transformational change (DiMaggio and Powell 1991, March and Olsen 1989 and 1995, Peters 1999, Scott 1987). Rational choice institutionalism focuses on bounded rational actors constrained by institutional rules and procedures. Historical institutionalism emphasises policy path-dependencies and ‘lock-in’ effects. Sociological institutionalism addresses mechanisms of socialisation, persuasion, learning, logic of appropriateness, etc. One common denominator of these institutional approaches is their emphasis on contextualised, endogenous policy dynamics. Attention is directed towards the way different institutional contexts

mould policy differently. Institutions not only constrain policy change, as viewed by the rational choice and historical institutionalists, they also contribute to the initial construction of policy, as considered by the sociological institutionalists.

Drawing on insights from the above institutional perspectives, four partly supplementary and partly conflicting hypotheses on policy convergence and divergence are suggested in the following. Assuming that the Europeanisation of policy reflects several different social mechanisms, our goal is to suggest hypotheses that shed light on the different dynamics of Europeanisation of R&E policies. In the following, the first and second hypothesis account for policy convergence, whilst the third and fourth hypothesis explain policy divergence.

2.2.1 H1: Europeanisation because of policy differences

According to our first perspective, the Europeanisation of R&E is fostered by real and perceived *differences* across levels of governance with respect to the content of policy. *Adaptational pressures* stem arguably from real and perceived differences between national policies of R&E and corresponding policies at the EU level (Cowles, Caporaso and Risse 2001). The causal mechanisms underlying this hypothesis rest on both rational choice institutionalist and sociological institutionalist accounts (Knill 2001). According to this hypothesis, a high degree of policy difference is causally related to policy convergence. Moreover, we assume that the degree of policy difference is lower in old EU member-states than in non-member-states or ‘quasi-member-states’ like Norway. EU member-states are more closely subjected than Norway to legal sanctions from the European Court of Justice, institutional learning processes and benchmarking exercises. Accordingly, we assume that the degree of adaptational pressure is fairly strong in new EU member-states and in states that are at the institutional rim of the EU – like Norway. This argument goes largely counter to Wessels and Rometsch (1996:357), who argue that “with EC-membership [states] will start moving in the direction of Europeanisation and convergence whereas countries outside the EC ... will not follow this direction until they have gained *full* membership” (emphasis added). On the contrary, our first hypothesis assumes that the pressure for policy convergence is stronger in Norway than in established EU member-states.

2.2.2 H2: Europeanisation because of institutional linkages

Reform processes rarely come on their own, they are rarely distinct from past and present reform processes. Reforms are often internally inconsistent and have points of resemblance with other ongoing processes. The borderlines between various reforms are often diffuse and difficult to identify by reformers and observers alike. Reforms in one part of an or-

ganisation easily trigger reforms in another part of that same organisation, particularly if the organisation is internally tightly coupled (Krasner 1988).

The links between EU institutions and Norwegian governmental institutions have grown increasingly close and manifold in the 1990s. Because of closer formal and informal linkages across levels of governance, reforms in EU R&E policies may penetrate into Norwegian policies. This argument stresses that the degree of adaptational pressures varies more between policy sectors and governmental institutions than between states. Assuming that European integration resembles a multi-speed Europe of differentiated integration, one could also assume that the distinction between EU membership and the European Economic Area (EEA) affiliation of Norway is moderate (Stubb 1996, Trondal 2002b). Norwegian government agencies and individual civil servants are in fact involved in the decision-making processes of the EU through various expert committees and comitology committees (Schaefer et al. 2000). Such participation is likely to involve adaptational pressures (Trondal 2001a). Phrased otherwise: there is a positive relationship between strong, institutionalised and routinised relationships between EU institutions and national institutions and the perceived adaptational pressure towards policy convergence.

These arguments rest on institutional theory, contact theory, theories of elite socialisation and the 'epistemic community' literature (Haas 1992, Olsen 1996, Pollack 1998, Trondal 2001a). According to this argument, the R&E policies of Norway might be fairly strongly Europeanised. However, Norway remains formally a non-member of the EU and thus has no voting rights in the Commission, the Council of Ministers or the Parliament, let alone in other EU bodies. Consequently, the Europeanisation of Norwegian R&E policies is likely to be moderate compared to that of existing EU member-states.

This hypothesis supplements the first hypothesis presented above. Whereas H1 argues that policy convergence stems from real or perceived policy differences, H2 claims that policy convergence is fostered by normative, causal and epistemic consensus among elite actors based on institutional linkages across levels of governance. Hence, whereas the first hypothesis underscores differentiation as a catalyst of Europeanisation, the second hypothesis emphasises institutional interaction and normative and causal consensus among elite actors as the vital driving force of Europeanisation. Moreover, H1 and H2 generate different empirical expectations of the degree of Europeanisation of Norwegian R&E policies.

2.2.3 H3: Europeanisation filtered; towards policy divergence

The various reasons for policy convergence notwithstanding, EU policies are likely to be mediated, modified and filtered through pre-existing domestic policies, formal structures, legal rules and policy instruments

(Héritier 2001, Knill 2001). The adaptational pressures felt by national institutions and actors are weakened and modified when domestic policies are strongly integrated and/or non-compatible with EU policies (Checkel 2001:222, Johnston 2001:499); indeed, the sheer existence of strongly integrated and old national policies is assumed to limit the degree of policy convergence. When these priors are weakly integrated and/or compatible with EU policies, the adaptational pressure for policy convergence is expected to be stronger (Cowles, Caporaso and Risse 2001). As such, I hypothesise that the differences between EU member-states and non-member countries are filtered and modified by pre-established national policies of R&E. The fact that Norwegian R&E policies are fairly strongly integrated and old means that they are likely to accompany only modest degrees of policy convergence towards the EU.

2.2.4 H4: the virtual reality of Europeanisation

Finally, governmental policies are sometimes geared towards action and sometimes meant solely for talk and symbolic signalling (March 1984). Similarly, reforms in R&E policies may reflect a sincere willingness towards instrumental implementation as well as symbolic window-dressing. This argument refers both to national and to EU policies (de Wit and Callan 1995:87). Accordingly, policy convergence “may have more to do with government fashions” than with real patterns of policy convergence (Pollitt 2001:934). One empirical proxy of policy instrumentality is clarity, operability and consistency of various policies and the number of concrete policy instruments – such as financial resources – suggested for implementation. According to Cerych and Sabatier (1986:13), “the ability to evaluate the extent of goal achievement is heavily contingent upon the clarity and consistency of the goals involved”. By contrast, unclear, opaque and non-consistent policies and lack of concrete suggestions for implementation might measure policy symbolism and hypocrisy. Moreover, we assume that the level of organisational hypocrisy and policy signalling increases to the extent that EU policy conflict and collide with existing national policies (Brunsson 1989). Accordingly, this hypothesis contradicts H1 stating that policy differences accompany substantial policy convergence. According to H4 we assume that policy differences between Norway and the EU accompany only symbolic policy convergence.

2.3 Data and methodology: comparing Norwegian and EU policy

The main purpose of this chapter is to suggest middle-range hypotheses on the convergence and divergence of R&E policies between the EU and Norway (cf. above). It does not provide firm empirical tests of these hy-

potheses; only some few empirical illustrations of policy convergence and divergence are provided on the basis of public documents and existing bodies of literature. In order to *test* the relative validity of each hypothesis, we need regression analysis on data not yet available. However, the probability distributions generated from our analysis may serve as guidelines for empirical testing in future studies.

This study goes largely beyond the ‘horizontal’ comparison between different nation-state policies and applies a ‘vertical’ comparative design between the policies of the EU and that of Norway. This vertical comparative design may measure the vertical convergence, integration and fusion of national and supranational policies in Europe. Moreover, relying on the logic of the ‘least likely research design’, this study focuses on the non-EU member-state Norway, which we assume is less likely to converge towards the supranational policies of the EU than EU member-states. This ‘least likely design’ thus rests on the assumption that EU membership ‘matters’ as to the degree of policy convergence domestically (cf. H2 above).

This methodological logic, however, is not clear-cut when put to test because the EU membership versus non-membership distinction has become a continuum rather than a clear-cut dichotomy. Nation-states have different forms of affiliation to the EU as well as different degrees of interaction with different union bodies (Egeberg and Trondal 1999, Stubb 1996, Trondal 2002b). Because of the EEA agreement, Norwegian decision-makers are integral members of the decision-making cycles of the European Commission (Trondal 2001a). Despite having rejected full membership, Norway is currently an associate member of the EU through various sectoral treaties and agreements with the Union in areas such as Justice and Home Affairs, Common Foreign and Security Policy, the Internal Market, and R&E. In R&E, the distinction between membership and non-membership is fairly ambiguous because of Norway’s participation in the EU’s educational and research programmes (Olsen 1998, St.meld. nr. 40 (1993–94)). Consequently, the distinction between insider and outsider states becomes increasingly blurred (Trondal 2002b). Consequently, the ‘least likely research design’ does not perfectly match the Norwegian case of R&E.

EU governance has become vital for Norway in a great many respects (Olsen 1996). The Norwegian government incorporates EU regulations and standards on a daily basis (Claes and Tranøy 1999, Egeberg and Trondal 1997, Jacobsson, Lægneid and Pedersen 2001, Sollien 1995). Moreover, Norwegian civil servants from various ministries and from the Research Council of Norway participate in Commission expert committees and comitology committees on a weekly basis. One of the most notable effects of EU governance in R&E is that Norwegian decision-makers par-

ticipate, network and learn directly at the EU level. Norwegian civil servants attend several preparatory and comitology committees in relation to the Framework Programmes (FP) of the EU (Olsen 1998, Statskonsult 1999, Trondal 1998). Studies demonstrate that few Norwegian directorates are more intensively involved in EU committees than the Research Council of Norway (Trondal 1998). The Commission committees and the comitology committees assist the Commission in relation to thematic and horizontal programmes under each FP.

In sum, the Norwegian participatory status in the EU resembles that of EU member-states in the field of R&E and EU governance has become increasingly relevant for Norwegian R&E policies. However, Norway remains formally a non-member of the union and thus has no voting rights in the Commission, the Council of Ministers or the Parliament, let alone in other union bodies. Hence, Norway represents an important empirical laboratory for studying processes of Europeanisation of national policies in general and within the field of R&E in particular, as Norwegian R&E policies are likely to be affected less by EU policies than EU member-states (cf. H2). Hence, the case of Norway is 'critical' in order to assess and explain processes of policy convergence in EU member-states as well as in the new applicant states in Central Europe.

Taking into account the main purpose of this chapter (cf. above), we do not present or analyse primary empirical data. Our major empirical sources are official R&E policy documents from the EU and Norway, supplemented by empirical literature. Though studies on the Europeanisation of R&E policies are scarce, we examine the literature currently available in order to assess the degree of convergence of EU and Norwegian R&E policies. Secondly, we employ Commission Green and White Papers on R&E in order to analyse its R&E policy. We do not take into account policy documents from the Council of Ministers or the European Parliament because Norway is institutionally affiliated only with the European Commission. Finally, Norwegian Green and White Papers on R&E are used to analyse the degree of policy convergence towards the EU.

The time frame of this sketchy empirical illustration is shortly before and after 2000. By using this short time frame we are likely to observe only marginal degrees of policy change. This time horizon may thus strengthen the 'least likely research design' that goes with the Norwegian case. Accordingly, if we observe policy convergence in Norwegian R&E policies at the edge of the millennium, this finding may be considered fairly robust.

2.4 Europeanisation illustrated

This section applies the empirical data described above to shed light on our four hypotheses on policy convergence and divergence. The following discussion, however, does not provide a conclusive test of each hypothesis, only illustrations of their probable validity. We reveal *preliminary empirical illustrations* of creeping supranational R&E policies of the EU as well as Norwegian adaptation towards these policies. Taking into account the fact that the issue of Europeanisation of R&E is under-researched, we should consider the following empirical analysis preliminary.

2.4.1 Creeping supranational policies

EU policies generally include common policies (e.g. competition, agriculture, internal market), shared policies governed in tandem by the EU and domestic authorities (e.g. research, structural funds), and policies primarily governed by domestic governments (e.g. culture, education). R&E policies could be considered a shared portfolio of the EU and the member-states, however with a strong component of national sovereignty (European Commission 2002:20, Neave 2001, Nøvoa 2001). ‘Supranational policies’ refer to the emergence of ‘independent’ and ‘de-nationalised’ policies at the EU level.³

EU institutions engage in regulative, re-distributive, re-interpretative and re-organising activities on a daily basis (Olsen 1996:264–266). In the field of R&E the main emphasis has been on regulative and re-distributive measures. The regulative activities include mainly secondary legislation through the *acquis communautaire*. Whereas the higher educational policy of the EU is mainly a product of regulatory action, the research policy has primarily been re-distributive through the framework programmes (Banchoff 2002:13). However, EU activities in R&E have increasingly targeted other measures as well: funding of R&E, the creation of a European identity among mobile students and teachers, and formal organisation of national degree systems, grade systems, and the whole symphony of national R&E. Hence, the R&E policy of the EU has become increasingly complex and penetrates large aspects of academic life.

Recent White and Green Papers from the European Commission, particularly on the recent “European Research Area” (ERA) initiative (more below), reflect a strong determination and commitment to developing and strengthening an independent EU policy in R&E (e.g. European Commission 2000a; Foss 2001). According to the European Commission (2000a:7),

³ Other definitions of supranationalism have been suggested elsewhere (cf. Trondal 2002a).

“[w]e need to go beyond the current static structure of ‘15 + 1’ towards a more dynamic configuration”.

Efforts towards EU co-operation in the field of higher education are more recent than in the field of research, though an independent supranational R&E policy has gradually emerged in the 1980s and 1990s. Whereas EU initiatives in R&E were mainly supportive to nation-state policies prior to the 1980s, 1983 witnessed the emergence of a ‘supranational turn’ in R&E policy which has later gained increased momentum (Beukel 2001, de Wit and Verhoeven 2001:187, Field 1997, Ruberti 2001). The Maastricht and Amsterdam Treaties have later confirmed this supranational shift; it is, however, counterbalanced by the subsidiarity principle (Beukel 2001). In a reflection of this supranational turn, European ideas and visions increasingly dominate the Commission’s arguments for closer R&E co-operation (e.g. European Commission 2000a). Less emphasis is put on arguments for supplementing, strengthening and co-ordinating national R&E policies (Beukel 2001).

The move from intergovernmental co-operation towards supranational governance in R&E has not, however, been a swift process (Karlsen 1994). The advent of increased supranational governance in R&E has not come about through careful planning and grand visions alone. It reflects very much the accumulated effects of Commission initiatives and decisions by the European Court of Justice during the 1980s and 1990s (Field 1997). Thus, despite the lack of Treaty provisions, the EU has achieved significant results in R&E (European Commission 2002:21). At the end of the 1990s the supranational turn in the EU’s R&E policies also reflected strengthened supranational competencies more generally (cf. European Commission 2002). However, this supranational turn in R&E policies also parallels the so-called “Bologna process” aimed at constructing an “European Higher Education Area” (cf. below; de Wit and Verhoeven 2001:186, Laffan, O’Donnell and Smith 2000).

The EU’s re-distributive activities in R&E have mainly centred around the various higher education and research programmes promoting mobility and various forms of transnational networking (Laffan, O’Donnell and Smith 2000:86). Inter-European mobility and networking are still the main goals of R&E programmes. In addition to strengthening the EU area’s economic and technological competitiveness worldwide, an important goal of current EU programmes is to construct a “People’s Europe” and an “ever-closer Union”. Hence, notions of European citizenship and the construction of a common European identity supplement the instrumental, economic and market rationales of R&E policies. However, these latter rationales still leave their mark on Commission White Papers on higher education and they have set the priorities in the 5th FP (e.g. Council of the European Union 2001). Moreover, the 6th FP is basically oriented towards

technological and economic fields of research. The theme “Citizens and governance in a knowledge-based society” is the only theme from the social sciences included in the 6th FP; the humanities are hardly included.

Illustrative of the focus on societal utility in current EU research policy, “[r]esearch will need to play an even stronger and more central role in the workings of Europe’s economy and society” (European Commission 2000b:3). Even more to the point, the EU’s research support measures should increasingly “be designed to exert a more ‘structuring’ effect on European research than is the case at present” (European Commission 2000b:4). By contrast, long-term basic research seems not to be the major focus of current EU research policy.

The Bologna Declaration (1999) called for a new architecture of European higher education. Its ambition is to create an open European area for higher education, create systems for international recognition of degrees, strengthen intra-European mobility and the competitiveness of European higher education internationally. The launch of the Commission’s European Research Area initiative on 18 January 2000 (European Commission 2000a) follows up on the intergovernmental declarations from Bologna and has introduced new dynamics to the union’s R&E policies (Hackl 2001, van der Wende 2001). The ERA initiative is “the most ambitious effort yet to co-ordinate and integrate research policy in Europe” (Banchoff 2002:13). This is also an effort to move the union’s research policy from merely distributive towards more regulative measures. Moreover, the ERA initiative is illustrative of the supranational turn in R&E policies. A key concept in the ERA initiative is the so-called “European value added”, which underscores the justifications for EU level R&E activities. This initiative aims at strengthening and building new research networks in Europe, increase EU funding and the coherence of national implementation of research activities, and promote the mobility of students and researchers (European Commission 2000a:8). In order to implement the ERA, the Commission adopted the 6th FP on 21 February 2001 (Council of the European Union 2001, European Commission 2001a). The ERA and the 6th FP both indicate that the intergovernmental dynamics from the ‘Bologna process’ are lifted to a supranational level of governance. The primary focuses of the 6th FP illustrate this supranational turn: focusing and integrating Community research; structuring the European Research Area; and strengthening the foundations of the European Research Area (Council of the European Union 2001:Annex 1).

Though the declarations and agreements ratified under the Bologna process are not legally binding, the Commission has followed up the ERA initiative by benchmarking mechanisms and concrete guidelines for implementation (Hackl 2001); it has led to concrete suggestions for imple-

mentation (cf. European Commission 2000b, 2001c and 2001d).⁴ At present, however, the political momentum of the ERA is weakened because of fierce debates about the 6th FP (Banchoff 2002:16).

To conclude this section, we see the advent of creeping supranational R&E policies at the EU level (Ruberti 2001). The union's resource base is limited but its regulatory activities increased substantially in the 1990s. The next section addresses this question: does this supranational turn accompany transformational changes of Norwegian policies of R&E? According to Adam (2001:6), "[n]ational autonomy and sovereignty in the domain of higher education ... have never before been challenged on such a scale".

2.4.2 Aspects of policy convergence and divergence

Studies demonstrate that processes of policy convergence are not unidirectional and vary between different policy sectors (Claes and Tranøy 1999, Mallea et al. 2001). Some aspects of government and governance also converge more than others – i.e. talk more than decisions, and decisions more than actions (Brunsson 1989). The level of policy convergence and divergence also varies across time and between the different European countries (Pollitt 2001); studies do reveal a patchy picture of policy convergence and divergence (Rometsch and Wessels 1996, Steunenberg and Dimitrova 1999). In this section we will observe that mixed patterns of policy convergence of Norwegian R&E policies is fostered by moderate institutional linkages across levels of governance (H2), moderate adaptational pressures from the EU (H1) and by filtering processes (path-dependencies) (H3). We observe few examples of symbolic policy convergence in the Norwegian case (H4).

At the EU level there is a fairly clear distinction between policy formation and policy implementation.⁵ Policy initiatives like the European Research Area are subject to gaps between EU policy formulation and domestic policy implementation. Both soft law and community legislation are to be implemented by domestic administrations, according to national administrative law (Graver 2002:67). Because of the union's weak capacities for implementation, EU initiatives and policies being properly imple-

⁴ E.g. EU directives like 89/48/EEC and 92/51/EEC on the question of recognition of qualifications, versus the Bologna declaration stating a more general goal of developing a common framework of readable and comparable degrees (Adam 2001).

⁵ This is however not true for EU higher education programmes such as ERASMUS and SOCRATES; they have established direct relationships between the EU and individual higher education institutions without the interference of national governments.

mented at the national level depends on the willingness and capacities of member-state authorities to ensure that they are transposed and enforced effectively, fully and on time (European Commission 2001b:25). Consequently, we might arrive at a potential principal-agent problem to the extent that national R&E policies diverge substantially from the corresponding policies of the EU. Lack of compatibility in this respect is assumed to accompany problems of national implementation of EU policy (cf. H3 and H4) (Cerych and Sabatier 1986:17). However, these problems are assumed salvaged due to adaptational pressures from the EU (H1) and institutionalised linkages across levels of governance (H2).

A patchy picture of policy convergence

The Europeanisation of Norwegian R&E policies is reflected among a complex set of actors and within different government institutions. Those few empirical studies that go beyond the Norwegian case indicate that different government institutions converge with respect to their R&E policies (Adam 2001, Nøvoa 2001). Moreover, studies that cover other policy areas than R&E also indicate that different national institutions adapt differently to EU policies (Bulmer and Burch 1998, Goetz 2000, Jacobsson, Lægreid and Pedersen 2001, Olsen 1996, Spanao 1998, Trondal 2001b). In the case of Norwegian R&E policies, dynamics of path-dependency (H3) are indeed reflected in Government Green and White Papers. For example, the recent Norwegian White Paper on R&E considers the ERA initiative largely supplementary to and supportive of established Norwegian policy priorities (e.g. St.meld. nr. 27 (2000–2001)). Moreover, the Research Council of Norway (2001a:1) states that it “is generally in agreement with the proposed specific programmes implementing the 6th Framework Programme”. The Council (2001b:1) also agrees “with the overall Scientific and Technological Objectives as well as the main targets for the new Framework Programme ...”.

Van der Wende (1997a) argues that bad records of national adaptation towards supranational R&E policies reflect ‘missing links’ between national policies of R&E and national policies of internationalisation. However, with the distinction between national and international politics becoming increasingly blurred, the ‘missing links’ between R&E and internationalisation are generally strengthened (Trondal and Veggeland 1999). In the Norwegian case I will suggest that the convergence of R&E policies partly reflects those institutionalised linkages (H2) that have emerged between the EU and Norwegian ministries and agencies. For example, the participation of Norwegian decision-makers in EU policy-making processes has strengthened their perceived need to co-ordinate their “Brussels strategies” (Schaefer et al. 2000, Trondal 2001a). As an instance of this, Norwegian R&E policies seem fairly strongly co-ordinated vertically between the ministerial level and the Research Council of Nor-

way. Studies demonstrate that Norwegian ministries attending EU decision-making processes pursue *intrasectoral* co-ordination activities *ex ante* in order to arrive at a coherent voice in Brussels (e.g. Trondal 2001a). One apparent effect of institutional linkages between domestic government actors and the EU is that Norwegian R&E policies have become increasingly intertwined and intermeshed with EU policies. Hence, institutional linkages across levels of governance accompany policy convergence across these levels (H2).

The EEA agreement has introduced legal sanctions from the EFTA Surveillance Authority (ESA) into Norwegian R&E policy, strengthening the adaptational pressure on Norwegian R&E policies (H1). Though the introduction of the EEA agreement in 1994 brought no immediate legal changes in Norwegian R&E legislation (Sollien 1995), secondary R&E legislation has since then been substantially modified. Recently the ESA submitted a reasoned opinion to Norway on the question of “equal treatment of men and women as regards access to employment, vocational training and promotion, and working conditions” (ESA 2001). In a case of supranational law meeting national policy priorities, this reasoned opinion referred to affirmative action designed to bring more women into professorships at publicly funded universities in Norway. Moreover, this is a case of conflicting interpretations of the constitutive aspects of a particular policy: is promoting gender equality in professorships to be considered gender-rights policy (the Norwegian position) or competition policy (the ESA position)? This case has yet to come to a conclusion but it will likely come up before the EFTA Court. The court will probably proceed from EU competition law in such cases. Accordingly, the Norwegian policy on the equal rights for men and women will be *re-categorised* as competition policy through legal rulings. This example strongly suggests that policy differences between the EU and Norway accompany processes of policy convergence through legal enforcement (H1).

More generally, studies of policy adaptation towards supranational R&E governance conclude that “the net tendency ... is probably more convergent than divergent” (Green 1997:179). In the Norwegian case, one convergent trend is that Norwegian policy makers and policy documents have given increased attention to the emerging EU policies of R&E. An increased Norwegian awareness of intra-European mobility, particularly through institutional agreements, is an apparent policy effect of the union’s R&E programmes (Innst. S. nr. 337 (2000–2001):16, Olsen 1998, St.meld. nr. 27 (2000-2001), St.prp. nr. 1 (2001–2002):152, van der Wende 2001). Convergent trends in Norwegian R&E policy that most directly relate to EU initiatives have to do with the question of student mobility, vocational training, changes in curricula and institutional co-operation (van der Wende 1997b:238). The EU’s emphasis on institutionalised stu-

dent and research mobility is reflected in the greater interest in Norway in a harmonised credit transfer and grading structure (ECTS) and a harmonised grade structure (Bachelor and Master). These policy changes are likely to reflect a mix of perceived policy differences (H1) and learning processes due to institutional linkages across levels of governance (H2). Future empirical studies are needed to further illuminate the relative validity of each hypothesis.

The Norwegian White Papers on R&E include no significant elements of symbolic window-dressing. This is demonstrated in the newly suggested financial model for higher education in Norway, in which the annual budgets of each university and state college are directly linked to their success in promoting international student mobility (St.prp. nr. 1, 2001–2002). More generally, we observe tendencies whereby the national policies of most European states converge towards the corresponding EU policies with respect to their basic conceptions of the constitutive principles of R&E (Nøvoa 2001, van der Wende 2001). A greater emphasis is put on the economic and competitive rationales of R&E, not only in rhetoric but in practice – as illustrated in the new financial model for higher education in Norway. Whereas Norwegian R&E policies have traditionally rested on a mix of academic, cultural, political and economic rationales, recent reforms have been increasingly biased towards unidimensional arguments of cost-effectiveness and utility (cf. chapter 1).

The supranational turn in R&E at the EU level has, however, only brought moderate transformational changes in Norwegian policies of R&E (cf. also the next sub-section). At present, Norwegian policies of R&E seem more strongly affected and penetrated by broader intergovernmental dynamics in R&E, for example illustrated by the Bologna process and the WTO negotiations on the General Agreement on Trade in Services (GATS) (Field 1997, van der Wende 2001). There are several unresolved questions when it comes to the status of R&E in a global economy with multilateral trade liberalisation. One of the most pertinent issues relates to the global free trade agreements and whether higher education should be treated as ‘public good’ or ‘tradable services (Mallea et al. 2001).⁶ The Bologna Declaration has led to greater emphasis on accreditation, mobility and lifelong learning. The GATS negotiations have put additional emphasis on the commodification of R&E, moving from a concept of “education for free” to “education for fee”. These aspects are also introduced in current Norwegian R&E White Papers. Norwegian R&E policy should therefore be considered the result of existing national priorities and broader global

⁶ We are also witnessing growing national counter-reactions against a global ‘commodification’ of R&E. These national reactions are mainly directed towards the WTO negotiations on the General Agreement on Trade in Services (GATS) and not so much towards the EU.

trends towards the commodification and institutional de-regulation of R&E. Future studies are needed to illuminate the relative effect of these factors compared with the adaptational pressures from the EU (H1) and the institutional linkages between national government institutions and the EU (H2).

Aspects of path-dependencies

In studies of the Europeanisation of national R&E policies it is important to analyse how processes of policy convergence are modified and filtered by national institutions, policy priorities and established practices (H3 and H4). Studies of the Europeanisation of domestic institutions and decisions outside the field of R&E demonstrate that processes of national adaptation are path-dependent, subject to inertia and local resistance (e.g. Cowles, Caporaso and Risse 2001, Knill 2001, Olsen 2001).

Also the field of R&E is fairly resistant towards supranational governance, initiatives and actions (van der Wende 1997a). For example, studies demonstrate that Norwegian R&E priorities have moved in path-dependent directions in the 1990s (Olsen 1998). This is due to a strong institutionalisation of Norwegian policies of primary, secondary, and higher education and research. Educational policies have played a major role in the nation-building processes in Europe, including in Norway (Rokkan 1987). Most countries still see at least education as a “process of nation-building” (Green 1997:181). This indicates that educational policies traditionally have been closer linked to national identities than have research policies. Moreover, the EU has been longer involved in research policy than in educational policy and, accordingly, Norwegian research policies are likely to converge more easily than higher education policies towards those of the EU. This is underscored by the FPs and the recent ERA initiative by the European Commission aimed at a common European research policy (European Commission 2000a). We are, indeed, witnessing increased similarities between the thematic research priorities of the EU and the corresponding priorities of Norway (European Commission 2000a; St.meld. nr. 12 (2000–2001)). One of the key properties of these research priorities is their instrumental and utilitarian approach in the field of industry and technology (Skoie 1995:10). Norwegian research policy, however, puts greater emphasis on research in the social sciences and the humanities than does the EU (Karlsen 1994). Norwegian authorities also emphasise the importance of long-term basic research, arguing that “instruments must be in place to balance short-term application and exploitation with long-term targeted basic research and generic activities” (Research Council of Norway 2001b:3), a focus clearly different from the research priorities emphasised in the 6th FP. This example illustrates path-dependent developments of Norwegian research policies, filtering the policy priorities and initiatives of the EU. Norway may thus be seen *both*

as a “reluctant European” *and* an “adaptive non-member” with respect to R&E policies (Olsen 1996, Sverdrup 1998).

2.5 Conclusions

Research on the internationalisation of national R&E policies is “occasional, coincidental, sporadic or episodic” (Teichler 1996:341). By contrast, though Europeanisation is a growing scholarly industry, the study of the Europeanisation of R&E policies and institutions has yet to become one. In this chapter I have tried to link studies of R&E and studies of Europeanisation closer together by suggesting four hypotheses on policy convergence and divergence.

We have seen a mixed picture of Europeanisation of R&E policies, with emerging supranational R&E policies at the EU level, especially related to the issues of student mobility and international networking. EU policy measures in R&E have been mainly regulative and re-distributive, though they are increasingly regulative. Moreover, its R&E policies rest primarily on instrumental and utility rationales. However, despite the emergence of creeping supranational R&E policies, Norwegian R&E policies have converged only moderately and slowly towards these policies. The supranational turn in R&E has not yet contributed to a fundamental convergence of Norwegian R&E policy. Moreover, “[t]here are no signs ... that point towards changing the core responsibility of the nation-state in (higher) education” (de Wit and Verhoeven 2001:225). As seen from the Norwegian case, the EU does not fundamentally challenge the key elements of political, juridical, administrative, economic and cultural sovereignty of the nation-state in the field of R&E. In the Norwegian case, I will argue that moderate levels of adaptation towards the union’s R&E policies reflect a mixed pattern of moderate adaptational pressures from the EU (H1), policy path-dependencies (H3) and moderate institutional linkages across levels of governance (H2). After all, Norway continues to be a non-member of the EU without voting rights in the union bodies (H2); the policy differences between Norway and the EU are moderate and they are seldom enforced by legal sanctions (H1). Moreover, the well-established and strongly integrated Norwegian R&E policy contribute to policy divergence (H3). Elements of symbolic policy convergence and ‘cheap talk’ are less evident in Norwegian R&E policies (H4). Future empirical studies are needed to test the relative validity of these hypotheses.

3 Internationalisation of Research

Kaja Wendt, Stig Slipersæter and Dag W. Aksnes

3.1 Introduction

The internationalisation of research can be seen as an interplay between internal and external driving forces and the responses made to those forces at the institutional and individual level within the research system. Among the outputs of this internationalisation we find more internationally co-authored publications and patents, international conferences and research programmes and projects, as well as contacts between individuals, institutions and states. Along with these responses to the driving forces there are also validations of output through evaluations, statistics and benchmarking of research, its results and the functioning of the research system.

Introducing our theme, we start out by focusing on a crucial internal driving force for internationalisation of research, namely the universal character of academic knowledge (section 3.2). Next we present three general models depicting mechanisms involved in internationalisation: the hierarchic model (centre-periphery model), the network model, and the market model. The current concepts of the ‘knowledge-based society’ crucial to the theories of ‘mode 2 science’ and the ‘triple helix’ are also parts of the conceptual approach (section 3.3). Furthermore, we discuss normative dimensions of this process of internationalisation and point to consequences like brain drain/brain gain. Its impact on the relationships between industrialised countries and between industrialised and developing countries will also be noted. Is internationalisation of research a win-win situation?

This chapter also point at driving forces mainly external to the research community such as policy initiatives, economic forces, new technologies and others (section 3.4). Possible obstacles to internationalisation and negative consequences will also be discussed. With regard to responses to internationalisation within the research community, the increased focus on globalisation and internationalisation in several sectors of society has given us a large literature that describes and conceptualises this transitory process. In the literature on internationalisation of research, the focus lies on mobility studies and bibliometric studies, while there is less literature that explicitly addresses the driving forces and the effect of research policy on internationalisation. In section 3.5 the mobility of aca-

ademic staff and scientific collaboration is discussed. We will also look at large-scale co-operation, a relatively new form of international collaboration in research (section 3.6). International collaboration is also reflected in the use of co-authorship in scientific publishing and we present the main bibliometric studies on this topic (section 3.7).

During the last 15 to 20 years, a whole new field of research has developed, reflecting the increased focus on science and technology (S&T) and with increasing supply of and demand for quantitative indicators. This chapter will examine this new field of research in order to see how it is among the driving forces as well as the feedback mechanisms (section 3.8). Section 3.9 provides a summing-up and concluding remarks and comments concerning further research.

3.2 The universal character of academic knowledge

Is science inherently void of national boundaries? Is it endemically borderless (cf. Sörlin 1994)? This discussion is important for the conceptual discussion of the meaning of internationalisation of research and science, but it also echoes a more fundamental academic discourse that concerns the distinction between universal versus particular knowledge, i.e. the epistemic status of academic knowledge. Historically, methodological relativism has alternated with positivist views of science. Some emphasize that the laws of nature are the same everywhere in the Universe and always have been, while others emphasize that scientific knowledge is socially constructed. This is not the place to elaborate on these epistemological controversies, but the question of the truth-value of science should be in mind whenever the national, inter-national or global art of science is discussed.

What we do know is that research and science never have developed independently of their context. Forerunners of present-day research communities developed in Europe around year 1000, closely linked to the church establishment, followed by the establishment of universities in the 13th and 14th century, then strongly influenced by the appearance of the modern national or territorial state in the 17th and 18th century (Sörlin 1994). The universities became an issue of the territorial states and their appearance represents the first step towards the nationalisation of research. Sörlin describes the development of academic research in the northern parts of Europe as a process in which research was forced into national boundaries along with the ascendancy of the territorial state. Academic research became an issue for the national state. The parallel decline of Latin as the lingua franca of science was also linked to the nationalisation of science. It is in other words with the nationalisation of

science and the universities it becomes literary correct to talk about an *internationalisation* of science.

Even before this nationalisation of science and surely after it, economic constraints as well as geographical boundaries and political processes have influenced research foci and opportunities for travelling and publishing. From the very start of academic activity in Europe, the church had a monopoly in terms of educating scientists (Sörlin, 1994). In the 20th century, science came to have a heavy role in deciding the outcome of the Second World War, and later the cold war influenced research not only in the Eastern block, but also in the Western countries, with huge military research budgets. Scientific progress as a major tool of national economic and political power is widely supported in the rich current literature of innovations and the knowledge-based society (e.g. Gibbons 1994, Nieminen and Kaukonen 2001). Science and knowledge as economic driving forces should give reason for an even stronger nationalisation. But despite these external and internal limits, scientific communication across geographical distances and political borders is a phenomenon as old as the scientific enterprise itself (Hakala 2002). Today, international communication and collaboration in science is probably stronger than ever.

On the other hand: even though large parts of the world are experiencing an extensive increase of collaboration, networking, diffusion, transactions, new communication technologies and opportunities for travelling, there are still important aspects of the knowledge phenomenon that are only to a small degree internationalised. An academic career is still national; degrees, positions and jobs are still mainly distributed nationally (Hakala 2002). Even large business enterprises still tend to keep their R&D-activities 'at home'; internationalisation happens reluctantly or often 'accidentally' (see chapter 5). When nations advocate more internationalisation, they candidly admit that their motives are to strengthen national research, not to replace it (e.g. Georghiou 1998). It is also tempting to pose the question of whether the internationalisation of research during the last decades should rather be understood as a 'westernisation' of research. Hakala (1998) puts it this way: "[I]t would be more apt to speak about continentalisation of science, because interaction increases mainly within zones in which countries have traditionally had strong links to each others, mainly Europe and North America" (see also Leclerc and Gagné 1994).

3.2.1 Disciplinary differences

Several authors claim that there are differences between disciplines with respect to the universal dimension of research; by extension we should expect differences in their international orientation.

In an early study of international research collaboration, Frame and Carpenter found that the more basic the field, the more international collaboration it fostered (Frame and Carpenter 1979:495). Kerr (1991) sees disciplinary differences in the degree of international permeability: at the one end we find “world orbit” fields (physical and life sciences, mathematics and engineering) that are “inherently international or universal by virtue of their unified subject matter. They transcend national boundaries by their very nature. Their global reach is facilitated by the ease with which their practitioners communicate through symbols and conventions that can be understood by all” (quoted in Wollitzer 1991:10). At the other end of the scale we find the disciplines that are “rooted in national particularity (domestic law, public administration) these fields are seen as national in their interest and sphere of influence”. In between these two opposites lie the disciplines that are “intraculturally similar” – that are similar across cultures but not with “undisputed transnational applicability” (Wollitzer 1991:13).

Among other factors internal to science are cognitive aspects like paradigmatic status, language of communication, degree of codification, degree of specialisation and the academic culture of a field; aspects that are important for the motivation to be international (Kyvik and Larsen 1997:256, Hakala 2002:28). This implies that researchers within a relatively homogenous field with standardised forms of communication who regard their field as international should be more inclined to collaborate than others. But there are also internal differences within the broad scientific fields. Though studies of Norwegian researchers’ international contacts do show differences between the humanities and the social sciences on the one hand and the natural and medical sciences and technology on the other (Kyvik and Larsen 1994:171, Trondal and Smeby 2001:33), there are considerable differences within the first group in international publishing according to researchers’ local or cosmopolitan orientation.

For most scientists, international collaboration is not one-dimensional, oriented towards one type of activity. Activities like conference attendance, scholarly visits abroad, international research collaboration and publishing in international journals are correlated, implying that being internationally oriented in one way enhances the possibilities also for other types of international activity. (Kyvik and Larsen 1994:171, Trondal and Smeby 2001:53) Kyvik and Larsen in 1994 found differences between fields in the way that there was a somewhat larger group of locally oriented scholars in the social sciences and the humanities than in other sciences, but these differences were almost eliminated in Trondal and Smeby’s 2001 study. When it comes to international publishing, differences between the two groups of fields are bigger, the hard sciences being much more international oriented. (It should be noted that this stands

in some contrast to the mobility rates of the same fields referred to below (section 3.5)). Several differences between the fields: cognitive, social and cultural, could account for this (Kyvik and Larsen 1997:255–261).

Hakala (2002) analyses the disciplinary differences by drawing distinctions between ‘soft’ and ‘hard’ fields and pure and applied fields and looks upon variations in aspects like communication patterns, organisation of research, career tracks, power, status and funding structure. Based on case studies of three different university units in Finland, she stresses the need to attend to differences in disciplinary and organisational contexts of internationalisation. Micro-level empirical research (ibid.) has revealed that disciplinary differences do not necessarily disappear when they experience a similar pressure to internationalise: Changes depend on the type of external pressure, on how it is experienced within the discipline, and on resources for accommodating and resisting change. Scientists within different fields often had fundamentally different interpretations of what internationalisation means. Researchers in ‘soft’ fields often saw internationalisation as an opportunity to compare their own research and to get new ideas. They were more sceptical to the thought of developing normative international standards of what was considered important research. Some claimed that internationalisation had gone too far, as publishing in international journals gives little understanding back to the local society and the local culture. The researchers from the ‘hard’ fields looked upon internationalisation as a natural continuation of research done at home and saw it as an essential means to rationalise the research process. These differences might disappear as all fields get more international exposure, but so far it is not clear if internationalisation will lead to a more homogenous scientific world, or if collaborative work will accentuate country differences (Miquel and Okubo 1994:295).

Disciplinary differences can probably not be seen independently from the normative question of whom the research should serve; universal ideals, national taxpayers, or commercial interests, to name but a few factors. Hakala (2002) shows that such questions can be of importance for researchers’ way of being international. Despite disciplinary and normative differences, there seems to be one direct benefit of international contact that all researchers agree on: the mutual exchange of ideas and thoughts is the most important reward (and hence motivation) for collaboration (Melin 2000:37).

3.3 Conceptual approaches to the internationalisation of research

The internationalisation of research is at the same time a new and an old phenomenon (see above and also chapter 1). Since medieval times there

has been international mobility of students and researchers. Researchers and traders have distributed inventions. The rapid societal changes in recent decades have been bound up with the ever-greater importance of information and knowledge, rapid technological development, and globalisation of the world economy. The internationalisation of research as a new phenomenon is part of these changes.

Internationalisation is also related to the shifting relationship between science and policy and the way this relationship is embedded in a wider cultural context. Elzinga and Jamison (1995) define four different cultural dimensions: 1) the bureaucratic policy culture concerned mainly with effective planning and administration; 2) the academic culture representing the values of autonomy and integrity; 3) the economic culture related to business, with an entrepreneurial spirit interested in successful innovations; and 4) a civic culture concerned with the social consequences and implications of science. Internationalisation can be understood as evolving in the gravitational flux between these dimensions.

The literature has few attempts at theoretical conceptualisation bearing directly on the current internationalisation of research. There are, however, many theoretical approaches that are relevant to this thematic. In this section, we will examine some central models in order to see how they can inform our understanding. It is important to bear in mind that this section only gives a brief introduction to these concepts, part of larger theoretical and empirical fields as they are. (See also chapter 1 for a discussion of relevant conceptual lenses.)

3.3.1 The knowledge-based society

The new mode of knowledge production is one of the newer and widely discussed theories foremost influenced by Gibbons *et al.* (1994). The new mode of knowledge production is characterized by transdisciplinarity, problem-oriented research, openness, less hierarchic and institutionalised structures, and closer links between science and society (see also Nowotny *et al.* 2001). There is a rapid development of new knowledge and technology and with this comes more competition, also across borders. These changes also influence the internationalisation of research. A main point in this theory is a stronger demand for knowledge to be useful to industry, government or society at large.

OECD statistics (2003) show an increase in business enterprise funding of total R&D: up from 59% in 1991 to 64% in 2001. R&D funding from foreign sources also shows an increase. In funding from abroad there is, however, no total OECD figures, probably mainly because of the fact that the US does not report such figures. This is an indication to the effect that internationalisation is of different importance to small and big countries. The smaller countries had a distinct increase in funding from abroad in

the 1990s. In a group of ten small OECD countries,¹ funding from abroad increased on average from less than 4% in 1989 to more than 9% in 1999.

Table 3.1 shows that total expenditures on R&D in Norwegian universities increased by 26% from 1991 to 2001, while external funding increased by 50%. Funding from abroad showed an increase of 372%. External funding made up around 20% of total funding in 1981. In the 1990s its share was around 30% of total funding at the universities, compared to 33% in 2001. In other words, this has been a period of more external influence through funding, especially from abroad.

Table 3.1
Relative changes in university expenditures on R&D in Norway 1991–2001, fixed 1991 prices

Year	R&D expenditures total	External funding	Of this from abroad
1991	1.00	1.00	1.00
1993	1.08	1.21	1.33
1995	1.08	1.10	2.38
1997	1.19	1.27	4.15
1999	1.30	1.38	4.90
2001	1.26	1.50	4.72

Source: NIFU

“Increasing economic constraints have led to a situation in which universities are trying to capitalize on their research and education functions, setting up direct contacts with market and industry” (Nieminen and Kaukonen 2001:12). Etzkowitz and Leydesdorff (e.g. 1997, Etzkowitz *et al.* 1998, Etzkowitz *et al.* 2000) use the term “entrepreneurial science” to describe the tighter relationship between what they call a “triple helix” of university-industry-government relationships. Many authors emphasise that the universities in particular are going through major changes, including forming stronger bonds with society at large. Academic science is experiencing stronger demands for social and economic relevance, from society at large and from the business sector. Universities in many western countries are also experiencing increased competition from other knowledge-producers, which forces on them a shift of identity: “from state-financed monopolies to self-financed participants in the knowledge-production markets” (Czarniawska, Genell 2001). Gibbons *et al.* (2001)

¹ The Netherlands, Denmark, Sweden, Norway, Greece, Austria, New Zealand, Ireland, Iceland and Finland.

describe the latest developments as a change “from spreading to stretched university”.

It is striking how a vocabulary from economics has spread to this part of society. The “capitalism of knowledge” (Etzkowitz 1998) integrates a new function of the universities along with teaching and research: the entrepreneurial university. More than ever, academic research is seen as an important tool for the economic growth and prosperity of states (and firms); this also gives it a better opportunity to influence society. Given this, one might expect a more nationally oriented research. At the same time other parts of the society are getting more international: national economies are ever more globally interwoven, multinational R&D-giants invest all over the world, opportunities for travelling and access to electronic communication improve. These factors all contribute to the largest increase in internationalisation of research ever.

“The national innovation system” (NIS) is another popular concept that sheds light upon the role of private firms but also universities in promoting innovation and economic growth among nations. This concept is as yet not clearly defined but has a political background in the OECD. Its popularity can be explained by the focus it puts on the nation at a time when international developments are given preeminence. It is easy to understand but is probably more useful politically than analytically (see 1.4.3).

3.3.2 The hierarchic model

The centre-periphery model has been a widely used model for visualising the scientific world, implying that the centre has a dominating position based on knowledge. This model can explain collaboration between countries and institutions when there is unbalance between them. In this model “ideas and publications flow from the centre to the periphery, whereas physical mobility takes place from the periphery to the centre” (Hakala 1998). This is of course only a conceptual tool, it is, however, not difficult to find empirical examples: Europe, Japan and, pre-eminently, the USA can be seen as the big research centres of the world. What counts as a centre can vary a lot between different research fields and they can vary in number, strength and over time. Small and poor countries have fewer opportunities to be considered as centres of research and can have difficulties attracting the best researchers.

Crucial to this concept is that through international collaboration in research, marginal countries (universities, regions) can overcome their marginality and move towards the centre. International collaboration in research can, however, also result in a brain drain from the periphery when professionals (especially from developing countries) are attracted to the better working and living conditions in the centre. Some think that the

centre-periphery model is no longer valid and that the picture has changed in the direction of a network model with the creation of more centres (next section). It is still evident that the centres of research are accumulated in certain geographical areas and that this changes very slowly; the US has taken up a major position over the last century, Japan over the last decades, Europe has had a strong position for centuries. The slow processes of change are of course only part of the picture as new centres develop inside the borders of many countries; they may have a more open and international orientation with loose ties to nations, disciplines, funding partners and organisational structure (Gibbons 1994). On the other hand: internationalisation has probably strengthened the position of regions and universities that already had a strong position in the world of research (Gulbrandsen 1997).

3.3.3 The network model

The network models are based on the assumption of a community of common interests among the participants. The current changes in science can be described in terms of increased internationalisation within scientific practice, new and faster communication patterns, emergence of new disciplinary branches, transdisciplinary events like conferences, research programmes or establishment of new institutions (Melin 1997). These changes are also described in the 'mode 2' concept. An implication of these changes is the importance of networks as locations for science, involving not only academia, but also other knowledge producers.

The networks can either be formal top-down networks like CERN and EU centres or informal bottom up teams or networks between researchers that know each other or share a common research interest. (See section 3.5 for a discussion of researchers' collaboration and 3.6 on large-scale co-operation.) The network approach makes it more difficult to figure out where the centres are as almost by definition the hierarchy is reduced (Hakala 1998). This can make it difficult for newcomers to know the right people, have the right supervisor and to do the right research – essentials in the 'invisible college'. The invisible college describes networks of researchers who know each other and meet at conferences, do joint-venture projects, write together, and communicate in different ways (referred in Melin 1997). There are different stages through which the network may develop, from institutionalisation to specialisation and in the end to taking over and changing journal focus (Melin 1997). It should be noted that collaboration in a network may be informal; this can make studies of social contact within networks difficult.

3.3.4 The market model

A market model for collaboration and competition is based on the existence of a market in which several players supply and demand research. Access to and success in the market is important to individual scientists and their countries alike. Here they offer their product: papers, articles, books and so on, and try to convince customers of its significance (Kyvik and Larsen 1997). Competition gains momentum with the spread of industrial capitalism. New technologies and knowledge develop fast and manufacturing is often moved to low-cost countries. Developing research within firms is expensive; it is increasingly important to know what exists and where to get it. Access to global intelligence must be maintained in order to be able to identify and use relevant knowledge (Gibbons *et al.* 1994). Mode 2 knowledge production implies competition, not so much in manufacturing as in innovation, a competition based on collaboration, offering new opportunities for the use of scientific knowledge, but with highly unevenly distributed possibilities (*op. cit.*) It is, however, also likely that concerns about business secrets can prevent diffusion of research results. In a market model, competition can bring more internationalisation as a consequence of the effort at being at the research front. Customers in the centre are considered the most attractive: they 'pay' more in terms of recognition and as a hallmark of quality. This again shows the hierarchy in the scientific community and reveals that internationalisation of research is only partially explained by one of the models. In the following sections we use these conceptual models to shed light upon different aspects of the internationalisation.

3.4 Driving forces behind international research collaboration

What are the main driving forces behind the increase of internationalisation in research? In the literature, different factors are emphasised depending on the theoretical and empirical starting points and the level of attention given to this aspect. Forces at international policy-level are discussed earlier in this report and will not be discussed here. The increased importance of knowledge is, however, a crucial background factor on several levels and the triple helix and mode 2 theories cover many aspects of this development. Georghiou (1998) distinguishes between the following two categories of motivation: "1. Direct benefits to the S&T concerned, allowing the research to be performed or applied at a higher quality, with a broader scope, more quickly or more economically than would be the case without co-operation; 2. Indirect benefits arising from the existence of the co-operation, (...) enhancement of reputation, access

to further research funds, political, economic or social benefits.” (Georghiou 1998:620) This study suggests that both scientific and more mundane motives are at work when collaborations are established.

The internationalisation of research in the universities can be said to have a two-fold motivational structure with elements internal and external to the science system. The motivation for international collaboration will be related to the internal characteristics of science like disciplinary structure and field of research as well as to external factors like the size of the national economy and the priority given to science. Incentives for funding and promotion policy from government and university administration are important driving forces for internationalisation. Finnish researchers interviewed by Hakala (1998) did, however, point out that imbalances in the rewarding structure such as academic promotions not always favoured internationalisation. At the individual level also family reasons will influence internationalisation. Travelling abroad for a family can be difficult because one of the family members will have to sacrifice her/his own career at home. Working conditions are important for the mobility of researchers both with regards to access to advanced scientific equipment and closeness to the research centres of the world. The labour market in a country or within a subject also probably matters. Keywords explaining the periphery-to-centre brain drain are better conditions for living, working and doing research.

The market perspective can indeed be seen as a central driving force towards internationalisation of research for individuals, universities, research institutes, firms as well as nations. Competition provides a push towards internationalisation. For companies, it is not hard to defend cooperation in order to gain valuable information and knowledge from which profit can be gained. For universities, it is the desire to be at the knowledge frontier or at least take part in the scientific exchange. International funding has grown in importance. This again is intrinsic to the escalated pressure put on universities towards contributing to the national innovation system. The universities try to strengthen their position in the competition for the best researchers and students. For all actors, internationalisation is important as a tool for improving research quality and becoming more attractive to international collaboration. In Norway – as in many other countries – the government see internationalisation as a crucial instrument for achieving higher quality in Norwegian research as well as a higher rate of economic growth (St.meld. nr. 39 1998–99). A study of research quality confirms that international contact and collaboration are important factors for quality (Gulbrandsen 2000:220 ff). But there are also some warning voices; “the degree of internationalisation is not necessarily an indicator of quality” (Hakala 1998:70) and “as quality of research is commonly indicated by the degree of internationality, the circle is com-

pleted. More internationality brings more international quality: who could disagree?" (op.cit.: 52).

Among other factors motivating international research collaboration that are external to the research process itself, we find the escalating costs of fundamental research combined with insufficient budgets, less expensive travelling and other types of communication, and political and financial mechanisms encouraging collaboration (Katz and Martin 1997:8–9, Melin 2000:32). Other external factors such as the political situation of a country or region, a common history or language, geographical proximity and common defence and/or trade organisations have been demonstrated to strongly affect scientific collaboration (Frame and Carpenter 1979:493, Luukkonen, Persson *et al.* 1992:123, Raan 1997).

Several empirical studies (see for example Melin 1997, Hakala 1998) show that small countries tend to be more active than large countries in international research collaboration. There are obvious reasons for this: The US has over many decades been a world power in scientific research, in 2001 paying for more than 40% of global R&D, Japan for 16% and a small country like Norway (2001) for less than 0.4% (OECD 2003). It is obvious that these countries will have a differing degree of interest in collaboration and participation in big research programmes. Kyvik and Larsen (1997:238) put it like this: "Especially for small countries with limited R&D resources, good contact with the international research community is regarded as a necessity".

Studying OECD countries, Melin (1997) found that smaller countries play a relatively more visible role in science than they did twenty years ago; R&D expenditures are more equally distributed and there is a more equal distribution of papers; he (op.cit.: 42) speaks of "an increased integration in science or an equalized access to the international system". One could also call this a loosening up of the centre-periphery concept. There are several aspects that support this: Travel is much easier and cheaper than some decades ago, new and inexpensive technologies like e-mail and the internet have given new and virtually free modes of communication. More networking has also given smaller partners new arenas to join; funding structures are also changing, with better opportunities for getting funding from abroad (see table 3.1).

Many western countries have integrated research activities in some of their developing aid programmes. International organisations like the World Bank, UN agencies and private organisations also fund research in developing countries. There are both positive and negative experiences on both sides to this practice. Some Norwegian participants who had joined such projects saw them as a one-way export of competence and knowledge; others thought it could give valuable contribution to scientific

progress; others again stressed the duty to bring knowledge to countries in which it can be put to use (Wiig *et al.* 2001).

3.4.1 Moderating forces

This leads us to a discussion of some forces moderating internationalisation. Closer links between academia and industry can lead to conflicts over business secrets. When concerns for profits prevent diffusion of research results, this could pose a threat to the universal character of knowledge. There are critical voices in the academic culture that express concern that traditional academic values like integrity and autonomy could come under strain as a result of the dependence on external funding. Economic considerations may increasingly conflict with ethical ideals about knowledge and research as a common good for the whole of mankind. The current debate on DNA patenting is a huge challenge to these ideals. Also in the civic culture there are concerns over the social consequences and implications of science (Elzinga and Jamison 1995). In the last century and increasingly after the Second World War, the applications of science and their consequences for humanity, society and the environment have come under criticism from social, feminist and environmental movements, a criticism that has had varying resonance among the public at large. Today a movement like ATTAC, initiated in France in 1998, brings together young and to some extent academic forces that condemn the negative effects of globalisation.

There are also public efforts concerning the negative effects of research-based technologies: 'Technology assessment' first appeared in the USA in the 1960s, representing a public forum for discussion of ethical aspects and feasible control systems. A general focus on research ethics can also to some extent act as a moderating force, for example through criticism of the use of poor countries as testing grounds for new pharmaceuticals. There has also been some debate on the many common challenges to the human race, poverty and environmental issues among them, that could call for international or supranational research but do not attract much funding. Such debates probably do not moderate internationalisation very much but can stop the most excessive consequences. It should be noted that these debates are themselves international; issues and control mechanisms are often 'imported' from one country to another; the debates themselves are often taking place in international forums.

3.5 When people travel: internationalisation of academic staff and scientific collaboration

One of the main traditional indicators of internationalisation of research and higher education is the mobility of teaching and research staff. The mobility of academic staff has a history longer than internationalisation of research as such; at least it dates back to the sophists of ancient Greece in the 5th century BC who travelled around giving lectures against proper payment. In medieval times the expansion of the university system, the use of Latin as a common scholarly language, and a less strict religious control of education enhanced the possibilities for the wandering scholar (Welch 1997:325). As the scientific system expanded and communication improved, scholarly travel became a normal academic activity during the 19th and 20th century before it was institutionalised as a policy measure in the post-war period. Personnel movement is now an intrinsic part of most international collaboration, and as such, along with collaboration, probably the most common way to satisfy the urge for internationalisation on the individual level. We will give a brief sketch of the latest developments in this field of study. First, we distinguish between types of internationalisation among academic staff before going on to the various elements of internationalisation. We conclude this section with some notes on the effects of internationalisation.

3.5.1 What is internationalisation and mobility of staff?

Internationalisation of the academic workforce is a well-known characteristic of the modern science system and has at least two main connotations. First, it is international mobility when a researcher moves from one country to another to work there on a regular basis for a shorter or longer period. This is part of the larger concept of work-force mobility that in general implies employment in a new country either on a permanent basis or for a shorter or extended period of time. As combining teaching and research is the normal routine of academic work, a mobile researcher is often also a mobile teacher. Our concern here is the research part of this mobility, but it should not be forgotten that teaching could also be an important reason for mobility.

A second aspect of mobility is mobility for training. This is often part of student programmes (for instance ERASMUS, Nordplus; see chapter 4), but going to other institutions and countries for training is a regular and frequent activity within the research community and can be seen as part of an academic's lifelong learning. Reasons for this kind of mobility can be to learn new methods, techniques or the use of equipment, or to get an update on theoretical or empirical findings.

Third, we think of internationalisation of academic staff when research is done in collaboration with researchers working in another country. This form of mobility has to do with the internationalisation of the research processes themselves and can be of a wide range: from two researchers meeting to do a small project together to establishing permanent large institutions such as CERN or the EMBL. In all cases the main objective is to realise a research project, but a survey of the literature indicates problems with an accurate definition. Katz and Martin suggest the following general definition of research collaboration: “(Thus), a ‘research collaboration’ could be defined as the working together of researchers to achieve the common goal of producing new scientific knowledge” (Katz and Martin 1997:7). After debating different aspects of collaboration and their implication for weak and strong definitions of collaboration, Katz and Martin end up by concluding that “... research collaboration (therefore) has a very ‘fuzzy’ or ill-defined border. Exactly where that border is drawn is matter of social convention and is open to negotiation. Perception regarding the precise location of the ‘boundary’ of the collaboration may vary considerably across institutions, fields, sectors and countries as well as over time” (Katz and Martin 1997:8). Adding ‘international’ to collaboration probably make the concept even fuzzier, except for stating that it is between two or more nations.

An unambiguous definition of international collaboration would have been analytically useful but seems hard to find. Instead of explicating on a definition that forces all the heterogeneous activities of international collaboration into one frame, it is probably more fruitful to dig deeper into the elements and mechanisms of international collaboration, though one should be aware that a great many factors are at work.

3.5.2 The elements of international collaboration

The many facets of international collaboration comprise many different types of activity. Several studies have been done on the various elements of international collaboration (Kyvik and Larsen 1994, Kyvik and Larsen 1997, Melin 1997, Raan 1997, Georghiou 1998, Hakala 2002), and this list is a composite of what these authors have treated as international collaboration:

- Personal contact (often informal)
- Researcher exchange, guest researchers/lectures (including fellowships)
- Workshops, seminars, conferences and other meetings
- Study or research visits
- Research assessments

- Collaborative programmes, projects or networks
- Access to or sharing of the costs of scientific instruments, large-scale facilities or data sources
- Longer-term relationships between laboratories
- Participation in national programmes of the collaborating country
- Establishment of subsidiary laboratories in a partner country
- Sponsorship or participation in national programmes

It is obvious that some of these collaborative activities are more widespread than others; face-to-face contacts and networks are considered especially indispensable (Hakala 1998:61, Melin 2000:35).

The collaborative activities listed above also have a more or less institutional character, thus they will have a more or less formal character and be more or less embedded in political considerations (Raan 1997:294). Establishing a large-scale facility or a laboratory subsidiary abroad is clearly not a decision made by one individual and should consequently be analysed on an institutional or national level. So far most studies seem to be on an individual level; hence it seems to be a need for more studies on international collaboration on the institutional and formalised level (see also chapters 4 and 5).

A study done by Chompalov, Genuth *et al.* demonstrates that general organisational features of research collaboration probably also applies on international collaboration. They identify distinctive organisational patterns on the basis of several characteristics and find the following characteristics essentials of how inter-institutional collaboration were organised (Chompalov, Genuth *et al.* 2002:756):

- Level of formalisation: to what degree are there steering committees, appointed managers, written contracts etc?
- Level of hierarchy: are there several levels of authority, systems of rules and regulations; what style of decision-making is applied?
- Scientific leadership: are the leaders of the project scientists or not?
- Division of labour: to what extent does the projects have a specialised division of labour?

When combined, these characteristics made it possible to distinguish between four different organisational patterns: bureaucratic, leaderless, non-specialised and participatory. Regardless of organisational pattern, research collaboration among these researchers is basically a consensual project. Whatever model is chosen, the basic feature is that the participants have a consensus about being involved and about reaching a scien-

tific goal. As no-one is forced into collaboration and the goals are perceived as common, research collaboration is fairly egalitarian at all levels (Chompalov, Genuth *et al.* 2002:765). This egalitarian view can probably be disputed, as there can obviously be conflicts over distribution of resources, research priorities, methodologies, rights to intellectual property etc.

3.5.3 Analytical perspectives on mobility

Mobility of highly educated people in general and especially researchers is a political concern, even an issue of conflict. Researcher mobility has been a political issue especially within the OECD and the EU, but also in a UN context. The reason is of course that human resources are regarded as a crucial element for the functioning of the national science and innovation systems. An OECD document on the subject reads as follows: “The international mobility of human resources in science and technology (HRST) is currently an important policy matter in many OECD countries. With booming demand for skilled labour, especially from the information technology related industries and occupations, there is apparently a growing shortage of skilled labour in a number of OECD Member countries” (Guellec and Garson 2000:2). Other policy-related documents convey the same message: the movement of human capital is crucial to the strengthening of the R&D system (e.g. STRATA-ETAN expert working group 2002:11). Even if a strengthened R&D system is regarded as crucial in itself, the measures undertaken to strengthen mobility of researchers are probably best understood as part of a more general ambition to strengthen the economy, where the R&D system is but one input. It is in this context we should understand the many initiatives that have come from the top of the political establishment to foster mobility. The same initiatives can also create frustration or even conflict as they can create a ‘brain drain’ from one country and consequently a ‘brain gain’ situation for another.

If science were understood only as the collective effort of humanity to enhance knowledge, a conflict situation would not have emerged, as where in the world a scientist worked would be of no importance as long he or she contributed to the world’s stock of knowledge. But with knowledge as a commodity and human capital as a productivity factor, mobility is not necessarily a ‘zero-sum game’. There are both net exporters and net importers of academic labour, the USA and the UK found to be the greatest exporters in one study (Welch 1997:329). An OECD document warns against regarding mobility as something inherently beneficial: “Too much mobility can lead to instability and can be as bad as no mobility at all” (Rosengren 1998:5). The mobility schemes can be analysed from both a winner’s and a loser’s perspective. Irrespectively of the outcome on a

national level, the mobility schemes are important because they can give economic and practical opportunities for mobility. But they were probably not much worth if the research community itself was not mobile and had a motivation for being so.

This leads to a bottom-up perspective on mobility. Some authors use centre-periphery dynamics to explain the reason for this motivation on both the national and individual level (Kyvik and Larsen 1997:238, Hakala 2002:8). Nations and researchers try to establish contact with other nations and institutions that they perceive as central to the scientific development in a field. But it is pointed out that the dynamics cannot work one way only. If researchers in the periphery were not in some way attractive as collaborators for the centre, there would be no collaboration (Kyvik and Larsen 1997:241). Because researchers in the periphery have to be attractive for collaboration, they have to make themselves visible on a market where papers, articles and books are traded for academic recognition (Kyvik and Larsen 1997:243). The market can thus be viewed as an inseparable part of the centre-periphery dynamics. There are also some indications that networks and markets are replacing the centre-periphery dynamics all together (Leclerc and Gagné 1994:287).

Other authors believe social networks are the primary source for collaboration. In a study undertaken by Melin, "Almost all of the informants emphasise the importance of networks in one way or other. It is important, not to say crucial, to be part of a scientific network and know people in one's own field, and communicate with them" (Melin 2000:35). Some of his respondents refer to friendship, personal chemistry, respect, trust and joy as important, while others say they can collaborate with everyone who has the right expertise. Though his study is on scientific collaboration in general, it seems plausible that the statement cited is also applicable in an international context. What Melin introduces is the importance of social dynamics for collaborative efforts to function. The social well-being of researchers involved is probably a prerequisite for collaboration and indirectly also for mobility as there probably would be no mobility if there were not some sort of social links to the place the researcher is going to.

To sum it up, some perspectives used on analysis of international mobility:

- Analysis of policy measures on a national or international level (top-down perspective).
- Analysis of researchers' collaboration on an institutional or individual level (bottom-up perspective).
- The dynamics of the market, the network, the social relations and between the centre and the periphery.

3.5.4 Volume and effects of international mobility and collaboration

It is probably not possible to establish the total assets of international mobility and collaboration. Measuring both the quantity and the diversified effects of international contact are very difficult. Most effects on human capital and cognitive capacities are probably not at all possible to measure. Despite this, at the political level there seems to be a firm belief in the positive effects of internationalisation. An EU document on the mobility strategy for the European Research Area anticipates that mobility adds value, among other factors, by:

- Enhancing the transfer of knowledge and technology between the different actors of the European research and innovation system, including industry;
- Raising the scientific excellence of individual researchers and furthering the creation of internationally renowned centres of excellence attractive to researchers from all over the world;
- Furthering the distribution of research excellence in the different regions of Europe;
- Making the research work more efficient by pooling together competence and experience, providing better dissemination of research results as well as optimising the use of research (European Commission (2001d:4–5)).

Similar thoughts are found at a global level in the OECD, though here they seem to be more aware of the possible negative effects created by brain drain (OECD 2000:2). Despite these positive political views on what motivates mobility, there are few scientific studies on international academic mobility at large or with a comparative perspective. Some preliminary studies on the quantum of mobility have been tried out, basically at a national level. One example is the US, where 27 per cent of all doctorate-holders in science and engineering were foreign born in 1999 (National Science Foundation 2002:3–29). In general there is a scarcity of adequate theories and methods in this field. An OECD study investigating the possibilities concludes as to the available data sources that “[the] data quality varies, have different focuses, are conducted with varying frequencies, cover different time periods, utilise different concepts/classifications etc. As such problems already exist at national levels, international comparisons are therefore very difficult at present” (Rosengren 1998:14). Similarly a study of international research mobility in the Nordic countries concludes that lack of comparable data severely hampers mobility studies. Most countries do not maintain good statistics on migrants’ educational and occupational status. In the few cases where statistics are available, they are usually not comparable with other countries because

of technical or legal difficulties (Nerdrum 2001:47). The lack of adequate statistics in this field may be helped in the future as the EU in its benchmarking efforts tries to incorporate indicators on the number of foreign researchers in member and associated countries.

Mobility for collaboration or acquiring skills is better statistically covered, at least in a Norwegian context. A study based on data on Norwegian university faculty shows that 77 per cent of them made attended at least one conference or seminar abroad in 2000 (Trondal and Smeby 2001:42). Twenty years earlier just 56 per cent of the researchers had such participations. The same study shows that 50 per cent of the staff made at least one international trip for collaborative purposes, 37 per cent had travelled at least once for training or study purposes, and 39 per cent had held at least one international guest lecture the previous year. For all these types of activity, there has been a considerable rise in the percentage of researchers participating compared to 10 or 20 years earlier.

As far as we know there are just a few investigations on the effects of long or short-term mobility. Based on an international survey of academic staff, differences between staff with foreign higher degrees as opposed to domestic degrees were analysed (Welch 1997). Mobility is concentrated around certain disciplines. Staff within computing science, physics, the humanities and the social sciences are the most mobile, while academics in the fields of business, health sciences, technology and education were the least mobile. Mobility is basically a male activity; it is suggested that the opportunity to travel and study abroad actively discriminates against women. This study also shows that academics educated abroad are more interested in research than in teaching and are more frequently on tenure or a permanent contract than staff educated domestically. A Norwegian study shows that academics with long-term professional stays in a foreign country have a broader contact pattern with colleagues abroad than those who have not had such a stay (Kyvik and Larsen 1994:170). On the other hand, long-term professional stays in foreign countries have a very small impact on productivity in international publishing.

The effects of international collaboration are also studied through bibliometrics. While studies of the impact of internationally co-authored papers are discussed in section 3.7.2, we here give some clues to why internationally co-authored papers have become popular. Van Raan suggests that "International collaboration often implies a considerable 'broadening' of the audiences around the authors, enhanced by more intensive 'networking' which is characteristic for 'internationality' of research" (Raan 1998:427). Others describe collaboration as having the effect of plugging the researcher into a wider network of contacts in the scientific community, and the collaborators will diffuse their findings formally or in informal discussions (Katz and Martin 1997:15). But more people involved not

only enhance visibility. More people working together can be a source of stimulation and creativity through intellectual cross-fertilization (Luukkonen, Persson *et al.* 1992:123, Katz and Martin 1997:15). Collaborative articles have higher impact because they are intellectually more stimulating. On the other hand, awareness of the enhanced visibility of collaborated articles can also lead to strategic collaborations because “fractional papers” can be added to those of others and thus get published (Luukkonen, Persson *et al.* 1992:123). The reason for collaboration will then be based on a ‘publish or perish’ strategy, – getting some results out is the basic goal, quality comes second. The need for visibility will also lead to concentration on English language journals with assumed high impact (Raan 1997:293).

It should be noted that international collaboration could also have malign consequences. We have no explicit references to negative effects of international collaboration, but studies on research collaboration in general suggest some effects that are probably transferable to an international context. Nieminen and Kaukonen suggest that communication and culture-related problems might occur when collaborators’ backgrounds diverge too much (Nieminen and Kaukonen 2001:63). Such problems reflect deep cultural and orientation-related differences among people of varying educational background, professional experience, action models, preferences and values. This report also point to intellectual property rights as an emerging scene of conflicts (Nieminen and Kaukonen 2001:66). On the material side, collaboration can add travelling expenses, and last but not least take up time (Katz and Martin 1997:15). Including more people means more time used on information, discussions, disagreements, and on getting to know one another. Higher administrative costs should also be expected.

3.6 Large-scale co-operation

One approach to the study of internationalisation of research is to look upon traditional forms of research collaboration as less institutionalised and more characterised by bottom-up initiatives and new forms of internationalisation of research as more based on top-down initiatives. These two forms now appear in parallel and exert influence on one another (see also chapter 1 and 3.4). The accelerating internationalisation of research is manifested in various ways; co-authorship is, as we will see in 3.7, one of them. There is more bilateral bottom-up research and more top-down inter-governmental initiatives. After the Second World War, several organisations and programmes for large-scale co-operation were established, notably in Europe. Large-scale initiatives include e.g. COST (Committee on science and technology), CERN (European Organization for Nuclear

Research), the EMBL (European Molecular Biology Laboratory), ESF (European Science Foundation), ESA (European Space Agency), EUREKA, ESRF (European Synchrotron Radiation Facility) and the EU framework programmes. They have varying funding mechanisms; some of them are mainly oriented towards basic research (COST, ESF) while others have a more applied focus (EUREKA). In Norway, changing governments have supported membership in many of them, often as one of the founding members (Godoe 1997). Large-scale co-operation has traditionally involved the hard sciences, notably physics, biology and nuclear energy, but it extends beyond traditional big science.

With the end of the cold war it has been difficult to keep up the funding of large-scale facilities in Russia and other earlier Eastern-block countries. Japan has also had own large-scale installations and has in addition taken great interest in joining the international organisations. In America such organisations are used for co-operation on the federal, i.e. interstate level. Americans generally has a good reputation when it comes to networking (Hakala 2002). The American government has signalled increased involvement in large international facilities (NSF 2002).

Big-science collaboration mainly implies top-down and policy-initiated internationalisation. The main reasons for establishing and keeping these organisations were the sharing of costs and risks. They offer a meeting place in which first-class researchers try to solve shared problems with the best and most expensive equipment. 'Locking' governments into international commitments has also been important to the scientific community; this is sometimes easier than obtaining national funding. In an era of globalisation, a nation's science base is a competitive asset in attracting and retaining inward investments (Georghiou 1998).

Though they are policy-initiated, organisations will likely see it in their self-interest to continue to exist and to expand. Often highly specialised institutions representing huge investments and accumulated knowledge, their further development involves important democratic aspects. Politicians may find it difficult to assess their activities and negative aspects of this kind of co-operation can stem from their conservative structure. Only rich countries can afford membership, as huge sums are tied up, and these organisations have great power to define research priorities for future generations.

Europe has good experience with international collaboration within the EU and will reap advantages from this (op.cit. 1998). The efforts of the EU aimed at creating a "European research area" are motivated by a wish to compete in relation to the domineering position of the USA and Japan. International accords concerning research policy are important driving forces in research at both the institutional and individual level (see also chapter 2). At the same time, a network as well as a competition ap-

proach can be used to explain how the EU wants collaboration to develop continent-wide.

3.7 When ideas travel: bibliometrics as an approach to the study of internationalisation

There are several ways to study effects or output from international collaboration. Quantitative studies of scientific publishing (bibliometrics) can offer interesting information; studies of patents as a technology indicator are another approach (cf. chapter 5).

Our focus here will be on bibliometrics, as new knowledge is usually disseminated through published papers, which can be used in an indirect measure of knowledge production. The fact that researchers from different countries co-author a scientific paper reflects international collaboration and international co-authorship may be used as an indicator of such scientific collaboration. In this section we describe some main results from bibliometric studies on this topic.

3.7.1 Co-authorship as an indicator of international collaboration

Computerised bibliographic databases make it possible to conduct large-scale analyses of scientific co-authorship. The database most commonly used for bibliometric purposes is the one provided by the Institute for Scientific Information (ISI), which covers 16,000 specialised or multidisciplinary journals, including all influential peer reviewed journals in the natural sciences, medicine and technology (Testa 1997) and a more limited selection of journals in the social sciences and the humanities. The ISI database is generally regarded as a satisfactory representation of international mainstream research (Katz and Hicks 1998). Of particular importance for the study of scientific collaboration is the fact that the ISI indexes all authors and addresses that appear in papers, including country as a controlled term.

By definition a publication is *co-authored* if it has more than one author, *internationally co-authored* if it has authors from more than one country. Compared to other methodologies, bibliometrics provides unique and systematic insight into the extent and structure of scientific collaboration. A main advantage is that the size of the sample that can be analysed with this technique can be very large and render results that are more reliable and statistically significant than those from case studies. Also, the technique captures non-formalised types of collaboration that can be difficult to identify with other methodologies.

Still, there are limitations. Research collaboration sometimes leads to other types of output than publications, for instance patents. Moreover, co-authorship can only be used as a measure of collaboration if the col-

laborators have put their names on a joint paper. Not all collaboration ends up in co-authorship and the writing of co-authored papers does not necessarily imply close collaboration (Luukkonen, Persson *et al.* 1992, Melin and Persson 1996, Katz and Martin 1997). Thus, international co-authorship should only be used as a partial indicator of international collaboration (Katz and Martin 1997). There are also particular limitations with the ISI database. For example, regional or domestic journals, books, reports etc. are usually not included. This means that ISI data are particularly suited to assessments of the element of collaboration in academic scientific research, in which publication in international journals represents the main mode of communication.

3.7.2 Bibliometric studies of internationalisation – some main findings

Increasing international collaboration

Smith (1958) was among the first to observe an increase in the incidence of multi-authored papers and to suggest that such papers could be used as a rough measure of collaboration among groups of researchers (Katz and Martin 1997). In a pioneering work, Derek de Solla Price also showed that multiple authorship had been increasing (Price 1986). These findings that have later been confirmed by a large number of similar studies (e.g. Merton and Zuckerman 1973, National Science Board 2002). The single-author paper is, in fact, becoming an exception to the norm; in the case of Norway, 86% of ISI-indexed papers were co-authored in 2000, compared to 66% in 1981. Co-authorship is, however, still much more common in the natural sciences/medicine than in the social sciences/humanities.

Scientific collaboration across national borders has also significantly increased over the last decades. According to Melin and Persson (1996) the number of internationally co-authored papers has doubled in about fifteen years. In Norway internationally co-authored articles' share of all articles went up from 16% in 1981 to 43% in 2000, hence almost every second paper published by Norwegian researchers now has foreign co-authors. Another example: in 1996, 40% of Finnish papers were co-authored by researchers working abroad – compared to 19% in 1986 (Persson, Luukkonen *et al.* 2000). Worldwide, 17% of all publications are now internationally co-authored (National Science Board 2002). Bibliometric analysis thus provides evidence to the effect that there is a strong move towards internationalisation in science and that the research efforts of nations are becoming more and more entwined.

The move toward internationalisation is also reflected in the publishing practices of scientists: English has increasingly become the *lingua*

franca of scientific research, and publishing in international journal is becoming more and more important, also in the areas of social science and the humanities.

International collaboration is more important in smaller countries

As might be expected, nations with big scientific communities have far more collaborative articles than have smaller countries (Luukkonen, Tijssen *et al.* 1993), though one finds a trend to the effect that the proportion of internationally co-authored papers increases along with decreasing national volume of publications (see e.g. Luukkonen, Persson *et al.* 1992, National Science Board 2002), hence international collaboration is relatively more important in smaller countries. This is probably a consequence of researchers from small countries often having to look abroad for colleagues and partners within their own speciality. Small scientific budgets and the need for cost-sharing and access to facilities abroad are other reasons. Size is, however, not the only factor with bearing on the extent of international collaboration; access to funding, geographical location, and cultural, linguistic and political barriers are other important factors (Luukkonen, Persson *et al.* 1992, Melin and Persson 1996).

Bibliometric techniques allow analysis of structures of international collaboration. For almost all other countries, the United States is the most important partner country; this reflects this country's pre-eminent role in science. In 1999, 43% of all published papers with at least one international co-author had one or more U.S. authors. For western Europe the share of U.S. co-authorship ranged from 23% to 35% of each country's internationally co-authored papers (National Science Board 2002). Generally, one also finds that most countries have much collaboration with their neighbouring countries (e.g. collaboration among the Nordic countries). Over the last decade we find a marked increase in co-authorship among western European countries; this probably mainly reflects the EU framework programmes.

Differences among scientific fields

In Smith's (1958) early study, he observed that theoretical papers were generally authored by fewer scientists than were experimental papers. Collaboration has later been shown to be particularly extensive in experimental research involving large-scale instrumentation such as telescopes or particle accelerators (Katz and Martin 1997). These patterns would also be evident in international co-authorship.

The degree of collaboration may also be a function of the basic/applied dimension. It has been argued that the more basic the field, the greater the proportion of international co-authorships (Frame and Carpenter 1979). In their analysis of the natural sciences and medicine, Luukkonen, Persson *et al.* (1992) found the highest percentage of interna-

tional co-authorship in the earth and space sciences, mathematics, and physics, with the lowest percentage in clinical medicine. They suggested that financial as well as cognitive reasons could explain this pattern.

International collaboration augments the impact of the research

The effects of collaboration on productivity and impact have also been studied with bibliometrics. In order to assess the impact of publications, citations of them are commonly used as a measure. These studies have shown that multi-authored papers generally are more highly cited than single-author papers. High citation rates have been found to correlate strongly with number of authors (Aksnes 2003). Some have suggested that the higher citation rates of multi-authored papers are due to self-citations (Herbertz 1995) but empirical work has shown that self-citation only accounts for a minor part of citations (Aksnes 2003).

Similar effects have been identified with respect to international collaboration. For example, Narin, Stevens *et al.* (1991) found evidence to the effect that internationally co-authored papers were cited more than twice as frequently as papers coming from single institutions within a single country. In another study, “many authors, several countries” papers were found to have the highest average impact (Katz and Hicks 1997). Such findings are convincing evidence for policy makers that allows them to facilitate researchers’ participation in international projects (Melin 1997). Still, some of the differences may be due to other effects, for example self-selection processes, in which the better, more widely-known and respected scientists are those who co-operate and author papers internationally (Narin, Stevens *et al.* 1991).

3.8 Statistics and benchmarking: indicators as policy makers?

The political importance of science and innovation policy has increased strongly as knowledge is being recognised as a main key to prosperity and wealth. Decisions concerning R&D policies have to a large extent been made on the national level, but the attention given to R&D has brought research policy higher on the agenda of international organisations and policy makers. With higher importance assigned to science, reliable data on science, and science indicators, are of greater relative importance. The internationalisation of science and science policy is to a large extent influenced by international benchmarking. Such comparisons have an evaluative function as a feedback mechanism on researchers, institutions and policy makers.

For long the OECD was the only provider of international comparisons in this field, playing an important role in statistical comparisons, as-

assessments, analyses and recommendations. National policies have been developed based on OECD statistics and recommendations. In Norway, the best example is the established longer-term goal of bringing national R&D funding relative to GNP up to the OECD average. This indicator could be said to be starting to have a life of its own as the *de facto* international standard, with local policy being interwoven with international policy. Other examples are assessments of a nation's scientific standing in given fields on the basis of scientific publications and how much they are cited. National performance is compared to an international benchmark and deemed high or low, good or bad. Were it not for the international character of science, comparisons such as these would be meaningless. The use of common units of measurement probably implies an increased unification of science policy. Standardisation has also been seen as the new mode of managerial control (Czarniawska and Genell 2001).

The OECD is active in developing indicators. At a ministerial-level meeting in 1995, its committee for scientific and technological policy reached this conclusion: "there is a need for Member countries to collaborate to develop a new generation of indicators which can measure innovation performance and other related output of a knowledge-based economy" (cited in OECD 2001). The EU is also of growing importance as it aims at becoming the most competitive and dynamic science-based economy in the world. Comparative studies have been recognised as a key tool for achieving this goal (Ragnarsson 2001). The EU process of benchmarking represents a new approach; countries will not only be compared to an average, but towards excellence and best practice. The comparative studies are meant to be steering instruments for augmenting the national success of member states and thus the success of the union as a whole (EU 2001e). The EU science and technology (S&T) benchmarking process requires indicators for the measurement of performance, for the identification of best performers, and for the measurement of gaps in relation to best performers. Crucially, the benchmarking process should draw on experience elsewhere and stimulate new thinking about policy implementation. This EU process has given the area a push with its need for statistics for benchmarking the S&T efforts of member countries and competitors. The benchmarking effort gives a feedback to the research community and in this way influences internationalisation. The consequences for national science policy priorities are discussed in chapter 2.

3.9 Conclusion

In this chapter we have discussed several concepts in trying to grasp and explain the increasing internationalisation of research. We have seen that there has been a tremendous increase in international publications and

staff mobility. If we are to understand these changes, it is analytically important to keep the driving forces and their results apart. This is not an empirically easy thing to do, as driving forces and results influence each other. We have identified the background factors as being internal to the research system, such as the universal character of science itself, as well as external, such as the globalisation of the economy, new means of communication, and more awareness of knowledge as a factor important to production.

Network theory provides a useful correction to the hierarchical centre-periphery model, as it provides a theoretical framework in which to examine changing structures in international collaboration. Network theory can be used to explain several aspects of the internationalisation of research as more research is done through such networks. The centre-periphery model is, however, still useful when we consider the stability in the internationalisation of research: to a large extent, the countries that were involved in traditional internationalisation are the same ones that are using new forms of collaboration. In this perspective the hierarchies have not disappeared, though they have loosened up. There is no simple answer to the question of whether internationalisation leads to more divergence or convergence in the world of research. In this chapter we have tried to point to some general patterns and have found that discipline, type of institutions and country size matter.

The perspectives of the knowledge-based society, the triple helix and the national innovation system are all approaches related to the transformation in the relationship between universities, government, industry, and the role of knowledge. Within the research system, external changes have, first, led to more participants in the international research process, more sources of funding, and a changing role for the universities, which are now more entwined in the economy and in society at large. Reduced national public funding for research can enforce internationalisation in the search for alternative funding. Small countries have better chances of joining into the international research processes. In turn, these changes have led to different adoption strategies. Soft disciplines seek internationalisation for other reasons (comparison, ideas) than hard disciplines (the research process itself). Common to them is the belief that international collaboration fosters quality. At the individual level, the chance of enhancing one's reputation, working conditions, family situation and incentives is important to collaboration and mobility. These driving forces influence both bottom-up research collaboration and research done in heavily institutionalised networks.

We have also pointed at factors that slow down the internationalisation of research. One important factor is cost. Poor and, to some degree, small countries have less access to large-scale co-operation because it ties

up huge resources of money and staff. In addition individual researchers may lack funding for scientific equipment and travelling. Other obstacles are ill-defined institutional responsibilities, the force of specialisation, and the fact that essentially national topics may be of little international interest. Considerations of business confidentiality can also prevent the diffusion and international sharing of research results. The current changes in the internationalisation of research are again experienced and explained differently depending on which cultural dimension that is emphasised: political, economic, academic or civic culture.

An overall conclusion to this chapter: knowledge about some of the aspects of internationalisation of research is fairly well established, though there are lacunas in our knowledge about other aspects. Our knowledge is best about aspects on which quantifiable data are available (such as bibliometrics, funding of international programmes and big science) and about reasons for and mechanisms of international collaboration on the institutional or individual level. On the other hand: robust indicators that allow international comparisons are still to be developed.

In general, there does not seem to be much firm knowledge on the amount and consequences of international mobility. As for theoretical approaches, most studies are informed by general social science theories; we have not encountered theoretical elaborations specific to the internationalisation of research.

3.9.1 Questions for further research

Norwegian research has had strong affiliations to the US in the post-war years, but during the last few years, evidence has emerged that suggests a reorientation towards Europe, probably as a consequence of the process of European integration. In future studies we will investigate this possible reorientation and examine if there are significant changes in the international relations of Norwegian R&D. One possible development could be that policies at the institutional level are converging as a consequence of the development of a closely integrated and interdependent research system throughout Europe. As a consequence the individual researcher will have fewer alternative ways of handling international relations. Converging policies combined with formalised rules for international collaboration can restrict individual researchers' options. On the other hand, active internationalisation policies can open up new options. Convergence or divergence is dependent upon how Norwegian institutions interact with institutions abroad and eventually why changes in these relationships have come about. Using a network approach, we will try to piece together a picture of the current international orientation of Norwegian research institutions, measured through financial inputs and collaborative efforts yielding co-authored publications.

Research being an ever-more important factor for economic growth, we also expect international competition to be an important aspect of internationalisation. Consequently we assume that international competition and collaboration are both mechanisms that give rise to new networks. With closer international collaboration and more competition emerging, we are concerned about how these factors will affect norms and values in research and the way researchers operate in an international context. Do Norwegian researchers perceive themselves as actors in the market, fighting for visibility on the international scientific scene or do they think of themselves as nodes in a network of peers? Are norms and behaviour mainly of a collaborative nature, or are they oriented toward competition? We will approach these questions in a study at the level of individuals.

4 The international dimension of higher education

Åse Gornitzka

In this chapter, we will start out by presenting and discussing the main contributions of the research-driven literature on the internationalisation of higher education, identify some major characteristics of this literature and the issues it raises. We will then organise our presentation according to the ‘objects’ of internationalisation and not according to the analytical perspectives that have been used to study the international dimension of higher education. We chose this approach because we feel that this literature is generally deficient in its explicit treatment of the analytical frameworks. Furthermore, the international dimension of higher education includes several processes and structures that potentially affect nearly all aspects of higher education, such as students’ learning, curriculum development, funding, quality assurance, organisation of higher education, staff development, and rewards. We will discuss some of these major aspects of higher education from an international perspective.

4.1 Internationalisation as a theme in the research on higher education

Internationalisation of higher education is not a new policy issue or a new research topic. In the late 1980s and early 1990s, notably the attempts of the European Commission at developing a supranational higher education policy led to a growing awareness in the member states of the importance of the international dimension of higher education. The member states rejected the Commission’s attempts, but most European countries have developed their own internationalisation policies and programmes. The signing of the Bologna Declaration by thirty European countries could also be seen in this light: as an effort by nation-states aimed at keeping control over the internationalisation of their higher education systems.

On the research side, several books and articles published over the past 10 to 15 years explicitly or implicitly deal with the internationalisation of higher education. A search in the Social Science Citation Index gave about thirty hits using “higher education and internationalisation” as

search term; this database yielded almost twice the number of articles when “internationalisation” was replaced with “globalisation”.

In 1990 it was predicted that internationalisation would become one of the core themes of higher education research and in higher education policy (Enders and Fulton 2002, introduction). In terms of policy interest and attention, this prediction has turned out to be not far off the mark. However, there are certain ‘missing links’ in the policies as well as in the research on internationalisation (van der Wende 1997a). Especially when it comes to theory-driven research and the development of analytical frameworks, the research field has not followed suit. Internationalisation cannot yet be said to represent a core theme in the most highly-cited work on higher education research. Some of the best work in this field dating from the 1980s and 1990s has a comparative focus, however with the national system as the unit of analysis. An instance of this: in his seminal *The Higher Education System*, Burton Clark (1983) made no direct reference to the international dimension of higher education. More recent work has explicitly referred to global trends instead of internationalisation as a background for understanding and analysing other phenomena of change in higher education, e.g. the link posited by Slaughter and Leslie (1997) between globalisation and marketisation of higher education.

Furthermore, the attention given to the internationalisation of higher education is not equally strong everywhere. In western higher education, this issue has been of much more concern to European policy makers and researchers than to their North-American colleagues. For instance, in the most recent volume of *Higher Education – Handbook of Theory and Research* (Smart 2002), a U.S.-based publication, internationalisation is not listed in the subject index, nor was any related term (e.g. globalisation). In the sixteen volumes that have been published in this series, only two chapters have titles that include the terms ‘international’ or ‘global’ (Lulat and Altbach vol. 1, Fishman Vol. XV). The US research tradition has been more focused on the issues of international education rather than on processes of and policies for internationalisation of higher education (De Wit 2002:210)

4.2 The national focus on internationalisation

The most widely adopted approach to the internationalisation of higher education is from the perspective of single national system. Quite a large number of publications have proceeded from the notion that internationalisation is a topic that is best examined at the level of the national system, in particular from the perspective of national policies and programmes for the internationalisation of higher education. Some of them will be introduced in the following. This body of literature is rich in descriptions of

what countries have been doing with respect to internationalising their higher education systems, and rather less advanced in its development of analytical frameworks and conceptualisations.

A European study carried out under the auspices of ACA (Academic Cooperation Association) and led by Kälvermark and van der Wende (1997) is a good example of a study of internationalisation with a national-level focus. It compiles overviews of internationalisation of higher education in several Western European countries; as such it serves as a reference for anyone interested in these issues in the countries included. It also offers important observations on more general trends and developments based on a comparison of national policies. First, the authors identify a shift during the 1990s in the *arguments* for national governments to move towards internationalisation, from cultural and academic rationales to increasing weight being placed on economic rationales. This development is more pronounced in some national systems than in others. There does, however, seem to be some kind of policy convergence with internationalisation seen not merely as a process that promotes academic standards, peace and cultural understanding, but also as a means of promoting the international competitiveness of nations in an increasingly globally interconnected world economy and among knowledge-based societies. In addition, Kälvermark and van der Wende observe that several countries are widening the geographical scope of their efforts: they extend their international co-operation beyond the multilateral interaction with other EU countries. Finally they indicate that national-level internationalising efforts are more and more linked to institutional-level activities. According to this study, during the 1990s European governments extended their repertoire of national policies and programmes for internationalisation in terms of rationales and activities, geographical scope, and involvement of actors at different levels. Van der Wende's update in 2001 of this study further underlines how the economic rationale has gained importance. She also suggests that the gap between policies for internationalisation and general national policies for higher education is narrowing.

The publications cited above are important because they try to go beyond 'parallel single-nation presentations' in offering more general observations on policy trends. Still missing is an analysis not only of common trends in policy, but a systematic analysis of possible dissimilarities between nations in this field. Interesting avenues of study could be pursued within the spectrum of national idiosyncrasies. Examples of this are the strong transatlantic traditions in the Norwegian academia after the Second World War and the Spanish experience of internationalisation as a "hypothesis rather than an outcome" (Peach 2001): the implementation in

Spain of a professed interest in the international dimension has certainly not gone far.

Studies outside the European context on national policies illustrate several recurring themes in spite of the fact that these higher education systems have quite different traditions from those of Western Europe. An example is Horie's study of the internationalisation of Japanese higher education (2002). Her discussion of the development and impact of Japanese policies provides a fascinating account of how an inward-looking system of higher education starts to turn towards the international dimension almost entirely on account of long-term government initiatives and plans. First, the word used in Japanese for internationalisation has a distinct meaning that implies a process of change for the better, from an imperfect state of affairs that does not meet international needs (Horie 2002:65). In this sense, internationalisation points in the direction of 'self-reform' or changing oneself because of international influences. In the Japanese context and as early as in the 1980s, internationalisation was seen as a way of improving the quality of higher education. The policy was based on cultural (promoting intercultural understanding), academic, and economic arguments (contributing to the internationalisation of economic and social systems). It was launched in 1983 with its initial focus on quantitative aspects of internationalisation: how could Japanese higher education attract more international students?¹ Even though one only came half way towards the numerical target, the government plan initiated changes in many Japanese institutions as well as at the system level, including changes in government funding of higher education. Japanese universities strived to internationalise their curricula and the government provided scholarships for international students. Government regulations were significantly changed in order to meet higher targets for the number of international students: strict and cumbersome visa regulations for foreign students were relaxed and the share of foreign students became a formal criterion for whether or not the ministry (Monbusho) would approve new departments or faculties (Horie 2002:71). However, the effects of the internationalisation initiative were not linear and straightforward and the general economic set-back in the 1990s in Japan had a severe negative impact, not only on the funding available for internationalisation programmes, but also on the general attractiveness of Japanese universities for foreign students.

A general point to be inferred from Horie's study supports the assumption that internationalisation policies and higher education policies are becoming more interconnected in national systems. In the Japanese

¹ A specific numerical target was set for the initiative and the entire internationalisation policy was named after that target, "100,000 by 2000"

system, for example, the effects of policy initiatives towards internationalisation reached beyond the mere goal of attracting more international students as it strengthened general reforms within institutions and at the system level. Also in that sense the Japanese case underscores the need to look at the internationalisation of higher education *in context*. National and international developments in the organisation, steering, and funding of higher education in general are important for understanding the policy and practice of internationalisation. While this implicitly refers to all countries, some governments explicitly emphasise this ‘interconnectedness’ in higher education policies.

Finally, the focus in various nations on internationalisation serves to highlight one important analytical dimension: the role of the nation-state in these processes. As early as in 1991, Kerr identified what he called two laws of motion in higher education: the further internationalisation of learning and more interest among nation-states in the conscious use of institutions of higher education in furthering policy priorities. Kerr states that the commitment of institutions of higher education to advancing universal knowledge makes them essentially international institutions, “yet they have been living, increasingly in a world of nation-states that have designs on them” (Kerr 1991:17). However, internationalisation has also become one of the purposes that national governments ascribe to higher education, whether as an end in itself or a means to achieve other ends. That is all the more reason to be aware of the possible dilemma of national purpose versus what tends to be regarded as the *inherently* international dimension of higher education. Furthermore we should take heed of the possible *dependence* of the further internationalisation of higher education on national policies and arrangements, or the possible *erosion* of the importance of the national level for higher education as it is facing increasing internationalisation or other forces of change.

4.3 Mobility: travelling students and staff

For long, internationalisation was in point of practice equivalent to student mobility. It is still at the heart of what is meant by internationalisation of higher education. As remarked by Kälvermark and Van der Wende, the policies for internationalisation among European states are still predominantly supported by traditional instruments of student mobility (Kälvermark and Van der Wende 1997:260). Student mobility basically includes two different forms: on the one hand, so-called free-movers, students who pursue and finance a study abroad on a private, individual basis, with some government/sponsor support or entirely at their own cost; on the other, foreign students on organised, planned exchange programmes.

What really brought the issue of internationalisation to the top of the European agenda on higher education were the student exchange programmes launched by the EC, especially the ERASMUS/SOCRATES programmes. Similar internationalisation programmes were also introduced outside the European area, such as in the Asian-Pacific region (UMAP in 1991) and ISEP for transatlantic student mobility. An important background for the EC's development of student mobility programmes was the limited formal basis of action for the EEC/EU (see chapter 2). Mobility programmes are an arena in which the EU can act without trespassing national sovereignty (de Wit and Verhoeven 2001). The Maastricht Treaty on the European Union did include two articles on education; one of them specifically mentions mobility as an area of action.

Community action shall be aimed at encouraging mobility of students and teachers, inter alia, by encouraging the academic recognition of diplomas and periods of study. (Union Article 126(2)).

The Community supported this article through the SOCRATES programme, an extension of the ERASMUS programme that was launched in 1987. To facilitate the recognition of periods of study abroad, the European Credit Transfer System (ECTS) was introduced. EU student mobility programmes were seen as a powerful means towards the creation of an internal labour market for professionals and qualified workers. But the EU also sees the promotion of student mobility as a way of creating a “European attitude” among its citizens (Van Damme 2001:419), assuming that it will create a cultural glue that could bring Europeans closer together.

The assessments of student exchange programmes have had an important trigger effect for research on the internationalisation of higher education. Much of the literature on student mobility exists in the shape of overviews and statistics on foreign students from the OECD and UNESCO, in the USA also from some national agencies². These data focus, for instance, on “import/export” of free movers and students on exchange programmes. Increases in the number of foreign students and changes or stability in geographical patterns of student mobility are fairly well documented. What the assessments of the EU programmes provided in addition to statistical overviews, was an added qualitative dimension such as motives for studying abroad, “rates of return”, and student experiences (Teichler and Steube 1991, Barblan *et al.* 2000).

While in the European context the EU student mobility programmes have proved their worth, the mobility across borders of free movers and students who take their degrees at foreign institutions is of equal if not

² See “US Open doors” <http://www.opendoorsweb.org/index.html>).

greater importance. In 1991, the experience of these students/graduates of in-school learning and post-degree career outcomes was seen as a lacuna in the knowledge in the field (Wagner and Schuster 1991:281–283); this is still arguably the case. Despite the advances in the factual knowledge about student mobility, there are surprisingly few attempts to build analytical frameworks that link this area of research to the general conceptual developments in the humanities and social sciences. The driving forces behind student mobility and student choice are poorly understood; the same goes for the consequences of cross-border ‘studying and travelling’ for the students themselves and for national and international labour markets.

4.4 Internationalisation of curricula and learning

As we may conclude from the previous section on student mobility, studies of the internationalisation of higher education have tended to focus on the most visible aspects of processes and activities. Also in internationalisation policies the more tangible activities seem to have been prioritised, there is much less explicit interest in the more intangible and qualitative aspects. One such area is the internationalisation of curricula and the learning experience. A major reason for the limited policy attention could be that it has been less conspicuous at a policy level, nationally or internationally. For instance, the Maastricht treaty on the European Union defines the community’s role as one of encouraging co-operation between member states and of supporting and supplementing member state action that results in such co-operation. However, the community has no mandate to interfere with what is taught in schools and universities, how it is taught, and the method(s) of assessment used in individual member states (Sullivan 2002:66). Curriculum development and teaching and learning are either areas with a high degree of institutional autonomy or they are left to the sub-institutional level or the individual level.

What does it mean, internationalisation of the curriculum? Again we can see that the international dimension covers a range of activities also with respect to this core aspect of higher education. It could for instance mean adding something international to the existing curriculum, such as cross-cultural skills and enhanced intercultural standing as part of a subject to be taught. The concept could also include attracting foreign students through an international language of instruction or special curricula for foreign students. Increased attention has been paid to efforts to internationalise the curriculum, ‘simply’ by changing the language of instruction and thus ‘denationalise’ degree courses for domestic and foreign students alike (Haigh 2002). For instance, the Academic Cooperation Association is currently making an effort to get an overview of foreign language

programmes offered at European universities. Finally, adding an international dimension to the curriculum could also refer to importing up-to-date curriculum contents. Some professional organisations that are collaborating across national borders have traditionally tried to harmonise curricula internationally. Such harmonisation of curricula has become an issue as it can be seen as a basis for achieving international recognition of degrees (van Damme 2001).

Internationalisation of curricula and of teaching and learning also raises a range of interesting issues that go beyond the mere listing of increases in the number of English-language degree programmes in non-English speaking institutions or the like. Some have, for instance, raised the question whether the internationalisation of curricula can be seen as a possible source of 'cultural imperialism' by which the Western curriculum is becoming a global standard that does not take heed of local needs and cultures (Edwards and Edwards 2001:86). In this sense the universities' efforts to internationalise the curriculum could be seen as contributing to a global cultural homogeneity that holds a Western bias (see next section on development and chapter one). Similar concerns have been voiced with respect to the consequence of policies that stress the importance of international publications, and thus create a push towards publishing in a specific, for many academics foreign, language, notably English. Especially in smaller language groups and within disciplines with specific local and national traditions, it is argued that an international publication policy is damaging for the academic discourse, producing homogeneity and denial of cultural heritage. And that eventually will have consequences for the content of teaching programmes within these university disciplines, as well as for links between research and public policies (see e.g. Smeyers 2000).

Generally, there seems to be little systematic knowledge that can get us closer to an understanding of the internationalisation of these core processes of higher education. Especially when it comes to the issue of the *consequences* of internationalisation in the epistemological sense and in terms of the students' learning experiences, and also with respect to the transition from learning to the world of work (see above), curricula, and teaching and learning, is a highly salient area in the study of internationalisation of higher education.

At a policy level, the interest in qualitative aspects of internationalisation has increased recently, especially in Europe. Policy developments have put these aspects on the agenda. Though the student mobility programmes in the European arena were mainly run by the EU, during the 1990s the transparency and quality of higher education became areas of intergovernmental and inter-institutional attention, especially in the framework of the Bologna process. We can see internationalisation of

curricula as a major theme linked especially to the policy issue of mutual recognition of degrees and diplomas. The recognition of foreign degrees and diplomas and the issue of credit transfer are core items on the European policy agenda. There is arguably a 'missing link' between the practical and the political interest in aspects of internationalisation of the learning experience. A recent article by Sullivan may serve to illustrate this mismatch. Sullivan (2002) laments the lack of comparative studies and conceptualisation of the assessment of teaching and learning, whereas his own contributions is a discussion of the adequacy of the European Credit Transfer System, based on an analysis of interview data where $N=1$, i.e. the experience of one student. Clearly the issue of the international comparability of the curriculum and teaching and learning experiences at the level of individual study programmes is a huge research task. And this is an area where the international arrangements that are being developed are lacking a knowledge base that policy makers can draw on.

However, the qualitative aspects of internationalisation are important not only for specific European developments. Questions of 'market information' turn up also in relation to the growing international market for higher education (see below), the internationalisation of curricula and learning, and the international comparability of quality standards. How can we tell what are good and what are mediocre study programmes when teaching and learning are offered without the traditional nationally-based frame of reference for quality assessment? On the research side, international recognition as a measure for quality has been a long-standing practice in most national university systems. Clearly with the rise of an international market for higher education the formal rankings that are published internationally from time to time function as a source of market information for prospective students and as ammunition in the public relation efforts of institutions that want to profile their activities on the international scene. In the case of Australia, one observer reports a gradually diminishing importance of national "parochial" rankings compared to international rankings (Poole 2001:404).

International quality rankings or other indications of the relative international rank of institutions are not merely important for institutional market positions, be it on the domestic or the international arena, they can also be used to signal how effective institutions are in meeting their goals. University mission statements seem increasingly to incorporate an international reference – it has practically become standard practice – such as "We want to be among Europe's top ten institutions" or "We want to be an international class university". A core idea is that exposure to an international environment improves the quality of teaching and learning. In addition, international connections have also become a hallmark of a good study programme or institution and can attract foreign students and

possibly also teachers. In that sense the international connections of an institution or study programme have become a proxy for quality.

4.5 Internationalisation and development

In many countries, the internationalisation of higher education in its earliest forms came in the shape of student mobility, or 'import', from the developing world to systems of higher education in the developed world. In countries such as Norway, Sweden, Denmark, the Netherlands and Germany, this form of student mobility has been an established part of development aid policy, and is still very much alive as a dimension of the internationalisation of higher education. In several of these countries this policy is disconnected from general higher education policies, run as it is by ministries of foreign affairs and aid agencies. Student scholarship programmes support a large number of foreign students from third world countries.

For Western countries with a past as colonial powers, the international dimension of higher education not only implied the import of students from their former colonies but also the export of their systems of higher education to the same. The present-day systems in many former colonies have paramount features of the higher education systems of their former colonial rulers, as can be seen in former Portuguese, French and British colonies in Africa. The consequences of this type of internationalisation of higher education thus remain with us today (Castells 2001).

Internationalisation of higher education in the context of development, however, contains several interesting dimensions that have been studied in the context of 'development research' rather than as a part of mainstream higher education research in Europe and North America. When the effects of globalisation on developing countries are on the agenda, higher education is also an item (see e.g. Cloete *et al.* 1997 and Muller *et al.* 2001). The international dimension of higher education is thus fitted into North-South issues, such as the relationship between internationalisation of higher education and reinforcement of elitism and inequalities at various levels (e.g. Scott 1998a), forces of global capitalism, cultural and language hegemonies, and so on. At a national policy level, a long-standing concern has been the issue of 'brain drain' versus 'brain gain' between centre and periphery: attempts are made at designing programmes that ensure 'guaranteed return' of student and staff that take part in organised mobility efforts. In this chapter, we cannot do justice to the range of issues that the internationalisation of higher education and development might encompass and to the body of literature in this field. However, we discern that several of the issues raised in the literature are salient for developing countries, maybe even more so than for cross-

border activities within the developed world. The issues raised in the next section are particularly pertinent to many developing countries. How will third world institutions and higher education systems be affected by a growing international market for higher education? Will former linkages between centres and peripheries be cut off and third world institutions be left out in the cold when international interaction in higher education is increasingly driven by competitive or pre-competitive concerns?

4.6 International markets and transnational education: new actors, changing markets

As we have pointed to with respect to European higher education, there is a marked shift in the direction of a policy for internationalisation based on an economic rationale. An overall shift from a focus on co-operation across borders to competition across borders is not limited to Europe as a region or to the level of national policies. Probably this shift is one of the most, if not *the* most, profiled feature of the 'new' face of internationalisation of higher education (cf. chapter 1). This trend should be interpreted in the context of more weight being attached to marketisation and commodification in many systems of higher education. A common view in much of the literature on the 'new' forms of internationalisation is the link between marketisation and internationalisation, in which the driving forces are seen as market-based imperatives (cf. Altbach 2002:7 among others). National, mainly public institutions are facing more competition for higher education delivery both nationally and internationally. This creates negative and positive incentives for the institutions to seek new sources of income, and they are increasingly looking to the international market for higher education. Some nations are far more trade-oriented than others in their policies, especially towards foreign students. France and the UK have, for example, long-established traditions of attracting foreign students to their institutions of higher education. Both have operated on an international 'market' for foreign students in an organised manner for a long time, for instance through organisations such as *Alliance Française* or *the British Council*. Compared to France and the UK, the currently most ardent actor on the international market for foreign students, Australia, is very much a newcomer (Edwards and Edwards 2001). The case of Australia can probably be seen as the symbol of the changes that are going on in the international market for higher education, in terms of volume and in the relationship between demand and supply.

The opening up of an international and transnational market for higher education is attracting increasing attention also from higher education research; see for instance Barrow *et al.* (2002), Barrow and Maassen (2001), Denman (2001), Jones (2001). There is also a distinct policy-

oriented interest that has produced several contributions in which trends and developments specifically directed at policy makers and actors in higher education are identified (e.g. Adam 2001, Mallea *et al.* 2001, Marchese 1998, Trondal *et al.* 2001). Several of these contributors try to identify what is meant by an international and transnational market for higher education, to distinguish between the many different configurations that this market is made up of, and to identify the actors that are operating on it.

First, a core feature of the international market for higher education is *student mobility* and the heavy marketing efforts to attract international students. There is nothing novel about students travelling to get their education outside their home country, but the active marketing of higher education programmes for the purpose of profit for the providers of these programmes has grown remarkably over the past two decades. Focused recruitment is increasingly a part of institutional strategies (Scott 1998). Projections suggest higher total demand for higher education worldwide and we may assume that this demand will not solely be met in a strictly domestic setting; it is reasonable to assume that foreign institutions will to a large extent absorb this expansion. In particular, we should note the entry of students from populous nations such as China and India in the international market. There are also, especially among so-called newly industrialised countries, inadequacies in the domestic higher education systems that make students from such countries particularly prone to enter the international higher education market. This could change the demand dramatically. In the 1990s the collapse of the Soviet Union could also be identified as a major source of restructuring of the international higher education market, the countries that evolved from the former Soviet Union were not serious competitors as host destinations for Asian and African students. Furthermore, it should also be noted that former colonial links are not as prominent for channelling student flows as before (Scott 1998). Jones (2001:108–109) identifies some overall characteristics of the new international student body: it is Asian, adult (over 23), and composed of first-degree holders with an immediate or impending unemployment problem. These students often seek technology-related courses and pay the tuition fees by their own pocket.

The literature thus argues that we are faced with an international market for higher education in which the patterns of demand are significantly altered. There is also a noteworthy change on the supply side with the proliferation of new modes of delivery and especially the type of supply that is often referred to as transnational higher education.

What is meant by *transnational* education? In its wider definition it denotes any teaching or learning activity in which students are in a different country (host country) from that in which the institution providing the

education is based (the home country). As opposed to traditional international education, national borders are crossed by information about education, by staff and/or educational material (Jones 2001:113). Several different forms of transnational educational delivery can be identified, such as transnational *distance education* and transnational *virtual delivery*. They also include the establishment of *branch campuses* – higher education institutions that extend their educational supply to promising markets in other countries by setting up local campuses under the full authority of the mother institution, and finally *franchising* of higher education institutions in other countries. The international market also includes the many corporate educational programmes that exist in a transnational setting. These are some of the forms of delivery that are present on the transnational market³.

The transnational market is complex and non-transparent, as it includes the delivery of degree programmes on onshore or offshore locations in partnerships with foreign higher education institutions, private associations and private corporations, transnational university networks in various forms and collaborative degree programmes with universities and business enterprises abroad, often delivered through distance education technologies. Further complexity is added by actual transnational *mergers* between institutions, e.g. the one between the Limburgs Universiteit Centrum in Belgium and the Universiteit Maastricht in the Netherlands.

Some aspects of the transnational market for higher education give the national systems a new role. Several arrangements at the institutional level are made “within the space of autonomy left to the educational market, therefore leading to possible confusion with a system level responsibility in higher education, especially if they transgress national procedures and frameworks for educational planning, and systems for recognition of degrees, etc.” (van Damme 2001:426). Clearly this development puts pressure on the established national regimes for higher education and it has already proven to be hard for educational authorities at the national level to come to grips with it (see e.g. Guri-Rosenblit 1999 on the Israeli case). Such consequences of internationalisation are not new and solely linked to the marketisation and commodification trend. In systems such as the Dutch and the Norwegian, domestic institutions have used bilateral agreements with institutions in other countries to bypass the restrictions set by national authorities, for instance, when colleges have been inhibited from offering post-graduate education.

However, some new challenges that national systems face with respect to the international and transnational markets may be observed.

³ See e.g. van Damme 2001:425-426 for an overview of different forms of transnational higher education delivery

First, there are several uncertainties involved as to how the overall international trade regimes will eventually affect higher education (Barrows and Maassen 2001). Second, there are several financial and legal aspects that need to be clarified when increase in volume and changes in composition of the international market for higher education cease to make it a marginal phenomenon (see also Trondal *et al.* 2001).

The extent to which these developments actually permeate different higher education systems is arguable. What is unquestionable, however, is that these developments increasingly put pressures on the institutions to respond and act. This is the theme of the next section.

4.7 Internationalisation and the institutions of higher education

There is a growing internal and external expectation for higher education institutions to act strategically; more and more they are called upon to seize a more active, even 'entrepreneurial' role (Clark 1998, Gornitzka *et al.* 2001, Musselin 2001). Internationalisation is one area in which considerable attention is given to the institutions as strategic actors; several initiatives in internationalisation have an embedded or explicit requirement of 'organised response'. In national, international and supranational initiatives there is a trend towards constructing programmes that require or intend to inspire concerted institutional initiatives. Internationalisation is seen more and more as a process related to the *strategic orientation* of higher education institutions. For example, the programmatic and procedural changes that were made when the EU's ERASMUS programme became a sub-programme of SOCRATES implicitly challenged the institutions of higher education to develop a coherent set of goals for engaging in European activities, to strengthen the responsibility of the central level, and to develop the strategic thinking of the institution (Barblan *et al.* 1998:10).

In the higher education research literature we also detect a similar interest in institutional level action in the area of internationalisation. Some take the institutional level as an explicit reference point; other studies have a more implicit expectation concerning the relevance of the institutional level, as can be noted from many of the studies referred to earlier in this chapter. For instance, the Japanese study referred to earlier contains some interesting observations on the relationship between policy development and institutional action. Horie (2002) notes that the higher education institutions in Japan varied considerably in their response to the focused internationalisation policy promoted by the government. She describes in particular a set of universities that were active and positive in implementing the policy. A common characteristic of these institutions

was that they saw government policy and the mixture of initiatives and implementation levers that were used as an opportunity not only to attract foreign students but also to enhance their position in the *domestic* student market. However, not all Japanese higher education institutions responded in the same manner. Another interesting observation made by Horie is how governmental pressures has consequences for internal power relationships and organisational structure when the government's policy on internationalisation served as an aid for administrators of international education to promote internal university reforms (Horie 2002:75). In addition, there was a significant professionalisation of such administrative institutional services and structures in the wake of the government's internationalisation initiative.

In the European context, evaluation studies, especially of the international mobility programmes, give insight into how institutions act and respond to challenges of internationalisation. The evaluation of the ERASMUS programme identifies as one of the major contributions of this programme the establishment of internationalisation as an important policy issue at the institutional level: "... dedicated academic and administrative measures for Europeanisation and internationalisation of higher education are generally viewed now as essential for a dynamic institution of higher education" (Teichler and Maiworm 1997:202).

There is also a vein in the higher education literature on internationalisation that belongs to the 'strategic management literature'. This refers especially to the Anglo-Saxon setting where universities and higher education institutions have been for a number of years international 'entrepreneurs'. For Australian universities, export-oriented activities have come to represent significant sources of revenue, as is illustrated in a case study done by Poole (2001):

Australian universities currently receive on average around eight per cent of revenues from these sources, with some depending on international entrepreneurialism for as much as one-third of revenues. Managing these activities in an efficient, effective and sustainable manner has thus become critically important to virtually every institution in the Australian higher education sector (Poole 2001:395)

Poole refers to the suggested need to link institutional approaches to the internationalisation of universities and general strategic management models for businesses (Poole 2001:397–400). Clearly, the competitive and profit-seeking practice of internationalisation in Australian higher education has made this an obvious link as an "aid to institutional leadership" in the institutions' quest for a successful exploitation of the international demand for education. An aim of the type of research referred to would typically be to identify critical success factors, or best-practice models,

more than to identify theoretically derived critical explanatory factors, or models for explaining changes in the strategies or practices of internationalising higher education.

Such studies can nonetheless reveal some interesting results of a more general character. For instance, Poole's case study of four institutions indicates that institutional entrepreneurial activities in a competitive market for international higher education have had structural implications for these institutions. There has been a gradual move away from highly decentralised structures towards partial control via centralisation (Poole 2001:424). This shift is occasioned, amongst other things, by the particular types of internationalisation activities that these case institutions are getting involved in. In addition to the 'traditional' approach of attracting international students to the main campus, these case institutions are getting more and more involved in a diversified mode of internationalisation, including attempts at increasing their number of international students through off-shore expansion, i.e. establishing campuses abroad, entering into partnerships, university centres and distance education. These activities demand more centralised and institutionally based support systems. With respect to the experienced international universities, Poole reports that there has been a significant trend towards a professionalisation of internationalisation that requires the development of several management competencies (Poole 2001:430–433).

Parts of the literature in question are focusing on those aspects of internationalisation that are rapidly becoming relevant dimensions in the assessment of curricular and institutional performance, hence there are several studies that try to delineate ways of developing and using indicators for internationalisation at the level of the curriculum, the department and faculty, and whole institutions. From our perspective these are interesting, because they can be used to find 'operationalisations' of internationalisation. For example, when one tries to find indicators for internationalisation within French business schools as a management instrument (Échevin and Ray 2002), core aspects of internationalisation are revealed, though in general these types of study do not go beyond the mere measuring of "how internationalised are you"?

The attention given to for-profit types of internationalisation in much of the literature almost overshadows the fact that many higher education institutions outside the Anglo-American-Australian sphere have engaged in serious internationalisation efforts that are *not* primarily motivated by the possible financial benefits. Several Norwegian studies clearly indicate that Norwegian higher education institutions seek to internationalise their activities mainly in order to ensure that they meet international quality standards in teaching and research (Olsen 1999:113–114). Some of the activities can even be seen as institutional cost items rather than a source

of revenue – at least in a short-term perspective – as has been the case with some of the institutional efforts in the ERASMUS programmes (Smeby and Wiers-Jenssen 2001).

A common feature in many of the institutional rationales for internationalisation is the view that the degree of internationalisation is linked to the status and quality of the institution. Geuna (1998), for instance, argues on the basis of a cluster analysis of universities in the European Union that there is a polarisation taking place in the European university system:

The polarisation of the university system suggests that only a restricted group of elite research universities will go through the institutional adaptations to the changing environment, while managing to retain a few of the important features that historically have characterised the university. The majority of institutions currently identified as universities, both research and teaching institutions, will be marginalized by the changes. Pushed by government policy to satisfy the current needs of mass higher education and industrially oriented research, they will tend to increase their national or local focus and be little influenced by changes in the international production of knowledge. (Geuna 1998:267)

Geuna sees the new opportunities that are created in the international arena as producing a Matthew effect in knowledge production. This is, for instance, the case when the institutions that receive large sums from the national research councils are also the ones that receive the largest proportion of the funds from the European Commission. Geuna concludes his study by predicting an increasingly clear-cut division between a small group of dynamic research universities and a large group of mainly teaching-oriented institutions. This will be a result of the dynamics between national forces and international trends (Geuna 1998).

Based on the above considerations it can be argued that the institutional level should be a prime level of research in the study of the internationalisation of higher education. This refers both to the motives and rationales of what actually constitutes the activities of internationalisation and the consequences of the increasing internationalisation of higher education.

4.8 Conclusions

One of the most striking features of the international dimension of higher education is probably that the saliency of this dimension as a policy issue at several levels is not matched by its importance as a research theme. In general there is a lack of a significant body of research-based analysis. The situation with respect to student mobility is an example of this mis-

match. Factual information abounds on student mobility, such as the number of students involved in exchange programmes or the number of foreign degree students. There are several sources of information, especially international organisations, both intergovernmental organisations and international associations of various sorts that organise institutions and sub-national organisations in higher education. National sources of student mobility statistics are well developed in many countries, and also the higher education institutions themselves increasingly provide information on the number of foreign students that they host. We cannot assess the quality and comparability across time and systems of such information. However, what we can see is that the descriptive overviews of the volume of student mobility are not matched by a thorough tradition of analysing why students are increasingly moving across national borders or what determines the patterns of travel. That is even more clearly the case for the lack of analysis of the consequences of student mobility for the students themselves and the systems and institutions that they leave or enter.

The interest in the international dimension of higher education is not likely to fade in the near future. There are clear signs that higher education institutions increasingly are assessed with respect to their 'degree of internationalisation', even to the extent that this becomes a formal criterion for funding. It can be expected that this will spur a greater effort to operationalise the international aspects of higher education activities.

Furthermore, our brief look into the literature on internationalisation reveals that many aspects of higher education, teaching and learning have an international dimension. As such, the study of the internationalisation of higher education is potentially a vast area of investigation. At the moment, what seems to be covered best is studies and assessments of student mobility and national as well as European internationalisation policies. There is, however, little general conceptual consensus when it comes to the meaning of internationalisation (or globalisation), although these concepts are quite frequently used (cf. chapter 1). We may detect a slight tendency of bypassing conceptual discussions and clarifications. Lack of consensus is not a problem in itself, but avoiding the issue altogether is a source of concern, at least if one is interested in venturing into a scholarly analysis.

Research on the internationalisation of higher education is dominated by policy-oriented descriptions that are of value as attempts to record emerging trends. This research has a focus on single nations or single programmes. Some publications that have been used by many other researchers interested in the topic are surprisingly parochial in the way they treat the core issues of internationalisation (and globalisation). This is especially true for the Anglo-Australian literature that has taken as a point

of departure the market-driven and financial imperative of attracting foreign students as the decisive aspect of internationalising higher education. This has not served to conceptually clarify the research theme, nor helped us gaining more general insights into the international dimension of higher education.

It could be argued that there is no theoretical perspective or analytical frameworks that prevail in the study of internationalisation of higher education. Other areas of research in higher education have profited from being fertilised by general social science literature, e.g. Clark's work on organisational sagas and co-ordination, the higher education policy literature (Maassen 2000). Similar emphasis on developing analytical frameworks for the analysis of internationalisation has so far been absent. Maybe this has to do with the state of the art in the general 'globalisation' literature that is not noted for its conceptual and analytical clarity. There are few, if any, theoretically driven or even theoretically flavoured analyses of internationalisation issues that can serve as a role model for studies of this theme.

Why is that a problem? Primarily, this is not a state to be desired because it makes it hard to have a fruitful discussion of, especially, the driving forces of internationalisation. However, it does make it challenging to present a nuanced set of explanations for the variations between systems and institutions and for attempting to develop an analytical framework that can explain developments in the field.

Despite the lack of theoretical frameworks for analysis, this is a research field that shows a lot of promise. Internationalisation is not 'a world apart' but is seriously linked either explicitly or implicitly to other important developments in higher education. As our limited excursion into some of the main publications has shown, there are several themes that are of great interest and relevance for further investigation. Below we highlight some of them. All of these are more related to qualitative than to quantitative aspects of internationalisation.

First, it should be of interest to follow up on the distinction between *arguments* for versus *activities* for internationalisation – what actors at different levels say and what they actually do. As the ideology of internationalisation seems partly to be shifting, there are interesting developments if we look at what governments and actors at the international and supranational level are doing in this area. Notably, there are possible shifts in the arguments for internationalisation that are put forward at the level of the institutions and also in their basic units. The relationship between arguments and activities and the interaction between different levels within higher education institutions stands out as a complex, but interesting avenue of research.

Second, the *consequences* of internationalisation at different levels are understudied but promising areas for further analysis. We have earlier in this chapter underlined the need for a serious research effort to investigate the consequences of internationalisation for students' learning experiences and their transition from learning to work. Also at other levels, the study of consequences of internationalisation is merited. For example, is internationalisation a trend that will strengthen a possible Matthew effect among higher education systems, institutions and academics? Which institutions and academics profit most from internationalisation of higher education? Are they the same, and are these the actors with the highest status nationally? In that sense internationalisation might not be a force that *transforms* higher education, but serve to cement the structures that are traditionally present in national higher education systems. What empirical evidence is there to support this position? What is the 'counter-evidence'? Such questions highlight the possible *diverse* effects of internationalisation, rather than assume that internationalisation carries the same consequences for all actors. Certainly we see the need to keep an attentive eye on the possible diversity of responses to and consequences of internationalisation and not simply assume that internationalisation is one single dominant force of change.

Finally, the relationship between the international and the national is a fascinating area of investigation. Is there an inherent national or international character of higher education? If we avoid separating the analysis of teaching and research functions, should we in line with Kerr (1991) see higher education as doing a balancing act with one foot in the nation-state and the other committed to the universal mission of pursuit of knowledge? The degrees and aspects of internationalisation in different higher education systems might be seen as a consequence of how this balancing act is handled. Is it in fact so that there are two major forces that are tugging at higher education: internationalisation of universities and nationalisation of the purpose of higher education? The processes of higher education, learning and research are becoming more and more international, while at the same time the purposes of higher education are becoming more and more nationalised, with higher education meant to serve with increasing intensity and scope the goals of the nation and of society.

5 What do we know about the internationalisation of industrial R&D?

Magnus Gulbrandsen

This chapter deals with the internationalisation of industrial research and development (R&D) laboratories and activities – generally seen as the core of innovation systems (cf. Nelson 1993). There is no single body of literature that treats this theme. The chapter therefore draws both on the economics of technical change and economic growth, the innovation management/organisation literature, and studies that have a research or innovation policy perspective. I have chosen to include mainly literature that deals explicitly with internationalisation of industrial R&D, rather than books and articles about private R&D and innovation more generally.

5.1 Introduction

Before the late 1980s, the growth and diffusion of foreign industrial research and development (R&D) was only noted by a few academics (notably Ronstadt 1977, Mansfield *et al.* 1979); the theme was not included in many of the central R&D statistics and the OECD *Science and Technology Indicators* of 1989 did not mention it. However, in the 1990s there have been many scientific investigations of the internationalisation of industrial R&D, their main focus being the *motivations* of companies for establishing research and development activities in other countries than their primary base.

5.1.1 A global economy?

Presently there is a lot of discussion about the ‘new global economy’, for instance in the most recent large investigation of national innovation systems (Larédo and Mustar 2001, in which the term is even used in the title). The “triple helix model”, which describes knowledge-based economic development as the result of an interaction between governments, industry and universities, applies the phrase “the global knowledge economy” to illustrate the relational dynamics of innovation (Etzkowitz and Leydesdorff 1997).

Behind these terms, there is a growing awareness that R&D and innovation are processes that to an increasing extent unfold in highly international networks. Traditionally, R&D has been the least internationalised industrial activity when compared to marketing/sales in other countries and manufacturing abroad (e.g. Kuemmerle 1999b; also Narula 2002). Almost all large companies have a much more international sales organisation than R&D organisation (von Zedtwitz and Gassman 2002). With the possible internationalisation of the third important business function – research and development – businesses and their laboratories may become organisations less dependent upon and with fewer perceived obligations and responsibilities towards nation-states. Ohmae (1995) is an example of a widely read author who gives strong normative recommendations to policy makers and business leaders based on a view that nation-states are “dinosaurs” on their way to becoming extinct.

On the other hand, it has been argued that despite the increasing level of internationalisation, firms still tend to concentrate their R&D activities ‘at home’, not least so the multinational enterprises (Pearce and Singh 1992, Patel and Vega 1999, Narula 2002). Although this claim may be somewhat controversial, the authors nevertheless show that many companies depend heavily upon national R&D and educational infrastructure. Not least the opportunities for recruiting the top university or college graduates contribute to the embeddedness of firms in national contexts (cf. Gulbrandsen and Larsen 2000), thus there are forces that pull in both directions when it comes to internationalisation.

5.1.2 Theory, methodology and definitions in earlier investigations

Before starting the thematic sections dealing with the empirical evidence, we should take note of a few theoretical and methodological points. The literature on internationalisation of R&D is relatively weak theoretically, possibly because of the lack of a general and extensively agreed-upon theory of innovation. In addition, the perspective that seems to be the most widely used presently is that of the national innovation systems and the term ‘national’ may be seen as somehow in contrast to the themes of globalisation and internationalisation. Early investigations of expatriate R&D tried to link its development with life cycle theory (Ronstadt 1977), while a few later studies draw on theories of organisational learning (for instance de Meyer 1993; see Niosi 1999 for a review). In many studies, the *typologies* of R&D units, their organisation, goals, motivations etc., constitute the most important theory-oriented tool of the speciality. One example is the distinction between centrifugal and centripetal forces in Pearce (1989).

Furthermore, many of the first studies of internationalisation were based on various types of R&D statistics only, particularly indicators of

R&D funding by source, and a few on personnel. During the 1990s there have been relatively many investigations based on patent data – which mainly have contributed by demonstrating that the internationalisation of industrial R&D and technological development started much earlier than the 1980s. Bibliometric indicators (based on number of collaborative publications etc.) are rarely applied. An increasing amount of studies are also based on surveys (interviews, questionnaires), particularly in large multinational companies. The empirical evidence is relatively strongly biased towards very large corporations. Perhaps naturally, the various indicators yield different conclusions about the ‘level’ of internationality: a company may be more or less ‘international’ if it is assessed according to funding rather than personnel or patent data, and so on.

Implicit definitions of internationalisation often follow from the methodologies that have been applied. Investigations based on funding take increased R&D trading across national borders as the central process of internationalisation, while others use cross-country patent citations as central evidence of the ‘international degree’ of various technologies. It should also be noted that many studies focus only on formally established R&D units, e.g. laboratories that have been set up in another country, rather than international collaboration more generally.

It should be added that a company might be described as international even if its R&D activities are concentrated in the home country. There are also many examples of firms with highly internationalised business functions that nevertheless retain a strong national *identity* (cf. Paoli and Guercini 1997). Little is known about if and how this identity influences the propensity to extend business activities to other countries. More generally, Paoli and Guercini distinguish between *multinational R&D* (having labs abroad) and *international R&D* (cross-national R&D collaboration). A large part of the literature elaborates the former, although the latter is perhaps the more interesting from the viewpoint of a small country with few large multinationals. International R&D can be further broken down into traditional R&D project collaboration, exchange of knowledge through patents etc., structural agreements like joint ventures, and participation in think-tanks and standardisation panels (partly what Godoe (2000) refers to as “innovation regimes”), training of researchers in foreign centres, and finally, recruitment of scientists and engineers from the global labour market.

5.1.3 Overview of the chapter

This chapter is divided into five main sections. First, we discuss the development of international R&D activities in industry. Here we have a particular focus on the geographical aspects, i.e. *where* companies go to carry out research and development and where they come from. The fol-

lowing section deals with motivations and roles/functions: *why* do companies establish R&D units and collaboration abroad? Which types of R&D units can be seen?

In the third part, we discuss management issues that arise from an increased international intra-firm innovation process, particularly the issue of *how* to solve co-ordination problems. The fourth section presents some central policy challenges of increased internationalisation. What can national governments do to *influence* and/or benefit from the development? Finally, a summary is given of the main conclusions, including an attempt at sketching a few key points for future studies of Norwegian industry.

5.2 The growth of international R&D networks in industry

A very general description of the present state of affairs would be that companies are increasingly moving R&D abroad regardless of the country in which they have their headquarters and/or traditional home base, and regardless of the industry in which they work (cf. Niosi 1999). This process follows the pattern of previous investments in marketing and production facilities (Kuemmerle 1999b). For firms based in small industrial nations, market factors (proximity to important customers, large markets etc.) are more important, although the R&D involvements abroad tend to be in the same technologies that the companies master at home (Cantwell and Janne 1999). Firms from larger industrial nations tend to broaden the scope of their technological portfolio. Furthermore, firms from small countries frequently transfer abroad some (or all) of their central R&D capabilities (see for instance Granstrand 1999).

5.2.1 Research is not the same as development

It should first be noted that R&D is not a single class of activities. Few studies have focused on the differences between the internationalisation of research and the internationalisation of development, but those that do find major differences (cf. von Zedtwitz and Gassmann 2002; this is also an underlying theme in much of the literature on the role of foreign units). Research activities, which may be defined as the need for new scientific knowledge and the need to remain 'plugged into' scientific networks and academic centres, are *not* very widely dispersed internationally.

Von Zedtwitz and Gassmann studied 81 large companies representing more than one thousand R&D sites and found that more than 87 per cent of foreign research locations are concentrated in five locations (*ibid.*): north-eastern U.S.A. (New Jersey, New York and Massachusetts), California, United Kingdom, western continental Europe (especially Germany)

and the Far East (Japan and South Korea). Development activities are much more dispersed. The major centres are still the same, but the development locations are more evenly distributed among European countries and north-eastern U.S.A. and they extend into Southeast Asia, Australia, Africa and South America. Only about half the development sites are located in the eight most development-intensive countries. This also means that some companies have separate (geographically) research sites and development sites, even those oriented at the same technology etc., despite much current debate about the many possible synergies between the two.

5.2.2 International activity in the 'triad', increasingly elsewhere too

Other studies also find that internationalisation of industrial R&D is very much characterised by a 'triadisation' involving companies from the U.S./Canada, Western Europe and Japan/South Korea. This can also be seen as a strong internal European trend; since the late 1980s, the greater part of technological activity in foreign-owned research facilities located in Europe has taken place in affiliates of European-owned companies (Cantwell and Janne 2000).

Canadian evidence states that although companies with R&D activities in Canada may come only from Europe, Japan and North America, several of the Canadian R&D units established abroad are found in developing countries like Brazil, China, India and Turkey (Niosi and Godin 1999). According to a survey carried out in India, this has been an ongoing trend since the mid-1980s (Reddy 1997), although it seems to have been recognised only much later. The driving forces are access to specific science and technology resources and exploitation of cost differentials. It is claimed that such R&D helps to integrate some developing countries into global technology development activities; the companies that are 'international' largely represent the triad nations, but their R&D activities are increasingly extended to nations outside Western Europe, North America and Japan/South Korea.

Correspondingly, the data on funding reveal large differences between countries with respect to their hosting of expatriate R&D and their being home for it. The picture has gradually been changing over the last two decades, particularly within some industries. The main hosts of foreign R&D in the first half of the 1990s were Canada and the United Kingdom, where it represented between 15 and 20 per cent of their domestic R&D expenditures.

The strongest growth in foreign-affiliated R&D, however, has been in the U.S. In 1987, 9.3 per cent of company-funded R&D in that country came from foreign-affiliated corporations; in 1995 it had almost doubled to close to 18 per cent (Serapio and Dalton 1999). A study of large Euro-

pean chemical and pharmaceutical companies found that they locate laboratories in the U.S. to tap into the public science base, to comply with public regulations regarding new drugs, and to exploit a more favourable climate for commercialising biotechnology (Senker *et al.* 1996). In this study, the main difference found between the European and the U.S. science base was the latter's scale, which increases scientific/technological options and choices, though some specialities are more highly developed in the U.S. However, Senker and co-workers also found that the companies consciously use their activities in the U.S. to increase their biotechnology capabilities in Europe in areas where Europe has weaknesses.

France and Germany are also high on the list of international R&D hosts with around 11 per cent of their private R&D expenditures coming from foreign sources in the mid-1990s. At the opposite end of the spectrum we find Japan, with virtually no foreign R&D at all. Japanese companies carry out a lot of R&D activities in other countries, however, see below.

However, internationalisation is not only happening in large countries and in 'their' companies – although country and company size make them stand very much out in many statistical tables. The international activities are growing in scope and complexity also for companies from smaller countries (Molero 1998). Knowledge production is found to be a decreasingly self-contained activity in Sweden as companies increasingly find their sources of knowledge abroad (Okubo and Sjöberg 2000). This may perhaps be seen as balanced off by the fact that through scientific co-authorships, primarily foreign companies are becoming important players in Swedish industry-oriented scientific research. Also other funding-based investigations observe an "accelerated internationalisation" in even the smallest and newest organisations (McDougall and Oviatt 2000). Grandstrand (1999) claims that there is a general growth in international R&D across sectors and countries with a strong current emphasis on collaboration with U.S. universities and suggests that some of these universities (e.g. the MIT, Stanford) may become truly multinational universities in the years to come.

If we turn to patent data and cross-country citations, the general trend is an increasing 'globalisation' of technology in the OECD area (Guelllec and de la Potterie 2001). There are still large cross-country differences in the extent of internationalisation as measured by this indicator. The degree of internationalisation is higher for small countries and for countries with low technological intensity. Two countries are more likely to collaborate if they are geographically close to each other, have similar technological specialisation and share a common language. The Nordic countries have a particularly high propensity to collaborate.

Another analysis of the U.S. patenting activities of the world's largest 539 companies indicates that technology production remains close to home for most of those companies (Patel 1995). In addition, when they locate R&D activities abroad, no systematic difference is found between their presence in a technical field and the relative technological strength of the host country in that area (Patel 1996).

5.2.3 The case of Norway: strong growth in international relations

The Norwegian data are interesting and illustrate many of the points found in literature based on the development in other countries. At the start of the 1980s, less than five per cent of Norwegian total industrial R&D was purchased from abroad.¹ Norwegian firms spent around NOK 1.4 billion on R&D purchases in other countries in 1999, i.e. 36 per cent of the total 'external' expenditures (i.e. purchased from outside the company) and around 15 per cent of total industrial expenditures on R&D. The amount of money has generally changed much from one biennial set of statistics to another: for instance, it doubled from 1995 to 1997 (from NOK 750 million to 1.5 billion); declines have been seen in other years. This is also the case in other countries and may mirror major restructurings like mergers and takeovers. Although policy makers and most governments have generally aimed at supporting and increasing internationalisation, this strong long-term growth in foreign purchases by important Norwegian businesses may also be seen as worrisome. Does this indicate that the companies are moving more of their activities to other countries, or does it imply that there is something wrong with the public research infrastructure? How can the Norwegian economy and society benefit from these developments?

The funding moving in the opposite direction is not nearly as high. In 1999, Norwegian industry received around NOK 630 million in R&D funding from abroad.² The figure has risen steadily since the end of the 1980s; in 1987 it was around 100 million. Around half of these funds come from the private sector, the remaining is mainly EU funding. During the 1990s, the EU funding has increased the most. It should be mentioned that the increase in international funding is even greater in the other sectors of research: foreign funding of academic research was more than seven times as high in 1999 as it was ten years earlier.

¹ The figures in these paragraphs are mainly quoted from Research Council of Norway (1999 and 2001).

² The preliminary 2001 R&D statistics show that there is no increase in companies' purchase of R&D. The data are not directly comparable, though, as R&D bought from another unit within the company was defined as 'internal' in 2001 and 'external' in the previous years.

Norwegian industry had 3,254 scientific articles indexed in the databases of the Institute for Scientific Information over the period 1991–2000.³ Around 40 per cent of these articles (and this proportion increased a lot during this period) were co-authored with people that reported an address outside of Norway. It could be added that 90 per cent of the articles were co-authored. Measured in this bibliometric manner, the U.S. is the most important country for R&D collaboration with Norwegian companies (339 articles, i.e. more than 10 per cent of all industry publications). The next countries on the list are the U.K. (260 articles), Sweden (208), Germany (124), France (120), Denmark (90), the Netherlands (87), Canada (64) and Belgium (48). If we look at regions, the EU came to be relatively more important than the U.S. over the course of the 1990s, although both regions show increased reported co-authorships with Norwegian companies. The number of articles with only Nordic co-authorship has, however, remained stable from year to year. It is also interesting to note that there are 55 different countries involved in this form of cooperation with Norwegian industry, representing all parts of the world. These data confirm that business R&D is highly internationalised in Norway and increasingly extended to countries that are not geographically or culturally proximal.

5.2.4 Industry differences and local linkages

As we have seen, there are important differences between countries. Large countries like the U.S., France, Canada and Germany are the major hosts to expatriate R&D, while smaller countries often have many companies that spend a high proportion of their R&D elsewhere. Significant differences can also be seen between industries.

The most globalised technological strategy can be found in the chemical and pharmaceutical industries and among German and British firms. Looking at industries, many studies have shown that the pharmaceutical industry is the most international of businesses, followed by food and beverages, and machinery and transportation equipment (see Niosi 1999 for a review).

In Norway, there are significant differences between industries in the amount of foreign R&D they purchase. If we compare the three standard subdivisions of the private sector (oil and gas, manufacturing, and services), we see that oil and gas companies are the most 'international': more than half of their R&D purchases were done abroad in 1999. Services are a little less international than manufacturing, with 27 per cent of external R&D funding going to other countries (as opposed to 35 per cent for manufacturing). If we look at the differences in more detail, chemical

³ These bibliometric data are based on Rapmund (2002).

companies (including pharmaceuticals) are the most international purchasers with more than 75 per cent of their total R&D purchases outside of Norway. These percentages swing relatively strongly from one biennial set of statistics to another. In 1997, the telecommunications sector only placed 5 per cent of its R&D purchases abroad; this share had risen to 16 per cent two years later (but was still relatively low compared to other industries). If we assume that R&D is a relatively long-term activity that is at least partly based on close personal contacts and trust, mergers and acquisitions have to account for at least some of those fluctuations.

Importantly, a high degree of internationalisation does not mean that firms to a lesser extent are embedded in their national contexts and innovation systems. A survey of 100 technology-intensive small firms in the Oxford and Cambridge regions (of the UK) shows that internationalised companies do not substitute international for local networks. On the contrary, technology-intensive firms that have achieved high levels of internationalisation in fact exhibit above-average levels of local networking with respect to research collaboration (with universities etc.) and intra-industry links. Internationalisation therefore appears to be grounded in successful *local* networking and research and technology collaboration (Keeble *et al.* 1998).

Finally, it should be said that internationalisation is clearly a path-dependent process. Companies' efforts at developing international, co-ordinated R&D networks have emanated from various historical bases and in the context of varying trends in the role of R&D within the corporation. One example: Japanese firms have mainly espoused a strategy of 'localisation' whereby wholly-owned research units are established (more often than not in the U.S.) with highly specialised technological mandates (Westney 1993). On the other hand, U.S. firms rely on joint ventures or labs with a wider array of technologies that face strong pulls to a local orientation (*ibid.*).

5.3 Motives and functions: why do firms go abroad for R&D?

Learning is a key term in the current literature that explores the motives for setting up international R&D activities, and the role/function of these activities (cf. Niosi 1999). There are two crucial effects. First, learning takes place through closer relationships with lead markets and customers that have a major role in technological development and may be oriented to adapting products, processes and materials to suit foreign markets and to providing technical support to manufacturing plants (e.g. Patel and Vega 1999). Second, important learning processes can be supported through locating close to major innovatory centres with their universities,

government institutes and key private R&D units (often those of competitors).

5.3.1 Is internationalisation accidental or planned? External and internal factors

Investigations in the early 1990s found that a large share of location decisions are ‘accidental’ – an unintended by-product of mergers and acquisitions that were not primarily carried out to access another company’s R&D/knowledge base (Pearson *et al.* 1993, Patel 1995). For instance, it has been established that the majority of foreign research units of Swedish firms that were ‘set up’ in the 1980s came about through acquisitions of foreign companies (Håkanson and Nobel 1993). This also goes for many Canadian R&D units abroad (Niosi and Godin 1999), hence the authors claim that globalisation in many respects is more the result of “resignation than pleasure”. Even location close to major academic centres is described with the somewhat resigned phrase that “if the excellent scientists will not move to the firm, then the firm must move to the scientists” (Casson and Singh 1993).

R&D units have traditionally been located close to major centres of production and major markets (*ibid.*). This may have changed as companies increasingly scan the whole world to find technological and market opportunities and, again, the learning element is seen as crucial: “Faster learning of more relevant information is the key to explaining the internationalisation of R&D” (de Meyer 1993). Most of the newest publications indicate that the increase in expatriate R&D is increasingly a conscious and well-planned decision, although the empirical evidence often shows that R&D internationalisation is still frequently an unintended effect of mergers and takeovers, requirements of the EU or other multinational funding sources, and so on. In addition, new (and planned) R&D units are most often set up as very small organisations, often market-support units, which have to prove their viability for years before developing into fully-fledged R&D centres (von Zedtwitz and Gassmann 2002).

The issue of path dependence is also clear when it comes to motives for creating a more international innovation process. Through internal R&D (in company units/ subsidiaries), businesses generate a stream of proprietary advantages that spur rapid growth in international markets (Patel and Pavitt 1997). This also means that each company’s direction of search is constrained by its present competencies.

Another example is a Nordic case study of six small firms – three ‘conventional’ and three ‘innovative’ (more high-tech, for one thing) – which found that internationalisation processes must be understood within the context of the company: its ownership structure, history and traditions, and so on. Conventional companies have a natural local con-

centration that ultimately implies strategies different from those of innovative companies with a more global focus (Boter and Holmquist 1996). Family-owned businesses may for instance be less motivated to starting and fuelling processes of internationalisation.

Difference between 'high-tech and traditional' or 'low-tech' industries have also been confirmed in a study of the major Norwegian R&D-performing companies (Narula 2002). Traditional industries are embedded in or locked into the national innovation system, which was created more or less to support those industries. Firms in new industries need to go abroad more frequently to satisfy their needs for knowledge. This is of course not only a Norwegian phenomenon – high-tech companies are among the most international regardless of national base (cf. Niosi 1999). Narula's point of view could be disputed: the data on funding referred to above show that oil and gas companies, definitely a part of the Norwegian industrial establishment, have the highest share of foreign R&D purchases. Still, the underlying argument of Narula seems to be that companies have little intrinsic motivation for internationalisation. They look at home first for knowledge that corresponds to their requirements; if those requirements cannot be met locally, the search continues elsewhere.

5.3.2 Market forces and the forces of scientific development

Now that we turn to the more conscious and planned decisions of R&D internationalisation, we note that these may be based on company-internal characteristics (ownership, culture etc.) or external characteristics and developments (in the innovation infrastructure, for instance). Furthermore, industrial R&D being part of the process of innovation, in its turn controlled by market forces and the forces "at the frontiers of scientific and technological development" (Kline and Rosenberg 1986), we can deduce, broadly speaking, that R&D location decisions are based on market features and scientific/technological features. Von Zedtwitz and Gassmann (2002) state that "R&D is torn between the demands for scientific and commercial result", as are the location decisions. They describe two principal motivations to establish R&D sites abroad (cf. *ibid.*, table p. 584 for a detailed description of motivations):

- Proximity to other corporate activities like manufacturing and proximity to local customers, which favour the operation and productivity of engineering and local product development. These factors can broadly be termed 'market forces'.
- The quest for technical know-how and expertise that is only available in few centres of excellence around the world. This makes for better productivity in research and allows monitoring of technological ad-

vances. This could be seen as the motivation derived from technological/scientific developments.

Many other investigators make the same points. Pearce and Papanastasiou (1999) suggest that there are two increasingly important strategic roles for the overseas R&D units of multinational enterprises. The first is to develop new products or very distinctive product variants for key segments of the global marketplace. These labs have a very close operative relationship with other localised functions (marketing, engineering, production, management). The second is to take positions in global programmes of precompetitive investigation with specialised pieces of basic research reflecting particular areas of expertise within the host-country science base. Both these types of decentralised units are seen as ways in which companies can respond to two key elements of the global environment: market heterogeneity and technological heterogeneity.

Kümmerle (1999b) emphasises that companies invest in R&D sites abroad in order to augment their knowledge base or to exploit it. The former motive leads them to establish facilities close to universities, while the latter type leads them to establish facilities close to existing manufacturing facilities and markets. He also found that companies establish multiple R&D sites in their home countries before investing in such sites abroad. Behind all these distinctions lie what can be seen as the major differences between 'research' and 'development'.

It could be added that Senker *et al.* (1996) found that the internationalisation of industrial R&D is also largely influenced by the internal development of scientific disciplines and the ability and willingness of countries to support new specialities in their public sectors. European pharmaceutical companies' higher degree of orientation towards the U.S. is at least partly explained by the U.S. leadership in for instance genetic engineering. Moreover, collaboration with universities is often less expensive than creating joint research ventures with other companies (*ibid.*).

5.3.3 Factors in internationalisation decisions

Von Zedtwitz and Gassmann's empirical study of multinational companies (2002) finds that when a location decision is made, the following factors come into review:

- Input factors (local talent etc.)
- Output factors (for instance possibilities for networking and collaboration)
- Operating efficiency (critical mass issues)
- Factors external to R&D (tax regimes, political and economic stability etc.)

A study of Swedish multinationals reached similar conclusions. Håkanson and Nobel (1993) identified four major motives for operating foreign R&D units (share in parenthesis):

- Support to local production (5%)
- Market proximity (adaptation of centrally developed products and processes to local/regional market conditions) (32%)
- Exploitation of foreign R&D results and resources (8%)
- Political factors (government action etc.) (34%)

The remaining 20% seem to be motivated by a combination of factors, all of which are basically oriented at enhancing a company's competitive position in ways not available from a domestic location. Interestingly, the exploitation of foreign R&D results and resources is not a very important motivation; political factors, on the other hand, are very much so. Political factors are much more than tax policies etc.; intellectual property and product safety regulations, criteria of acceptance for new chemicals and drugs and so on are also important considerations.

A study of Canadian corporations confirms the above. They perform R&D abroad in order to support their manufacturing subsidiaries and in order to be closer to their customers and markets. The most frequently used explanation for the use of foreign R&D abroad was "diversification into related activities". Other motivations are to hire skilled personnel, monitor foreign technological development, and increase the inflow of new ideas. They also choose "friendly socio-political environments" (Niosi and Godin 1999). A study of large European chemical and pharmaceutical companies found that their U.S. laboratories mainly recruited personnel "locally" (Senker *et al.* 1996). There is, however, a tendency for European-born researchers to find post-doc positions in the U.S. and then go on to subsidiaries of European companies.

In other words, R&D location decisions are possibly not very different from other location decisions. Also when deciding on the location of a factory or a company or divisional headquarter, similar points would be made about market proximity, available talent and skills, and the wider political, cultural and economic environment. It could, on the other hand, be argued that scientific talent is more concentrated and less available than the training and skills needed for other business functions.

5.3.4 The functions of expatriate R&D units

A brief look into what R&D-oriented subsidiaries actually do turns up three major functions (Canadian data from Niosi and Godin 1999):

- A majority that produce goods in the same or related industries as in the home country (this is typical in many different industries)
- Vertically integrated subsidiaries that conduct process research at home and advanced materials and final products research abroad (typically chemical and metal industries)
- Very few “truly global” corporation can be found with an international division of labour among foreign laboratories (this is most common in pharmaceutical firms)

Bartlett and Ghoshal (1990) developed another typology that is quite widely used. They suggested four different types of management (or rather motivations) in international innovation projects:

- Central-for-global: developing new products or processes at home for the global market
- Local-for-local: developing products and processes independently in each R&D establishment around the world for use in the local market of the subsidiary
- Locally-linked: developing novelties in each location for global exploitation, e.g. when business units in different countries have worldwide responsibilities for certain product types, markets etc.
- Globally-linked: developing novelties through the collaboration of R&D units located in different countries for exploitation in the world market.

A very similar distinction can be found in von Zedtwitz and Gassmann’s (2002) study of more than one thousand R&D units of 81 multinational companies. On the basis of fundamental distinctions between development-oriented units and research-oriented units and between domestic units and “dispersed” units, they come up with four “archetypical” organisational structures of internationalised R&D. This is shown in the table below (number of companies in parenthesis).

Table 5.1 Archetypical organisations of internationalised R&D.

Major distinctions		Research (Follows know-how and development)	
		Domestic	Dispersed
Development (Follows production, technical service and sales)	Domestic	National treasure R&D (10) Example: Kubota (Japan)	Technology-driven R&D (7) Example: Xerox (US)
	Dispersed	Market-driven R&D (42) Example: Schindler (Switzerland)	Global R&D (19) Example: Glaxo-Wellcome (UK)

Source: von Zedtwitz and Gassmann (2002)

This does not mean that the role/function of the units is constant. The authors note that there is an increasing tendency of internationalisation of both research and development functions (for different reasons, though) as well as a tendency that development follows research and vice versa. In addition, there are counter-trends to internationalisation. Some companies have moved/collocated or closed down R&D units as a result of mergers and acquisitions or cut down their number of sites for other reasons. In the Nordic context, many are worried about the reports that Ericsson, a big multinational, is shutting down many of its R&D centres in several locations worldwide, not least in the Nordic countries.

A case study of 12 multinational companies found that the longer the time horizon of the research, the more dispersed the structure tends to be. Moreover, the structural outcome seems to be strongly influenced by two variables: the degree of dispersion of external sources of knowledge and the degree of dispersion of the key internal R&D resources (Chiesa 1996).

Pearce (1999) also points to some central trends, the major trend being that the role of foreign R&D units has gradually changed and that they are of increasing importance to companies' technology and innovation strategy. This has four main implications. First, there is an increasing involvement in product development rather than adaptation. Second, companies aim at an interdependent rather than dependent position in technology programmes. Third, supply side influences are increasingly relevant (host country technology competencies, capacities and heritage). Finally, centralising forces (e.g. economies of scale, communication and co-ordination problems, security concerns) have declining influence on R&D.

5.3.5 The case of Japan

There are many studies of Japanese companies. Japan is an interesting case because there is very little foreign R&D in Japan (cf. first section above), and because Japanese firms established foreign R&D relatively late compared to their European and U.S. counterparts. Japanese automobile firms now have close ties between R&D and production facilities in the US, while in other industries (such as computers and electronics) the principal linkage of R&D labs in the U.S. is to R&D labs in Japan (Angel and Savage 1996).

It is also interesting to note that a number of medium-sized firms in Japan have highly internationalised R&D operations, whereas most of the largest Japanese electronics firms remain strongly dependent on domestic R&D (Belderbos 2001). Positive and significant determinants of the number of overseas innovation are R&D intensity, export intensity and overseas manufacturing intensity. The results support the notion of a technology exploitation motive as well as a substantial additional role for a technology-sourcing motive.

The comparatively low internationalisation of Japanese firms may be explained by their relatively late and rapid overseas expansion. Other empirical studies of Japanese companies also stress their need to catch up with their counterparts in Europe and the US when it comes to internationalisation. (See Sapienza 1993 for a study of the Japanese pharmaceutical industry, which, it should be added, is a very special case as it is one of the very few places where one finds large firms with a higher degree of internationalisation of R&D than of sales.) Another author states that the R&D labs established outside Japan by Japanese companies are part of a “global innovation strategy”: the overseas units provide basic research input that helps the parent company derive the basis for new generations of products. The second, though more minor role of these subsidiaries, is to develop specific variants of new products that fully respond to distinctive market segments (Papanastassiou and Pearce 1994). A major explanation is the weak status of Japanese universities and basic research. In other words, shortcomings in the knowledge infrastructure could necessitate the internationalisation of company R&D.

An empirical investigation of five Japanese multinationals (Asakawa 2001a) shows that the role of overseas laboratories evolves over time – from the “starter” to the “innovator” and then to the “contributor”. This affects the headquarters-subsidiary relationship accordingly, and “semi-connected freedom” seen as a good balance between the need for local autonomy and the need for internal information connectivity. This brings us to the issue of management challenges.

5.4 Challenges to management brought on by increased internationalisation of R&D

Most of the literature emphasises that internationalisation of R&D leads to major management challenges, particularly related to knowledge transfer and diffusion and co-ordination of processes. This is not least due to the tensions that internationalisation bring about or represent. The borders of multinational (and not only large) companies have become more porous and less clear.

5.4.1 Tensions in international R&D

One fundamental tension often described by investigators is that between evolutionary growth and increasing commitment to foreign markets on the one hand and the forces that tend to concentrate capabilities to a limited number of locations on the other (Zander 1998). Growth in turnover and market shares may require a dispersion of the company, while R&D may benefit from a concentration of resources approach. A similar point is made by von Zedtwitz and Gassmann (2002:585): “We are therefore confronted with a fundamental tension between centrifugal forces that try to establish distance between research and development for greater R&D effectiveness, and centripetal forces that try to integrate research and development for stronger customer orientation and higher economic efficiency.”

The framework of centrifugal versus centripetal forces was first developed by Pearce (1989) in order to explain dilemmas of concentration versus decentralisation. He argued that the decentralising forces are increasingly dominant. The most important of these forces are access to critical inputs in foreign countries, the need for interfunctional communication (with marketing and production functions located abroad), political factors (in most countries, national R&D grants more or less exclusively go to national organisations) and the need to be close to the customer.

This framework has been criticised for not explaining internationalisation but rather decentralisation (Paoli and Guercini 1997). Internationalisation, as seen above, is not only the process of establishing formal R&D units abroad, but also a feature of more general processes of acquiring and exchanging knowledge resources and R&D personnel that do not necessarily call for foreign R&D units. In addition, the centrifugal/centripetal model largely depicts internationalisation as a deliberate and highly top-down process; this may be out of tune with much empirical evidence. If internationalisation is also an emergent, bottom-up process, we may want to look for increased heterogeneity in companies, what Paoli and Guercini call “trans-culturality”. The main tension is then per-

haps between forces that sustain relative homogeneity (including the establishment of foreign R&D units) and forces that promote professional, cultural and national heterogeneity. These forces may both lead to increased internationalisation, though possibly with different implications for policy makers and R&D managers.

It could perhaps be hypothesised that modern information and communication technologies (ICT) will contribute to decreasing the costs of decentralisation (or, in other terms, increase the centrifugal forces), though this has not been studied recently. A mid-1990s investigation found that few large companies were using e-mail and that ICT did not help diffuse and integrate scientific and technological knowledge (Senker *et al.* 1996). There is obviously a need for a closer focus on this issue.

Once one or more foreign units have been established, one can expect tensions caused by autonomy-control issues and information-sharing issues (Asakawa 2001b). These have two further dimensions: the functional dimension (R&D/corporate, other business functions) and the geographical dimension (host country/home country; cf. Asakawa 1996). Asakawa's (2001a, 2001b) empirical study of Japanese multinationals found that the tension appeared (somewhat unexpectedly) to be more salient in relation to information-sharing issues than to autonomy-control issues, and the local side seemed more dissatisfied than the parent side with the current level of information sharing and the autonomy granted. The nature of organisational tension evolves with the level of R&D internationalisation (Asakawa 2001b; also 1996).

Another key term in understanding tensions is perhaps proximity. The multinational firm that manages dispersed R&D units is seen as facing an organisational trade-off between external and internal "proximity" (Blanc and Sierra 1999). Lessened proximity changes the relationship between co-ordination and control. This is not a tension that can be removed, companies prefer to search for an optimal balance by establishing hybrid structures and intermediary configurations (Gassmann and von Zedtwitz 1999).

5.4.2 Solving co-ordination problems

The general message in the literature concerned with 'balancing' tensions and solving co-ordination problems is that management should focus on knowledge creation and diffusion "mechanisms". What these mechanisms consist of is not, however, always apparent. It is also clear that solutions vary according to the corporate strategy adopted, of international duplication or of international diversification of advanced technological capabilities (Zander 1999).

In general, the innovating firm must balance centralisation and decentralisation, and in international R&D, the role of the project leader is ex-

ceedingly important (Moenaert *et al.* 2000). Available evidence suggests that modern information and communication technologies lessen the co-ordination problems by improving knowledge flows and increasing productivity (Howells 1995).

A study of European and Japanese multinationals found four different categories of co-ordination mechanisms of international R&D and innovation processes. These were termed structural, hybrid, informal and “internal markets” (Reger 1999). The empirical results show that Japanese companies make extensive use of personal contacts, informal communication and socialisation, whereas European companies rely more on internal markets for R&D: business units ‘buy’ R&D rather than the corporation having a centralised budget.

These results are confirmed by Gassmann and von Zedtwitz (1999). They identify five trends of organisational change in R&D activities in order to cope with tensions and uncertainties. First, they note a stronger orientation of R&D activities towards international markets and knowledge centres. Second, they find that many firms establish tightly co-ordinated listening posts. Third, there is a strengthening and reinforcement of foreign R&D sites rather than these being left alone in the ‘periphery’. Fourth, decentralised R&D units are increasingly integrated into new organisational structures. Finally the authors note that there is a tighter co-ordination and recentralisation of R&D activities at fewer know-how centres.

5.5 Policy implications

The internationalisation of industrial R&D has fundamental implications for policy. As governments fund more or less (and directly as well as indirectly) half the R&D effort of industrialised countries, the desirability and opportunity to fund foreign companies and give them access to nationally produced research results has been questioned (Niosi 1999). Some authors asks whether this development will lead to increased international spillovers that may reduce the legitimacy of public support for science and technology in nation-states (Schimmelpfennig and Thirtle 1999). On a more specific note, Huizinga (1992) argues that increased internationalisation leads to less generous expensing rules within individual countries when it comes to R&D tax deductions. Internationalisation may in the end even eliminate them. It will be interesting to monitor whether the recently proposed tax deductions in Norway will affect foreign purchases of Norwegian R&D (as well as the Norwegian purchases of foreign R&D). Other authors suggest that the globalisation of innovation warrants the *expansion* rather than the *reduction* of the public policy portfolio and

support for R&D in order to ensure adequate returns on these investments (e.g. Archibugi and Iammarino 1999).

Hence there are two dominant views in the general debate about the policy implications of internationalisation and globalisation of industrial R&D (Gertler *et al.* 2000). The first contends that globalisation *reduces* the significance of the home base as the primary site for innovation, as firms increasingly source and apply their innovations on a global basis. The second view, typical in the innovation systems approach, contends that the institutionally embedded nature of the innovation process, which is a central feature of the new economy, requires a continued, even accentuated role for the local context (Lundvall 2002 is a good example). As we have seen above, there is empirical support for both of these views, although there is probably a lack of studies that focus specifically on the interplay or tension between the innovation infrastructure in the home base and the infrastructure in other countries. It could generally be claimed that the role of 'outsider' in another country's innovation system might be difficult and highly expensive as a way to get access to relevant knowledge and networks. See Niosi and Bellon (1994) for a general discussion of how the trend of internationalisation and globalisation fits in with one of the dominant models of the national innovation system.

In a discussion of policy implications of the internationalisation of business R&D on the European Union, Meyerkrahmer and Reger (1999) suggest that the following policy implications are the most important, both to the EU and to national governments:

- Stronger focus on extra-European collaboration and mobility
- Strengthening of the attractiveness of the EU for foreign R&D investment and the absorptive capacities of R&D organisations in Europe
- Stronger integration of different policy areas and of indirect policy measures
- The establishment of a transparent and global framework for policy co-ordination and priority-setting worldwide

Niosi (1999) emphasises that questions of size, critical mass and quality of the science base have to be part of the discussion of internationalisation of industrial R&D. A warning for small countries could be read into the finding that the relative size of the market and the relative strength of a country's science base determine whether foreign direct investment in research and development is carried out (Kümmerle 1999a). If a 'trade balance' in R&D funding is desirable, small countries may need to focus strongly on developing strengths in selected academic fields that are of interest to industry. We have seen that investments in development, the D part of R&D, largely follow production and marketing functions. Small

countries with relatively high production costs and small home markets should then possibly attempt to attract units that are more oriented towards the R part. There are, however, few research units compared to development units, another option may be to try to create a good climate for advanced production activities, which also tend to attract R&D investments.

There is probably still ample room for creating unique niches, for companies or regions/nations that wish to attract and retain R&D resources. Most of the studies cited above do not conclude that companies become more similar or that all regions and nations must embrace the same innovation policies and attraction mechanisms. For example, a study of the international computer industry finds that companies in this sector have become more divergent and that there is little evidence of a process of isomorphism (Duysters and Hagedoorn 2001). Thus there are few signs of a general convergence, although as shown above there is a tendency towards more concentration of (advanced) research activities in a small number of locations worldwide.

Finally, it should be added that there are many implicit messages to policy makers in the empirical findings referred to above, for instance that investments in R&D are not very different from other types of investments that cross national borders. It has been shown that R&D in one country responds to a change in the price in another, 'competing, country; this has been taken to suggest that innovation policies could play an important role in determining whether "increasingly footloose R&D" locates in one country rather than another (Bloom and Griffith 2001). Attracting R&D is not just related to scientific and technological strengths but also to costs and availability of R&D personnel as well as taxes and incentives more generally.

5.6 Concluding remarks and discussion

In this chapter, we have seen that industrial research and development activities are increasingly carried out in other countries than the home base of companies. This is a general trend, although there are differences between nations and industries in the degree of internationalisation and the degree to which they are hosts or homes to business R&D in/from another country. Around 15 per cent of the R&D expenditures of Norwegian companies was spent abroad in 1999. There is, however, only one scientific study of the internationalisation of Norwegian industrial R&D (Narula 2002).

We can distinguish between various degrees or types of internationalisation: A company may have *international* R&D, that is collaboration with R&D units in other countries, or it may have *multinational* R&D, that

is formally established R&D units in other countries. Much of the literature focuses on the latter, although this is not very relevant in relation to Norwegian industry. Little is also known of to what extent the labour market for scientists and engineers is becoming more international.

The literature has focused relatively strongly on explaining the *why* of these processes, but so far we know little about the *effects* of the development. Still, many useful middle-range categorisations and typologies have been made. We have for instance seen that research activities are increasingly carried out in a few locations worldwide, often close to industry-friendly elite universities, which implies a *regionalisation* of industrial research. Development activities, on the other hand, follow previous investments in marketing and production units. Behind this we find technology-related, market-related and organisational driving forces. It is important to be aware of the fact that there are also forces that *reduce* the degree of internationalisation, for instance the benefits of concentration and the strength of ties with national innovation infrastructures. There is also some evidence to the effect that the driving forces may have changed, e.g. the reduced importance of business secrets and organisational benefits of geographical concentration.

Furthermore, we have seen that internationalisation of industrial R&D is relatively strongly influenced by other processes than aiming at the most efficient R&D organisation. Examples are industrial restructurings (takeovers, mergers etc.) and the hunt for inexpensive manufacturing and access to large markets. A distinction can be made between empirical studies that originate in the management and organisation fields and those that represent the economics of technological change and innovation. The former can be interpreted within a rational choice framework (cf. chapter 1) with a focus on internationalisation as a more or less conscious decision-making process. Learning, R&D intensity, export intensity and products customised for certain markets are key words here. The latter studies, not least those embarking from the national innovation systems approach, are more related to theories of path dependency (and hence perhaps the neo-institutionalism framework). This strand of literature often emphasises how firms are embedded in (or 'locked into') local contexts and are somehow forced into adapting to changing global competitive environments and changed business climates.

If we were to distinguish between 'old' and 'new' patterns of internationalisation, the old ones can be tied to the processes of increasing export shares (gaining access to new markets) and establishing foreign production. New patterns are more related to learning and gaining access to world-leading (niche or general) knowledge resources. New and old pattern are intertwined; the old ones have *not* become less important. Large multinational companies are over-represented in the empirical data, but

there is some evidence that smaller knowledge-intensive firms are becoming equally international but keep strong ties with the public research infrastructure of their home base.

Most empirical studies focus on formally established foreign R&D units, among which we can distinguish between several types (cf. above). There is a lack of investigations of other types of internationalisation, for instance international university-industry collaboration and recruitment of scientists and engineers in an international labour market. We generally know little about how companies gain access to other countries' national innovation systems and whether this poses particular problems. Another interesting point is perhaps to see whether the *identity* of companies from small countries like Norway changes as a result of increased international involvement in knowledge production and utilisation.

All types of internationalisation, possibly the establishment of foreign R&D units in particular, pose challenges for management. Two clusters of problems are discussed in the literature: increasing tensions, for instance between concentration and decentralisation and between autonomy and control, and co-ordination problems. Solving or balancing these tensions often imply a restructuring of a company's total R&D organisation by linking R&D units closer to business divisions and/or strengthening foreign research and development units.

Further studies of Norwegian companies will still need to focus on the why, the how, and the implications of internationalisation. It is of particular interest to look at other types of internationalisation than establishing foreign R&D units and to incorporate factors that lead to more international as well as less international private-sector research and development. It might also be fruitful to compare the strategies and challenges of companies with those of research institutes and higher education institutions (cf. chapter 4), and to explore further the effects of internationalisation of industrial R&D on the broader Norwegian research and innovation system.

6 Conclusions

*Åse Gornitzka, Magnus Gulbrandsen and
Jarle Trondal*

As a consequence of far-reaching economic, cultural, technological and social trends that are truly global, as well as intensifying European integration, the operational contexts of national higher education and research systems are increasingly transformed. It is not surprising that internationalisation is an important issue in higher education, research and innovation policy and practice.

In this chapter, we discuss what the different thematic chapters (2 through 5) can contribute to the overall internationalisation framework presented in chapter 1. Our main intention is to extend this framework in a manner that can be used in various types of empirical studies of internationalisation. Concrete suggestions for studies are made in the thematic chapters.

6.1 The power of internationalisation and its changing face

Recent developments have introduced new patterns of internationalisation of innovation, higher education and research in addition to traditional cross-border interaction. The mobility of students and research staff and knowledge flows across borders are not only intensified but also taking new directions. The pathways to and the driving forces of internationalisation have also partly changed with a stronger formalisation of cooperation at institutional, national and international/ supranational levels.

Moreover, new actors have entered the growing international market for higher education, with transnational supply of services and a stronger presence of international consortia, in science as well as in the delivery of study programmes. New technology facilitates emerging new patterns and stimulates the global markets for higher education. The various aspects of internationalisation represent important parameters and challenges for domestic research and higher education systems and they have had time to settle and reach a certain level of institutionalisation and maturity. According to Adam (2001:6), “[n]ational autonomy and sovereignty in the domain of higher education ... have never been challenged on such a scale”.

In the private sector we have seen that internationalisation is increasingly a relevant characteristic for companies of all sizes and in all nations and industries, not least in small countries with a limited science base and a small home market. The internationalisation of industrial research and development follows previous investments in foreign production and marketing and restructurings like mergers and takeovers, but can also be tied to the growing importance of industry-friendly elite universities, particularly in a few regions of the U.S. Still, the major framework for understanding civilian innovation has for a decade or so been the “*national innovation systems*” model. Even its name indicates that increased internationalisation does not necessarily imply that national policies and programmes will diminish in importance. This obvious tension is a good starting point for more general conclusions about the characteristics of present-day internationalisation.

6.2 Tensions and internationalisation

Several tensions have been highlighted in this report in order to describe internationalisation or to distinguish traditional from emerging forms of internationalisation. In these concluding paragraphs, we will point to five such conflicting aspects. This could pose a starting point for creating relevant hypotheses in empirical studies and also serve as a summary of the theoretical status of internationalisation as it is currently found in the literature.

First, we have seen that there may be a tension between *co-operation and competition* in the internationalisation of higher education and research. This is a key element that refers to the increasing importance of the *marketisation* of research and higher education, and also changing views of R&D collaboration in industry. It is guided by competitive strategies of both institutions and national systems. Moreover, co-operation and conflict have always existed in higher education and research. Today this dimension is organisationally embedded in supranational institutions – for example in the framework programmes of the EU.

Second, a tension can be seen in the question of the *deterministic* nature of internationalisation. Is internationalisation of research and higher education (and perhaps whole clusters of knowledge production and dissemination) inevitable, or can it, at least to some extent, be *controlled and influenced* by the political-administrative leadership of smaller nation-states?

Third, the issue of *divergence vs. convergence* as a consequence of internationalisation has come centre stage. This refers, for example, to the international homogenisation of policy arrangements and national research and higher education systems. Do all companies need to collabo-

rate with the MIT and Stanford University in the U.S.? *Can* all companies collaborate efficiently with institutions highly embedded in other nations' innovation systems?

The fourth aspect is the tension between *substitution and synergy*. Do international funds for research and/or education substitute national or company-internal funds, or do they create synergy by releasing additional resources? These are important questions in the EU and in states participating in EU programmes, in which the development of quality/acceptance criteria of additionality and subsidiarity expresses the concerns.

Finally, a tension can be described between possible *positive or negative effects* of internationalisation. Do we have any normative standards against which to assess and evaluate the different aspects of internationalisation? How does, for example, a growing awareness of the importance of the quality and transparency of national higher education and research systems relate to the loss of national political authority with respect to these systems? At the end of this concluding chapter, we discuss these five core aspects of internationalisation in more detail.

6.2.1 Co-operative vs. competitive approaches to internationalisation

Internationalisation in higher education was traditionally perceived mainly as a co-operative effort, as seen in the exchange both of students and staff. Recent developments, however, indicate that institutions of higher education face an increasingly internationalised market for students as well as for research. These developments have led to more inter-institutional competition internationally (Wende 2000). Public and private R&D units have for a long time been accustomed to international competition. Still, even in industry there is increasing R&D collaboration between companies that compete in the same markets (see e.g. Håkanson 1993).

The blend of competitive and co-operative international relations poses significant challenges for organisations involved in higher education and research as it creates a stronger need for them to develop a profile in their research (and teaching) activities now that the division of labour between them is no longer merely national; moreover, they have to develop their capacity for collective strategic thinking and action. A particularly salient issue is how *technological development* affects and shapes international collaboration and competition.

It is not necessarily clear if the development towards more competition and more collaboration is always intended from the side of policy-makers. Of course, benign aspects of competition have been emphasised the last decade or more, but there has also been a strong highlighting of

'synergy', 'productivity', 'efficiency' and other goals for public and private endeavours. These goals could also be underlying reasons for the actors' possible experience of a difficult balance or tension between competition and collaboration.

6.2.2 Convergence vs. divergence

The trends in higher education and research are neither unequivocally in the direction of international convergence nor towards divergence. In terms of regulations and international conventions, there is a movement towards international compatibility and comparability of higher education structures and degrees (cf. the Bologna Declaration).

Still, there is a growing demand for diversification within the various domestic systems. The discussion of whether globalisation and internationalisation lead to more similarities between countries or to increased differentiation and divergence is evident in much of the literature (e.g. Held *et al.* 1999, Slaughter 1998). Future studies should move towards detecting the *conditions* under which convergence and divergence are more likely to happen in higher education and research. We thus suggest a middle-range research agenda.

6.2.3 Determinism vs. control/influence

Policy documents, at least in Norway and other small countries, often seem to take processes of globalisation (and other assumed driving forces of internationalisation) for granted (Research Council of Norway 2000a and 2000b). It has been argued that small countries can only build a strong scientific base by creating close ties with the scientific metropolises (Ben-David 1962, Kyvik and Larsen 1997). In this perspective globalisation is a centre-periphery process in which countries on the periphery have to adapt and download one-sidedly, with few options for influence and uploading.

However, it is well known that small countries can build on natural (and increasingly "non-given") advantages to create world-leading niches (Porter 1990). The position of the Nordic countries in research, education and innovation in the (large) pulp and paper and telecommunication industries may be a good example. The question nevertheless remains: in which areas and to what extent could small countries exert influence on the forces that lead to internationalisation? This dimension is not merely relevant at a national level but also from the perspective of individual R&D institutions, companies and actors at the micro levels: are the forces of internationalisation in R&D and higher education such that they leave little leeway for control and choice?

6.2.4 Substitution vs. synergy

This dilemma is traditionally evident at a national level and is particularly related to research/innovation policy. The challenge is to create funding and control mechanisms that release an extra effort in companies, rather than pay for activities that would have been carried out anyway. 'Additionality' and 'subsidiarity' are common justification and evaluation criteria.

European Union funding, and perhaps the framework programmes in particular, have made this dilemma more visible also at the supranational level. The member states want to 'have their money back' when paying the participation fees, which may require new funding and co-ordination mechanisms. With the increasing funding going to the framework programmes, and the recently decided aim to raise the R&D funding in Europe to three percent of GDP, this dilemma is not likely to diminish.

With increased internationalisation and larger co-ordination problems (e.g. between national and EU policies) it could be argued that the challenge of creating mechanisms that contribute to synergy rather than substitution is even greater. It has been suggested that R&D policies are still mainly developed in a national context, but that the co-ordination with international programmes (like those of the EU) adds new dimensions to pre-existing domestic policies (cf. Georghiou 1998).

6.2.5 Benign vs. malign consequences

Although globalisation may be a highly debated term and process, internationalisation is often thought of as a benign trend and as a goal of much national policy for research, innovation and higher education. Through increased internationalisation governments hope to achieve, for instance, more efficiency in higher education systems, improved competitive structures, import of relevant knowledge, and quality assurance and improvements in knowledge production and dissemination.

For some, this development also has some possible malign effects; examples include brain drain and an increased risk of knowledge being exploited outside the country where it was developed, threats of major industrial restructuring and relocation, less control of higher education systems and fewer possibilities for accreditation and other types of quality control. Some authors argue that the effects are mainly negative when universities, companies and governments uncritically copy initiatives and programmes that have been successful elsewhere, such as science parks for biotechnology (Fairweather 1988).

Whether the benign or the malign consequences are in focus in strategies and policies for internationalisation may vary among scientific disciplines, sectors, or according to the type of academic/ scientific activity such initiatives are addressing. For instance, it has been observed that

in some disciplines (e.g. the life sciences), the level of internationalisation is now very high; this might imply that more international co-operation could in fact lead to lower rather than higher quality (cf. Hakala 1998). Future research should also discuss the criteria by which we should assess the positive and negative sides of internationalisation. Do these criteria exist *a priori* within academia or do they have to be imposed through inter-subjective discourse?

6.2.6 Challenges for future research

These tensions are important puzzles in the internationalisation of higher education and research and should guide future debates on the internationalisation of these sectors of society. We believe that future empirical and theoretical research should take these tensions (or dichotomies, contradictions etc.) as ‘core hypotheses’ about central aspects of current developments in the field of internationalisation of knowledge production and dissemination.

In general there is a lack of scientific knowledge on the actual nature as well as the effects of the internationalisation of higher education and research. Until recently, studies of internationalisation were mainly directed towards questions of international co-operation and the emergence of cross-level networks. Throughout the 1990s, an intensified political and scholarly debate has emerged on the issue of the national adaptation to and stimulation of international rules, norms, standards and structures. Research on internationalisation is lagging behind the rapidly changing practice.

This report departed from the observation that the internationalisation of higher education and research has many faces and facets and has moved on to the conclusion that research should focus on areas of tensions. Future research must empirically document and analyse the driving forces and the outcomes of internationalisation through multi-level and comparative approaches. From a Norwegian point of view, comparative studies ought to compare mechanisms, practices and the experience of internationalisation in Norway with the situation in other countries, and at differing levels of governance.

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