This volume presents recent scholarship on the changing research mission of the university and on the implications of these changes for the university itself. As these papers make clear the leading nations increasingly view the research mission of the university as a principal component of national innovation policies. The papers therefore examine the current preoccupation of higher education policy with concentrating knowledge production to enhance national innovation and competitiveness and with assessing research. The authors explore how this new policy emphasis has influenced: research funding mechanisms; research evaluation; initiatives designed to encourage university knowledge transfer; and reforms of doctoral education. The papers analyse the impact of these reforms and the response of universities to the changing policy environment.

The volume has a strong comparative focus drawing on research from a range of European countries as well as from Australia and the United States. It combines papers from some of the leading scholars in research in higher education together with papers from younger scholars in the field. This is the first volume in a new series which will publish selected papers from the annual conferences of the Consortium of Higher Education Researchers (CHER). The volume will be of particular interest to researchers in the field of higher education, to those who occupy leadership roles in higher education institutions and to those involved in the development of higher education policy at national and international levels.
The Research Mission of the University
ISSUES IN HIGHER EDUCATION
The CHER series

Volume 1

Series Editors:

Barbara M. Kehm, CHER Secretary
Christine Musselin, Director CHER Board of Governors
The Research Mission of the University

Policy Reforms and Institutional Response

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PREFACE OF THE SERIES EDITORS

We are pleased to announce that the Consortium of Higher Education Researchers (CHER) after more than 20 years of existence has made arrangements to publish selected papers from its annual conferences in this new book series. Papers from the 20th annual CHER Conference which took place in University College Dublin, Ireland in 2007 on the theme ‘The Research Mission of the University’ constitute the inaugural volume in the series. Because the CHER conferences have regularly been a source of influential scholarship on higher education, we include with this first volume an Appendix providing relevant details of previous conferences as well as a listing of the many special conference publications that have emanated from these meetings.

CHER is grateful to the host of the 20th annual CHER Conference, Prof. Patrick Clancy, and to Prof. David Dill for undertaking the burden of editorship.

More information about the organisation CHER and its future annual Conferences is available on the following website: http://www.uni-kassel.de/wz1/CHER/Welcome.html.

Barbara M. Kehm, CHER Secretary and Christine Musselin, Director CHER Board of Governors.
INTRODUCTION
THE RESEARCH MISSION OF THE UNIVERSITY:
AN INTRODUCTION

The most recent international review of higher education policy by the OECD, *Tertiary Education for the Knowledge Society* (Santiago, et al., 2008), suggests in its title a fundamental change in the relationship between the university and the social order. The university is no longer viewed primarily as a cultural and scientific supplement to society, the source of the key professions and the educated elite. Instead, it is perceived to be the primary economic engine of advanced societies, whose future wealth is now based upon knowledge. In this new relationship the research mission of the university is being transformed and is now considered a principal component of national policies on innovation (Dill and van Vught, 2009).

In this volume we present recent scholarship that explores the changing research mission of the university and the implications of this transformation for society and the university itself. This preliminary essay provides a general introduction to the theme of the book as well as brief overviews of each of the included papers.

Viewed from the perspective of the 1,000-year history of the university in western society (Figure 1) the research mission – the systematic production of knowledge – is a relatively recent phenomenon. For seven centuries following the founding in 1088 of the University of Bologna, generally recognised as the oldest degree-granting university in the world, the teaching mission was the preeminent contribution of the university to society. During this era universities were places of advanced training for professionals in the church, the legal system, and the field of medicine (Gellert, 1992). While the universities of this period provided to their students knowledge that was continually reinterpreted, such knowledge was rarely informed by empirical investigation. It was not until the late eighteenth century, with the influence of the philosophers of the enlightenment, that universities began to emerge as genuine places of inquiry (Clark, 1995). The reforms adopted at the University of Berlin in the early nineteenth century under the leadership of the Prussian administrator Wilhelm von Humboldt became an influential model for the German university system and eventually the rest of the world. The ‘Humboldtian’ ideal of the unity of research and teaching, in which academic teaching would be based upon the ongoing research of the individual professor, provided motivation and support for the systematic collection of data and information on all aspects of the natural and scientific world, a mission that continues to this day.

The contribution of the university to economic development is an even more recent phenomenon and did not emerge until later in the nineteenth century when the insights of academic research were applied to the improvement of agriculture in...
a number of countries (Lundvall and Borrás, 2004). The Morrill Act signed into law by President Abraham Lincoln in 1862, which initiated the U.S. federal policy supporting land-grant universities and agricultural extension stations, is frequently cited as the first demonstration of the positive contribution that academic research could make to economic development. But an even earlier example is the Danish policy leading to the development of the Agricultural University in Copenhagen in 1856 and the Agricultural Research Station in 1883, which disseminated good dairy practices throughout the country and helped produce the successful Danish dairy industry.

![Figure 1. Evolution of university mission.](image)


The earliest science-based industry developed in late nineteenth-century Germany from university-based research (Murmann, 2003). The German federal and state governments as well as the universities actively encouraged the application of research discoveries in organic chemistry to industry. The increased financial support for chemistry at German universities and the adoption of new laws protecting the patent rights of private businesses were the principal reasons German industry led the world in the production of synthetic dyestuffs and organic chemical products until World War II. In England, Germany’s primary industrial competitor, the idea of significant university-industry cooperation clashed with the dominant values of higher education and consequently Britain’s fine chemicals industry declined during the twentieth century.
Despite these early developments, prior to World War II government support of academic research in all nations continued to be justified primarily on historical and civilising grounds. Prevailing beliefs about the university as a bastion of culture and basic research independent of markets and governments discouraged closer connections between academic inquiry and industrial activity, not only in the UK, but in many other countries as well. This view of the research mission of the university was directly challenged before the war by the British physicist J.B. Bernal in the *Social Function of Science* (1939), which provided evidence of the important role research intensity played in industrial development and called for a radical expansion of government support for academic research. The prevailing view was further challenged by the experiences of the war, during which academic researchers made important contributions to military innovation and technology. As further outlined in Vannevar Bush’s highly cited post war report in the US, *Science: The Endless Frontier* (1945), the evidence from the war years suggested that if government made significant investments in university basic research, then applied research, technical innovation, and social benefits in the form of increased wealth, health, and national security would automatically follow. This ‘linear model’ subsequently influenced postwar science policies in most of the OECD countries. As a consequence government support for academic research in the OECD countries quickly achieved the order of magnitude increase that Bernal had called for before the war and which many critics at the time had deemed naïve.

Consistent with the linear model the major debates about the research mission of the university in the postwar years were about assuring sufficient resources for academic research and determining how to apportion these resources wisely (Lundvall and Borrás, 2004). By the close of the 1980s, however, the traditional science policies based upon the assumptions of the linear model were coming under serious question. The decline of the cold war and the rising expenditures associated with education and the aging population – particularly the costs of mass higher education, health care, and social welfare – led to restraints on public investments in research. Associated concerns about the quality and productivity of universities motivated the development of new national policies for evaluating and assessing the outputs of academic research (Geuna and Martin, 2003).

Influential analyses such as the ‘Mode 2 thesis’ (Gibbons, et al. 1994) and the ‘triple helix model’ (Etzkowitz and Leydesdorff, 1997) attacked the underlying assumptions of the linear model and called for a new conceptualisation of the relationship between universities and economic development. Empirical research on the process of industrial innovation discovered that it was decidedly non-linear, but rather an interactive, reciprocal process involving different actors and organisations (Nelson, 1993). While the research revealed the traditional output of academic research – publications – clearly made an important contribution to technical innovation, equally significant was the contribution of highly skilled human capital in the form of new research doctoral graduates (Cohen, Nelson, and Walsh, 2002). Also critically important, and ignored in the assumptions of the linear or ‘science-push’ model, was the knowledge transfer process – those university activities that helped link academic research with the various actors and organisations engaged in industrial innovation (Edquist, 1997).
At the same time there was an increasing recognition among policymakers in the developed countries of the way in which global forces had changed the basis of economic development (Soete, 2006). In an internationally competitive market, industrial innovation, defined as ‘the ability for firms and workers to move rapidly into new activities or to improve production processes’ (Aghion, 2006, 2), becomes the principal means of sustaining economic growth and productivity in developed nations. While some industries such as pharmaceuticals are obviously more research intensive than others, as developed nations move closer to their technological frontier R&D becomes essential in every industry, because the survival and growth of all industries are dependent upon their ability to innovate. In this new global context academic research, research doctoral education, and knowledge transfer play an even more critical role in economic development then in the past (Mowery and Sampat, 2003).

This new appreciation of the contribution of university research to technical innovation is dramatically altering the nature of science policies currently being implemented in the developed countries (Geuna, Salter, and Steinmuller, 2003). The university research mission is now perceived to be a primary engine of economic development and national policies therefore seek to strengthen academic research and doctoral education, while improving the channels linking university research and industrial innovation. The academic ideal is no longer the university as a bastion of knowledge and culture, but rather the ‘entrepreneurial university’ (Clark, 1998). This observable shift in national policy and university strategic behaviour raises important and challenging questions regarding the research mission of the university, which are the focus for this volume.

ACADEMIC RESEARCH AND TECHNICAL INNOVATION

Our first section on Academic Research and Technical Innovation explores the new environment now shaping the research mission of universities. This new context is strongly influenced by current government policies designed to improve the research productivity and knowledge transfer activities of universities. As previously noted the current government emphasis on university research as an engine of economic development has been stimulated by recent insights into the nature of technical innovation and the important role played in this process by university research and doctoral education (Cohen, Nelson, and Walsh, 2002; Soete, 2006).

The changing policy context for university research is well illustrated in our first paper, a brief case study of Irish national policy, by Patrick Cunningham, the Chief Scientific Adviser to the Government of Ireland. He describes how the recent prioritisation of research is driven by an unashamedly economic agenda. As a late industrialising country, Ireland has experienced a rapid evolution towards a society with a high concentration on modern manufacturing in ICT, pharmaceuticals and biotechnology together with a significant internationally-traded services sector. During the 1990s, a strong consensus emerged among public policy makers that the retention and growth of such internationally mobile knowledge intensive industries require a strong and supportive research and innovation climate. This recognition has led the government to embark on a large investment in R&D, rising from
0.33% to 0.63% of GNP over the period 2000 to 2008. Having moved out of the lower ranks of European countries in terms of investment in research, the aspiration, ultimately, is to match the leading countries on this indicator. The preoccupation with benchmarking relative expenditure on R&D has become a proxy for the assessment of national competitiveness. In spite of the current severe recession in Ireland, which followed an unprecedented economic boom lasting for more than a decade, the government has indicated that it will continue its intensified investment programme in research and innovation in the belief that fostering the ‘smart economy’ represents the best prospect of returning to a high growth path.

The shift in national science policies from the traditional ‘linear’ funding model of academic R&D to the more integrated and strategic ‘national innovation’ model emerged first in Scandinavia. Finland was the earliest European nation to declare ‘knowledge intensity’ and ‘technological superiority’ as strategic policy objectives and to adopt a formal ‘National Innovation Policy’ that focused on the development of a comprehensive university research and educational infrastructure for the nation and its industries (Ormala, 2001). This strategic approach to university research is now being implemented around the world in many of the developed nations (Dill and van Vught, 2009). Marton’s account of the political efforts to reform Swedish research policy to meet the needs of innovation policy is of particular interest, since Sweden is a world leader in terms of the percentage of GDP spent on R&D (OECD, 2008). This expenditure is matched by the national ambition to be Europe’s most competitive and knowledge-based economy. Marton’s detailed analysis of policy development over a twelve-year period demonstrates how an understanding of the university’s role as a public research provider requires a study of the overlapping policy areas of research policy, industrial policy and regional policy. Following Smits and Kulhmann (2004) her analysis of policy change shows an evolution in innovation policy from a focus on intermediary infrastructure needs in the mid 1990s towards a focus on systemic instruments in the mid 2000s. She characterises the middle period of this transition as one where there was a strong focus on ‘user-oriented’ policy instruments combined with bi-lateral exchanges between researchers and businesses with a focus on technology transfer issues. A precondition for the evolution of the systemic approach to innovation policy is an acceptance that the overarching goal of research policy is ‘to contribute to economic development and … to society’s transformation towards sustainable development’ and that HEIs should increase their cooperation with surrounding society. Its implementation requires a complex trade-off between the imperatives and preferences of regional actors, whether from academia, business, public administration or other stakeholders and national policy makers.

The identification of a close interaction between research policy and national innovation systems testifies to the manner in which science, notwithstanding its inherently universal and international character, is deeply embedded in the project of the nation state. However, a feature of the current policy environment is that in addition to these national efforts, supranational entities and agencies are also promoting policies designed to strengthen and reform the research mission of universities to make it a more integral component of technical innovation. For example, the Organisation for Economic Cooperation and Development (OECD) has
been a leading advocate of this national innovation approach (OECD, 2005). From a European perspective the most significant supranational initiative has emerged from the EU, which has become a significant funder of research and more importantly a major force in influencing the direction of research policy (EU, 2003; 2005; 2007). Gornitzka’s paper reviews the evolution of research policy in the European Union, which has culminated in an inter-government agreement to establish a European Research Area (ERA). Its establishment forms a central pillar of the ‘EU Lisbon Strategy’ to become the most competitive and dynamic knowledge-based economy in the world. The rationale for the establishment of the ERA has been the research and technological gap between Europe and the United States and Japan and the conviction that research is the key to improving European competitiveness. The objective is to address the ‘problem of fragmentation, isolation and compartmentalisation of national research efforts’ and to secure a major increase in investment in research, reaching 3% of GDP by 2012. The emergence of a supranational dimension in the governance in research policy has not been a story of the smooth transfer of legal competencies. Drawing from the literature on policy change, Gornitzka presents a nuanced account of how research policy was shaped. She notes especially how the organisational structure of policy making institutions and the ‘interactions and collisions’ between policy sectors influence the direction of policy. Over time there have been variations in the relative emphasis given to traditional science policy versus a view of science as part of industrial policy or as a key component of the knowledge economy and of innovation policy. Similarly, there have been variations over time in the degree of support for the EU as a policy actor developing supranational research policies versus the EU as a facilitator of intergovernmental cooperation between separate national research policies. Gornitzka argues that a distinctive feature of EU research policy is that it represents a case of ‘policy layering’ whereby new policy directions are added without replacing existing policies. For example, while the current emphasis in research policy is centred on European competitiveness and the innovation agenda, the recent creation of the European Research Council links back to the more traditional science agenda of supporting excellence in basic research.

RESEARCH REFORMS AND UNIVERSITY ADAPTATION

In our second section, Research Reforms and University Adaptation, we explore the impact of these new policies on the research mission and activities of the universities. With respect to the emerging emphasis on the relationship between academic research and innovation, national policies have focused on four general approaches to reform. These are first, changes in research funding mechanisms designed to increase competition as a means to raising research quality; second, a stronger emphasis on research evaluation; third, initiatives designed to encourage university knowledge transfer; and fourth, reforms of doctoral education. What impacts are these new reforms having on universities and most importantly on the conduct of academic research?

Traditionally, academic research funding has followed a dual funding model in which general university funds (GUF), or institutional block grants, in support of
teaching and research were allocated to universities on the basis of history, formulas based on inputs, or negotiation, while national research councils provided funding on a competitive basis for particular research projects (Jongbloed and Vossensteyn, 2001). With the exception of the US, competitively allocated research funding composed a relatively small proportion of academic research support in most countries, thereby awarding substantial discretion in the choice of research priorities and topics to the universities themselves. Beginning in the 1980s, the increased interest of policymakers in linking academic research to innovation and economic development as well as the rising costs associated with ‘massification’ of higher education systems motivated a greater emphasis on competitive research funding. Since that time in many of the developed countries the proportion of academic research funds provided through competitive research council grants has increased substantially, institutional block grants have been modified to include a competitive component, and new competitive grant schemes have been introduced for research infrastructure support and ‘centres of excellence’ (Geuna, 2001). In addition, international competition among universities has been fostered by market forces (Teixeira, et al., 2004), such as university rankings and league tables (Dill and Soo, 2005), which have helped encourage a global ‘academic arms race’ in which all universities are heavily investing in research infrastructure, new doctoral programmes, and ‘world-class’ academic staff in an effort to strengthen their research reputation.

The common assumption among policymakers is that more competitive research funding will help to improve university research productivity and quality in the overall higher education system and thereby strengthen national innovation. However, the reliance on competitive research funding has raised concerns that the emphasis on excellence in basic research will lessen the commitment of academic staff to teaching and reduce the diversity of research as well as research activities within universities (Geuna, 2001). Supporting this concern, an international study by Lester and his colleagues (Lester, 2007) discovered that because the economic impact of universities is primarily local, the patenting and licensing of basic research discoveries play a relatively minor role. Instead, the major pathways by which research contributes to economic development include consulting, the provision of new research doctoral graduates, and collaborative research with local industry.

Given these potentially significant concerns, what is the evidence of the impact of competition policies on research diversity and productivity?

There is a widely held belief that the introduction of a performance based competitive funding system for research has led to increased concentration of research in fewer universities. As noted earlier, this increasing stratification of institutions has been fuelled by national and international ranking systems that have the potential to lead to goal displacement, whereby many HEIs embark on a relentless pursuit of prestige maximisation at the expense of other activities. Beerkens’ examination of the Australian case provides a valuable empirical assessment of one aspect of this issue. She examines the link between the introduction of a performance based competitive funding system and research concentration. Her innovative approach to the problem is guided by the industrial organisation literature that has developed market concentration and convergence models. She uses bibliometric data on numbers of publications and citations per academic staff
member for 36 Australian universities from the early 1990s to the early 2000s examining levels of convergence and concentration in research productivity. She finds little support for the concentration hypothesis. While all universities in Australia have increased their research performance those universities that had lower research performance at the start of the period have improved their performance relatively faster and thus have been catching up with the high achievers. She does, however, note that the ‘catching up’ process occurred in the earlier years and seems to have ceased by about 2000. Since it may be easier to improve research performance from a low level to average levels than from average to higher levels she suggests that we cannot completely reject the concentration hypothesis and calls for more research to examine the process in subsequent years and, more importantly, to replicate the research in other countries which have experienced similar reforms in the funding of research. This call for more empirical research is appropriate since while there is a substantial analytical literature on the diversification of higher education systems (Scott, 1995; Kivist, 2004; Teichler, 2007), we lack rigorous empirical studies on research performance and indeed other outcomes from different segments of the higher education sector.

The new concerns with innovation, economic development, and national competitiveness have also motivated policymakers’ interest in assessing the impacts of research. New policy instruments have been implemented for evaluating the relationship between funding inputs and various measures of research outcomes (Basri, 2008). The use of publication measures, patents as well as patent citations, and research income secured are common quantitative measures employed in a number of developed countries. The well-known RAE in the UK combines publication measures with peer review, but because of the high cost and administrative burden of the process it has been proposed that future versions of the RAE rely more on quantitative performance indicators. In some countries, such as Finland and the Netherlands, research evaluations rely primarily upon subjective peer review. Because these new research assessments may affect academic researchers’ problem choices, the nature of their research outputs, and the balance between basic and applied research, Butler (2007) argues for an appropriate balance between peer review and performance indicators.

The complex interactions between funding systems, performance measurement and research outputs are well illustrated in Jongbloed’s paper on ‘steering the Dutch academic enterprise’. He describes the changing research policy environment for Dutch universities and how they have responded to these changes. A central focus of the analysis is the changes introduced in the funding model since the early 1990s. There has been an increasing emphasis on competitive project funding, the so-called second and third stream funding, coming principally from research councils and from a plethora of other mission-oriented intermediary bodies which operate between government and the research community. In addition, the research element of the core grant allocated to universities has become more strategic and performance oriented. This more selective and competitive funding environment has been matched by the introduction of a more systematic system of performance monitoring. An important feature of Jongbloed’s paper is that his review of the Dutch national situation is complemented by an analysis of how three individual
universities have responded to the changes in the policy environment. He reports how the internal allocation model within each university responded to the incentives that were in place at the national level. While these responses revealed some institutional differences in their internal allocation models and some differential research outcomes, both in terms of quantity and quality, all three case studies revealed the development of more interventionist research management practices designed to improve research performance. Jongbloed’s analysis confirms the efficacy of funding instruments that explicitly reward a limited set of objectives or that strive to eliminate fragmentation in the research enterprise.

Jongbloed’s twin focus on the national and institutional levels is complemented by Leišytė’s comparative paper which examines national differences in the research policy environment in England and the Netherlands, as reflected in changing patterns of governance, and the response of selected academic units to these environmental changes. In examining the response of academics to the changing external environments, Leišytė selects research groups in medieval history and biotechnology in four universities in each country with a focus on how their research practices, as reflected in their publication preferences, have responded to the changing external environment. Research output preferences are the choices researchers make about their research products; which products to produce and which audiences to serve. While there was clear evidence of successful coping by academics who managed to retain intact their core output preferences, there was also evidence of a shift towards ‘quicker’ and short-term outputs and of a greater responsiveness towards multiple audiences. For example, while medieval historians retained their preference for books over journal articles, there was evidence of a shift towards producing more articles to meet shorter-term accountability requirements of funders and research assessment. For biotechnologists the publication strategies centred on achieving a balance between targeting those journals with the highest impact factor while ensuring that they publish in sufficient quantity and that they secure continuity of funding, a process which is facilitated by the perceived ‘relevance’ of their research. Leišytė’s findings suggest that English academics perceive themselves as being under more external pressure, with targets to produce a certain amount and type of publication during a limited time period.

In the current climate of heightened accountability research assessment has become the most pervasive instrument used in many countries. This is the subject of Harman’s paper, which focuses mainly on the situation in United Kingdom and Australia but also includes a review of developments in other countries. An interesting feature of the UK – Australian comparison is that while the UK has historically relied on peer review as the main instrument of research assessment and Australia has relied on the use of simple metrics, both systems are currently being altered and seem to be converging towards a system which will be based on the use of bibliometric and other quantitative data, such as research income, combined with the use of light peer review. Harman’s account, which is informed by a wide knowledge of international approaches to ranking and assessment, provides a critical review of the strengths and weaknesses of the different measures. These include the problems of applying the same methodology to science based and non-science based disciplines, differentiating between quality measures and
impact measures, and the problematic use of peer review when disciplines are aggregated into broad disciplinary groups. Another matter which emerges from the two country comparison is the funding consequences which flow from differential research assessments. In Australia, in 2000, the Research Quantum funds allocated to universities represent less than 5% of total operating grants to all higher education institutions and about 10% of grants to the most research intensive universities. In contrast, in the UK, the research funds allocated in the years following the results of the 1996 RAE amounted to about 30% of the total funds allocated for teaching and research to all English universities; for some of the more successful universities these funds constituted about 50% of their total grants while for new universities (ex-polytechnics) this amounted to less than 1% of total grants. Clearly research assessment results matter in all systems but can be of profound significance in some systems.

As noted, an important new component of the new national policies governing academic research is the emphasis on knowledge transfer. In an effort to increase the flow of knowledge to the market many countries are now following the lead of the Bayh-Dole policy in the US by allocating patent and licensing rights to universities through new laws designed to increase university incentives for knowledge transfer (Mowery and Sampat, 2004). With the growing competition for academic research support around the world, many universities are responding to these incentives by aggressively seeking research revenues from technology transfer offices, industrial start-ups, and related activities. There is a significant debate as to whether most universities are in fact benefitting economically from these investments. There is also some concern that the emphasis placed on the ‘hard’ artifacts of academic research, as reflected in the emphasis on patents and licenses, may lead to an undervaluing of the ‘softer’ knowledge transfer processes of publishing, conferencing, consulting, and the hiring of new PhD graduates.

Geiger and Sá provide an authoritative overview of the role of the technology transfer office (TTO) and the commercialisation of university research in the United States. The TTO has become a standard feature of universities in recent decades and symbolises the commitment to mobilise university research for economic development. The authors demonstrate how the early success of TTOs is associated with the growth of biotechnology and its strong patent paradigm, which came to define the technology transfer process between the university and industry. This paradigm seems less suitable for engineering and physical science disciplines where patents tend to cover partial components of, or incremental improvements to, complex systems. They examine a range of dilemmas that have arisen with the operation of TTOs. These include the adoption by universities of the revenue model seeking to maximise income from patents rather than maximise knowledge transfer and their tendency to ‘over-reach’ by seeking to push the boundaries of patentable material upstream in order to claim ownership of fundamental knowledge or research tools. Some of these practices can diminish the public good, illustrating ‘the tragedy of the anti-commons’ (Heller and Eisenberg, 1998), whereby the excessive pursuit of exclusive patents leads to an underutilisation of shared resources. Overall, Geiger and Sá’s sobering analysis challenges the conventional
wisdom by arguing that universities should not harbour grandiose expectations that their TTOs will bring new riches to their institutions or revitalise tired economies.

Finally, improving the quality and productivity of doctoral education is an important part of the new policy reforms (Dill, et al., 2006). Doctoral programmes, which constitute a critical element of the university’s research mission, are the subject of Kehm’s paper. She notes that the increasing concern of higher education policy makers in Europe with doctoral education is explicable since these programmes represent an interface between two major reform processes, the Bologna Process to create a European Higher Education Area and the Lisbon Strategy to create a European Area of Research and Innovation. The paper describes the recent proliferation of competing modes of doctoral education that have come to challenge the traditional master-apprentice model. Following McCarty and Ortloff (2005), Kehm suggests that we can identify three variant conceptions of what constitutes a doctorate. The first conception centres on the acquisition and critical discussion of highly specialised knowledge. The dissertation is geared towards establishing and conserving core knowledge in the relevant discipline; interpretation and exegesis are core methodologies. The second conception centres on the process of training students for professional careers as researchers. The intellectual world is less the comprehensive library of already existing knowledge than the labyrinth of problems and riddles, which remain to be solved by the creative use of sophisticated methodologies driven by intellectual curiosity. The third conception of the doctorate centres on its usefulness for professional career development. With respect to the research component of the professional doctorate the distinction between old and new knowledge and the balance struck between acquisition and conservation is supplanted by the criterion of usefulness of the knowledge for professional practice. Kehm’s analysis suggests that while this increasing diversity is partly a function of increasing doctoral enrolments, more fundamentally she argues the multitude of models reflects a multitude of motives and purposes. Getting a doctorate no longer serves exclusively as preparation for entrance into the academic profession but now leads to a variety of careers in the non-academic labour market. Thus it is no surprise that a concern for doctoral education has shifted from the exclusive remit of professors who acted as gatekeepers to the academic profession, towards a concern of institutional leaders who are concerned with the reputation and corporate identity of their institutions and more recently towards a concern at national level (and in Europe, at supranational level) linked to the problems of innovation and global competition.

MULTIPLE MISSIONS

The analytic focus of the papers in this collection reflects the current preoccupation of higher education policy with concentrating knowledge production to enhance innovation capacity and competitiveness together with assessing the universities’ relevant response. The willingness of national governments to invest heavily in university research is legitimated by the prevailing global ideology that this investment will contribute to competitiveness and economic growth. The pervasiveness of this perspective, evident in almost all countries, exemplifies the institutional
thesis (Meyer et al, 2007) suggesting that local social organisations, such as universities, are dependent on wider environmental meanings, definitions, rules and models. This principle of ‘isomorphism’ also purports to account for commonalities in institutional change, such as that noted above in our account of the evolution of university mission from its preoccupation with teaching, through its subsequent embrace of research, and more recently of economic development, through the knowledge-innovation nexus. However it would be naive to seek to understand the modern university through a single lens. In reality the university has a multitude of missions; the challenge for institutional leaders is to manage creatively the interplay of missions.

Kehm’s account of the varying conceptions of the doctorate reminds us of the tension between competing missions of the university which have been successively incorporated over a period of the past thousand years. The conception of the doctorate as the development of a student’s capacity to generate new knowledge reflects the Humboldtian tradition that has been firmly institutionalised over a period of two hundred years. The conception of the doctorate as a training for enhanced professional practice reflects the incorporation of the Napoleonic model and an important element in the modern American university. It also links back to the very first universities that prepared recruits to the earliest professions of law, medicine and the church. Both these missions share a common commitment to public service understood as making available to citizens useful knowledge and the findings of academic research. In contrast, the third conception of the doctorate, centred on establishing and preserving the core knowledge of the relevant disciplines, with an emphasis on interpretation and exegesis, reflects the cultural mission of the university, which links back to the mission of the medieval university and to Newman’s ideal that the function of a university is the teaching of universal knowledge. In a recent review of the transformations of the mission of the university, from medieval to postmodern, Scott (2006) adds to the dominant 20th century triad of teaching, research and public service missions those of nationalisation, democratisation and more recently, internationalisation. He suggests that the teaching and research missions date from the pre-nation-state stage of Western and World history while the nationalisation, democratisation, and public service missions date from the nation-state stage and the internationalisation mission dates from the globalisation stage.

Scott’s description of this evolution of mission as transformations may not be the most appropriate. What is more striking is the ‘multi-layering’ of missions; with the possible exception of the nation building mission which may be historically specific, university missions tend to retain their legitimacy and compete with each other to retain their salience. Mission creep only becomes a problem when there is a perception that the prominence given to a new mission is undermining more traditional objectives leading to goal displacement. This perception has clearly emerged with respect to the corporatisation of the university (e.g. Bok, 2003; Rhodes and Slaughter, 2004; Kirp, 2003) and the relentless quest for prestige maximisation in research rankings (Marginson, 2007). There is evidence of a growing concern that higher education institutions have failed to achieve a harmonious balance between the competing missions now being pressed on them by different
stakeholders. This concern has emanated especially from those who work in the humanities and social sciences. While some proponents of these disciplines have responded to the utility mandate, pointing to the importance of research for evidence-based policy making (British Academy, 2008) the more abiding rationale for many of these disciplines is cultural. A recent report on Advancing Humanities and Social Science Research in Ireland (RIA, 2007, p. 15) argues that ‘our ability to articulate and reflect on our environment, our traditions, our languages, our religious beliefs, and the visual and architectural forms that shape our consciousness, is the condition of civilised social discourse.’

The lack of consensus on the mission of the university is not, of course, a new phenomenon. More than forty years ago Clark Kerr (1963) coined the term ‘multiversity’ in recognition of the fact that ‘the university must be so many different things to different people that it must, of necessity, be partially at war with itself’ (pp. 7/8). While recognising that the university is not one community but several and while its many distinctive units do not, according to Kerr, have a common soul they share common values. Central to these values is a commitment to ‘the preservation of eternal truths, the creation of new knowledge, (and) the improvement of service wherever truth and knowledge of a higher order may serve the needs of man’ (p. 38).

It is the task of those in leadership positions in universities and national policy makers to facilitate the realisation of these values both at the institutional and systems level. Jónasson (2008) acknowledges, in a recent paper for the Magna Charta Observatory, that such strategy definition is not an easy task ‘since balances have to be found between short and long-term objectives, practical and theoretical concerns, social and economic interests and between local, national and global concerns’ (p. 148). The management and organisation of the research mission of the university and its integration with other competing missions occupies a central element in this governance agenda. One of the objectives of research on higher education is to illuminate some of the complexities involved in the delivery of higher education in contemporary society. It is our hope that the combination of theoretically informed and empirically grounded papers in the present collection will contribute to a better understanding of the research mission of the university in our ever more challenging environment.

REFERENCES


THE RESEARCH MISSION OF THE UNIVERSITY: AN INTRODUCTION


PART 1. ACADEMIC RESEARCH AND TECHNICAL INNOVATION
INTRODUCTION

In July 2006 an important policy document was issued by the Irish Government. It was called the *Strategy for Science, Technology and Innovation 2006–2013*. It laid out a set of policy initiatives and financial commitments intended to complete the transformation of the Irish economy, a process that had begun in the mid-1990s. The objective, as stated by Micheál Martin, the then Minister for Enterprise, Trade and Employment, is that ‘Ireland, by 2013, will be internationally renowned for the excellence of its research, be at the forefront in generating and using new knowledge for economic and social progress, within an innovation driven culture’ (Martin, 2006).

Central to this ambition are the universities and the rest of the third-level educational sector, through which some 58% of current government expenditure on research is channelled. It is therefore not an exaggeration to say that universities are seen as the principal instruments through which dramatic change in the structure of society can be achieved.

The central thrust of this policy is unashamedly economic. The bulk of the increased investment is therefore being directed towards those areas of knowledge, science and technology that underpin wealth generation in society. At the same time, it is generally acknowledged that the broad functioning of society depends on the full range of education and learning, and there are therefore parallel initiatives to expand research in humanities, the arts, and the full range of activities that make for balance, enrichment in the broad sense, well being and fulfilment of people.

THE ROOTS OF CHANGE

While the transformation of the Irish economy has been dramatic in the last ten years, the origins of change go back several decades. Following the ending of the colonial relationship with Britain in the 1920s, there were three very difficult decades. In 1958, a significant policy shift of the Irish Government set the country on the path of open exchange with the world on economic matters. This was followed by membership of the European Union in 1973 and of the Euro currency group in 1999.
Investment in education was greatly increased by the extension of free secondary education to all in 1968, and by the establishment of a network of third-level institutes of technology from 1970.

Following a period of economic difficulty in the 1980s, a program of social partnership emerged from 1987 on, under which workers, employers and the government agreed national norms for advances in pay and conditions. This has given relatively peaceful industrial relations for the last two decades. In parallel with these developments, tax policy has been progressively adjusted to favour foreign direct investment. Corporation tax is now 12.5%, not the lowest in the EU but attractive by international standards. The combination of these developments prepared the country well for the opportunities that came with global economic expansion in the 1990s.

Perhaps the most important element in all of these developments was the progressive spread of university-level education. In the 1950s, about five per cent of each annual cohort went on to university level. For a number of years, this percentage increased at the average rate in OECD countries, which is at about five percentage points increase each decade. However, from the 1980s onward the rate of transfer to tertiary education in Ireland accelerated, and is now above 55%. It is still increasing at the rate of about one per cent per year. This is reflected in the rapid increase in educational levels in recent cohorts (Fig. 1).

Figure 1. Percentage with tertiary education.
Today, about half of the students in third-level institutions are in the seven universities, and the other half are in the 14 institutes of technology. This balance is expected to continue into the future (Fig. 2).

Figure 2. Projected student stock, 2003/4 – 2015/6.

RECENT DEVELOPMENTS

Ireland’s progression up the ranks of the various statistical indicators has been substantial. However, it still leaves us well behind Sweden, Switzerland, Finland, and Denmark, who are the European leaders in innovation. The European Innovation Scoreboard is a consolidated index of 29 input and output measures of a country’s relative position in the creation of a knowledge economy. On the most recent (February 2009) summary index, we ranked eighth – respectable, but not yet where we wish to be.

The transformation of the Irish economy (Fig. 3) has been rapid and substantial. Traditional resource-based industries still dominated industrial output at the beginning of the 1990’s. Fifteen years later, traditional manufacturing had been eclipsed by modern manufacturing (dominated by IT, Pharma and Biotech) output, and it had also been exceeded by a rapidly growing internationally traded services sector.
To drive and support this transformation, a deliberate policy of investment in science and technology was undertaken, starting in the mid 1990s. The broad purpose of this policy was to transform the scale and nature of public investment in R&D so that Ireland’s vital statistics in this area would be more appropriate to those of a society and economy that was dependent on highly technical modern production and services.

In 2000, public investment in R&D was approximately €380m per annum (in 2007 prices). This amounted to 0.33% of GNP, positioning Ireland in the lower ranks of European countries on this measure. Eight years later, absolute expenditure on R&D was close to €1 billion, and 0.63% of a very much larger GNP (Fig. 4).
This increase in real expenditure has been at the rate of approximately 12% per annum, against a growth in GNP over the same period of 7% per annum. This growth in public funding has been paralleled by an expansion of private investment in R&D, with a ratio of one third public, two thirds private being maintained across the decade.

Substantial though these figures are, they still leave Ireland below average in the OECD though somewhat above average in EU-15 (Fig. 5). Because of the scale of the repatriation of profits by foreign multinationals operating in Ireland, GNP is considered a more appropriate measure of national income in Ireland, rather than GDP, which is significantly higher.
The successful transformation of the Irish economy since 1990 was driven largely by a series of policy initiatives built on the opportunities presented by membership of the European Union and of the Euro zone, together with the expansion in world trade following progressive rounds of liberalisation. Many international companies were attracted to Ireland by a favourable tax regime, supportive infrastructure, and the availability of well educated employees at competitive pay-rates. As international competition on all these fronts gradually increased, and as our cost-base rose, it became increasingly evident that, to stay competitive, Ireland needed to move up the knowledge scale.

A series of well argued reports (see Table 1) prepared the ground for political decision making. New structures were put in place, and both capital and operational budgets for science were progressively increased, in real terms, at an average of ten percent per annum for the last decade. Two significant initiatives were the PRTLI Programme for capital support for science (largely in the Universities), which has invested €865m to date; and Science Foundation Ireland, which has funded the addition of 320 Principal Investigators and 2,800 additional scientists overall with an investment of €1.3bn over the same period.
A CASE STUDY OF NATIONAL POLICY IN IRELAND

Table 1. Key Science Policy Reports.

<table>
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<tr>
<th>Year</th>
<th>Event Description</th>
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<tr>
<td>1958</td>
<td>Publication of <em>Programme for Economic Expansion</em> (the Whitaker paper)</td>
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<td>1982</td>
<td>Publication of <em>A Review of Industrial Policy: A Report by Telesis Consultancy Group</em></td>
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<td>1992</td>
<td>Publication of <em>A Time for Change</em> (the Culliton report)</td>
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<td>1995</td>
<td>Publication of <em>Making Knowledge Work for Us</em> by the Science, Technology and Innovation Advisory Council (the Tierney report)</td>
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<td>1999</td>
<td>Publication of reports from 8 Technology Foresight Panels</td>
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<td>2002</td>
<td>Publication of <em>Framework for an Overarching National Policy for Research and Technological Development</em> by the Irish Council for Science, Technology &amp; Innovation</td>
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<td>2004</td>
<td>Publication of <em>Ahead of the Curve: Ireland’s Place in the Global Economy</em> by Forfás; Publication of <em>Building Ireland’s Knowledge Economy: The Irish Action Plan For Promoting Investment in R&amp;D to 2010</em></td>
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<tr>
<td>2007</td>
<td>Launch of <em>National Development Plan 2007–2013</em></td>
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<tr>
<td>2008</td>
<td>Publication of <em>Building Ireland’s Smart Economy: A Framework for Sustainable Economic Renewal</em></td>
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BEYOND THE STORM

As the economic storm clouds gathered in recent months, the Government has confirmed its commitment to building Ireland’s future on an increasing capacity for innovation in society. On December 18th 2008, the Taoiseach said: ‘We aim to develop a smart economy and become known as the innovation island … to invest heavily in research and development, incentivise multinational companies to locate more R&D capacity in Ireland, and ensure the commercialisation and retaining of ideas that flow from that investment’ (Cowen, 2008).

While every country in the world has been affected by the global financial crisis, Ireland faces particularly severe challenges. At the height of the boom, the building industry constituted more than 15% of GNP here, as against the norm of 5% in
other developed countries. This in turn meant that the financial institutions were unusually exposed when the downturn came. The decade of boom years also fuelled an exuberance in public spending that cannot be sustained in the coming years (though Government expenditure as percent of GNP, at 42% in 2008, is still below the EU average).

In addition, our small scale increases the vulnerability of the Irish economy. To some extent this is offset by the stability that comes with membership of the Eurozone. As against that, the easy option of maintaining competitiveness by currency devaluation is no longer available. The challenges ahead are therefore very substantial – to stabilise Government finances, to restore national competitiveness, and, after the storm, to complete our progress to a position as one of the most durably competitive economies in Europe.

At the centre of that ambitious plan is a commitment to continue building the knowledge economy. The last National Development Plan took the public investment in research and development from a figure of 0.33% of GNP in 2000, to 0.63% of a very much larger GNP in 2008. In that year, the Government science and technology budget came to almost €1bn – a figure roughly equivalent to what was spent on overseas development aid. During this period, Ireland more than doubled its capacity for R&D. Such early indicators as we have of output (numbers of highly trained scientists, publications, citations, patents) have all shown significant increases (HEA, 2004b; Department of Enterprise Trade and Employment, 2008).

Figure 6. Total Investment in R&D (GERD).
The commitment in the current National Development Plan, covering the years 2007 to 2013, is to continue this pattern of growth in public investment, and indeed this has been delivered in 2007 and 2008. The broad objectives set out in the Lisbon agenda are that Europe should spend 3% of GDP on research and development by 2010, and that two thirds of this should be contributed by the business sector, one third by public sector. It will take us some years more to reach the 3% goal. However, in Ireland the business sector has been expanding its R&D investment in parallel with the expansion in public funding and provided 65% of the overall expenditure on R&D in 2006 (Fig. 6). In that year, €1.6bn was spent on R&D performed in the business sector. Reflecting the high-tech nature of overseas investment here, over 70% of this came from foreign (mainly American) companies. That investment continues – 43% of the 130 new foreign direct investment projects in Ireland during 2008 were R&D related.

REFERENCES


