

Whitley, Richard

Working Paper

Construction universities as strategic actors: Limitations and variations

Manchester Business School Working Paper, No. 557

Provided in Cooperation with:

Manchester Business School, The University of Manchester

Suggested Citation: Whitley, Richard (2008) : Construction universities as strategic actors: Limitations and variations, Manchester Business School Working Paper, No. 557, The University of Manchester, Manchester Business School, Manchester

This Version is available at:

<https://hdl.handle.net/10419/50654>

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.

Working Paper Series

Constructing Universities as Strategic Actors: Limitations and Variations

Richard Whitley

Manchester Business School Working Paper No 557
June 2008

Manchester Business School

Copyright © 2008, Whitley. All rights reserved.
Do not quote or cite without permission from the author.

Manchester Business School
The University of Manchester
Booth Street West
Manchester M15 6PB

+44(0)161 306 1320
<http://www.mbs.ac.uk/research/workingpapers/>

ISSN 0954-7401

The working papers are produced by The University of Manchester - Manchester Business School and are to be circulated for discussion purposes only. Their contents should be considered to be preliminary. The papers are expected to be published in due course, in a revised form and should not be quoted without the authors' permission.

Author(s) and affiliation

Professor Richard Whitley

Professor of Organisational Sociology

Manchester Business School

Booth Street West

Manchester

M15 6PB

Phone: +44 161 275 6336

E-mail: Richard.Whitley@mbs.ac.uk

Abstract

Recent changes in the funding and governance of research universities have attempted to make them more strategically active in contributing to national goals. However, the ability of universities to develop strategic capabilities as cohesive organisations is limited by the inherent uncertainty of research processes and results, and the dominant influence of scientific communities on research priorities and evaluation standards. Insofar as universities are able to exercise discretion over resource allocation and strategic choices, they are therefore more like investment management companies than integrated firms. The extent to which universities do become more similar to such strategic actors depends on the nature and policies of the state, and the organisation of research funding and the national public science system. The effects of recent changes to the governance of universities on their strategic autonomy and capabilities vary considerably between countries and higher education systems.

Keywords

Changing governance of universities; strategic actors; state policies; research funding; national public science systems; organisational capabilities; strategic autonomy.

How to quote or cite this document

Whitley, Richard (2008) Constructing Universities as Strategic Actors: Limitations and Variations.

Manchester Business School Working Paper, Number 557, available:
<http://www.mbs.ac.uk/research/workingpapers/>

Introduction

Recent changes in the funding and governance of universities and research organisations in a number of countries have led many to imitate the formal structures of business corporations and to develop explicit research strategies (Braun and Merrien, 1999; Krucken and Meier, 2006; Rhoades and Sporn, 2002). These changes have been especially marked in the public higher education systems of continental Europe and Japan, where many states have decentralised some administrative and financial authority to universities as separately accountable organisations (Engwall and Nybom, 2007; Henkel and Little, 1999; Kneller, 2007).

Previously, most of these higher education systems were based on "strong state authority and an equally strong academic oligarchy. There was hardly any room and legitimacy for the organisation as an independent decision-making actor" as Krucken and Meier (2006: 244) characterise the German one (see, also, Lange, 2007; Schimank et al., 1999). Increasingly, though, states that greatly expanded such systems in the 1960s and 1970s have attempted to decouple universities from state ministries and institutionalise them as semi-autonomous organisations with their own strategies, administrative apparatus and resources.

Although such policies have sometimes been implemented to meet short-term political targets, such as reducing the number of state employees as in Japan, they often constitute part of wider-ranging and longer-term changes in state-society relations in many countries. These changes involve states renouncing direct responsibility for delivering public services and administrative control over them in favour of a more formally remote and regulatory relationship that combines considerable formalisation of accountability procedures with the construction of a quasi-market, as frequently discussed in terms of the "new public management" movement (Braun, 1999, Power, 1997; Schimank, 2005; Shore and Wright, 2000).

Such changes in many higher education systems have been accompanied by an increasing emphasis on the commercialisation of academic research in some countries and some sciences, most notably the biomedical fields in the USA (Hughes, 2001; Krinsky, 1999; Mowery et al., 2004), and on the university becoming the central agent in managing such commercialisation processes. While some US universities, such as California, MIT, Purdue and Wisconsin, have been actively involved in patenting for some time, many more became involved in such activities after the passage of the Bayh-Dole Patent and Trademark Amendment Act in 1980. This Act gave universities the right to retain the property rights to inventions deriving from federally funded research. It has been imitated by many other states wishing to encourage technological innovation-led growth despite the limited evidence for the view that such powers have led to greatly increased university revenues, let alone to new "Silicon Valleys" (Casper, 2007; Geuna and Nesta, 2006; Mowery et al., 2004; Mowery and Sampat, 2005).

In the few instances where university owned patents and commercialisation have been successful in generating large income streams, this has increased their

ability to act strategically, especially in the private US universities since much of their income is earmarked for specific activities that cannot be readily altered by university administrators (Geiger, 1986). It also of course greatly encourages universities to take an interest in research that promises such rewards and to establish formal procedures for ensuring that researchers notify central offices, such as technology licensing or transfer departments, when they consider that their results may have commercial value, as at MIT and Stanford (Etzkowitz, 1999; 2003; Hughes, 2001). This is particularly evident when funding from other sources, especially state research grants, declines sharply, as in Australia, the UK and other countries in the 1980s and 1990s (Marginson and Considine, 2001; Mowery and Sampat, 2005).

However, as Musselin (2007) has recently emphasised, the extent to which universities and similar organisations dedicated to the production of public certified knowledge, henceforth referred to collectively as universities, could become comparable strategic actors to firms in competitive markets is limited by inherent characteristics of knowledge production and dissemination. It also varies between differently organised public science systems as well as being affected by broader features of political economies such as the nature and role of the state and the dominant institutions governing labour markets (Whitley, 2003a; 2007). Within national academic systems, major differences between the sciences and the importance of scientific communities in setting intellectual goals and evaluating the worth of research results additionally constrain universities' ability to develop distinctive collective intellectual identities that are trans-disciplinary (Whitley, 2000), despite some US universities' attempts to develop interdisciplinary strategies for "creating the future" (Brint, 2005).

Such limitations and variations help to explain why many of the recent attempts to extend the principles and techniques of the new public management to universities have apparently had limited impact on working practices and authority relations so far. They also highlight the continued diversity of higher education systems and research traditions despite attempts to standardise procedures and structures across the European Union and elsewhere (Braun and Merrien, 1999; Krucken et al., 2007; Schimank, 2005).

Given the undoubted changes that have taken place since the postwar science-society compact was revised in the 1960s and 1970s in many countries (Guston, 2000), and the continued debates over university purposes and governance in the 21st century, it is worthwhile considering how universities could become different kinds of strategic actors in different higher education systems. In particular, the claim that they can be entrepreneurial in similar ways to many firms in competitive market economies needs to be evaluated (Clark, 1998). These sorts of questions involve consideration of the different ways that firms and other organisations are able to act strategically and compete on the basis of their distinctive collective competences (Dosi et al., 2000; Helfat et al., 2007; Whitley, 2003b), as well as the extent to which universities could develop in similar ways.

Accordingly, in this chapter I outline the major factors that limit universities' ability to function as independent strategic actors with unique organisational capabilities comparable to private firms in market economies, and then explore how we can

understand the key factors affecting their varying autonomy and "organisational actorhood" (Krucken and Meier, 2006) in different societies within these limiting conditions. First, I summarise the key features of firms as strategic actors in competitive markets and then outline the major reasons why universities competing for intellectual prestige are unlikely to develop organisation specific competences in managing their core activities. Next, I contrast four ideal types on universities as distinct organisations and their similarity to different sorts of firms, and finally consider the major factors that are likely to affect the extent to which universities develop distinctive strategic capabilities and autonomy from both states and scientific elites in different societies.

The Nature of Firms as Strategic Actors in Market Economies and the Limited Strategic Actorhood of Universities

When considering how universities could become particular kinds of strategic actors, it is obviously important to clarify what is meant by this term and how we could decide in what respects they are indeed similar to organisational actors in other fields of activity. One characterisation that has been applied to universities in a number of recent discussions of their changing nature refers to their becoming more entrepreneurial and enterprising (Bleiklie, 2005; Clark, 1998; Etzkowitz, 2003; Krucken, 2003; Marginson and Considine, 2001).

Such organisations are seen as independent collective actors pursuing distinctive purposes in competitive circumstances with idiosyncratic resources and capabilities. As Clark (1998:4) puts it: "An entrepreneurial university, on its own, actively seeks to innovate in how it goes about its business.....(they) seek to become 'stand up' universities that are significant actors on their own terms". Later on he suggests that they are similar to high technology firms in developing a work culture that embraces change. The important characteristic here seems to be the ability of the university as a whole to determine its own destiny, with unified authority over resource acquisition and use and substantial autonomy from the state and from scientific elites.

However, this concept of strategic action emphasises external autonomy and internal integration through central authority at the expense of organisational learning and development of collective capabilities that provide competitive advantages. Firms become strategic actors in market economies only partly on the basis of being able to determine their own goals and act as a unitary entity. Equally important is their ability to generate and change particular kinds of organisational skills and knowledge through the authoritative coordination and direction of human and material resources that cannot be readily imitated by competitors. Following work by Penrose (1959), Richardson (1972; 1998), organisation-specific knowledge and collective problem solving skills are increasingly being emphasised as essential characteristics of firms that differentiate them from simple aggregations of individuals, legal fictions and purely financial vehicles (Dosi et al., 2000; Helfat et al., 2007).

As Teece et al (1997), Kogut and Zander (1992) and others have highlighted, it is the development of collective capabilities through the systematic coordination and authoritative steering of economic activities and generation of joint problem

solving routines by mobilising employee commitment that are crucial for firms to be able to compete effectively as separate strategic actors (Metcalf and James, 2000). This implies that legally constituted companies may not actually function as distinct strategic actors in this sense if they lack collective capabilities that are both specific to the firm and embedded in organisational processes and understandings.

Crucial to this development of firm specific knowledge and competences is the use of authority to coordinate and direct activities (Hamilton and Feenstra, 1997). Such authority need not necessarily be hierarchical, it can be realised through horizontal networks of business partners such as the postwar Japanese inter-market groups, Chinese entrepreneurial networks and Italian industrial districts as well as by formal hierarchies (Crouch et al., 2001; 2004; Gerlach, 1992; Hendrischke, 2007). The critical point is that the organisation is able to take decisions that are binding upon its members and commit resources to achieve collective goals. Thus, cartels, trade associations, business groups and labour union federations can all function as authoritative strategic actors in particular kinds of market economies insofar as they are capable of exercising collective authority over the activities of their members and effectively sanctioning deviant behaviour (Whitley 2007).

However, employment organisations as strategic actors are additionally able to use authority to organise and direct the work of their staff for organisation-specific purposes. Because employment contracts in market economies usually grant employers and their agents the right to use employees' skills and knowledge in ways that they can determine, and to change these as circumstances alter - subject to legal, labour union and professional constraints - they are largely able to structure the division of labour and coordination processes as they wish. By doing so in organisation-specific ways, they generate particular kinds of routines and knowledge that are difficult for others to replicate and can confer sustained competitive advantages on particular firms. Through organising and controlling work in idiosyncratic ways, then, employing organisations not only function as distinct units of authoritative action, but also construct unique collective knowledge and skills for dealing with problems that enable them to perform better than their competitors.

In the light of this view of firms in market economies, if universities are to become strategic actors with distinctive organisational capabilities and knowledge, they would have to develop two sets of collective capabilities. First, to exercise discretionary authority over the acquisition, use and disposal of human and material resources, and second, to generate particular kinds of problem solving routines and knowledge that are organisationally specific rather than being the product of individual employees and project teams. Creating such organisation-specific capabilities would require researchers to share their intellectual goals, resources and knowledge in the joint pursuit of organisational purposes, as distinct from those of individual research groups and scientific fields.

As numerous studies of higher education systems have emphasised over recent decades, the discretionary powers of universities as collective actors differ greatly between nation states (see, e.g., Braun and Merrien, 1999; Krucken et al., 2007;

Mowery and Sampat, 2005). They have been particularly low in much of continental Europe and East Asia where they have not directly employed academic staff or had much authority over the allocation of resources between departments and faculties, let alone been able to establish new institutes or close existing ones. Often they have functioned as administrative channels for distributing state funds to established groups and collective academic bodies for certifying intellectual competences. Usually their administrative procedures were determined by state regulations, including in some countries how degree courses were to be organised, students assessed and facilities administered in much the same way as other state organisations. They were even more limited organisations than the holding companies and financial vehicles characterised by Teece et al (1994) as hollow firms.

At the other end of the discretionary continuum - although in practice this is a multidimensional set of distinctions - are the private US universities that support themselves from student fees, endowment income, alumni donations and external research grants (Geiger, 1986). These are typically self-governing non-profit corporations whose managers are appointed by self-selected boards of trustees and are independent of state agencies, although to obtain federal funds they have to be accredited by state-recognised associations and follow national rules. Academics are their employees whose conditions of service are decided by each university, albeit with some influence from the labour union in many cases, and in theory the organisation of departments and faculties is a matter for each institution to determine on its own.

These powers have enabled many US universities to invest in a range of ancillary activities, such as student and alumni support services, development offices and general cultural facilities, in order to differentiate themselves from other higher education institutions in an era of greatly expanded provision, and to gain additional discretionary resources (Rhoades and Sporn, 2002). They have also been able to establish organisation-specific procedures for reporting inventions, evaluating research and teaching performance and other accountability mechanisms (Huisman and Currie, 2004).

Such strategic autonomy in resource acquisition and use undoubtedly enables many US universities to make discretionary investments in particular fields, establish different kinds of departments and faculties and promote novel kinds of interdisciplinary cooperation. They are also able to engage in different kinds of activities such that they are much less standardised and homogenous in their teaching programmes and research specialisations than their equivalents in more state-dominated systems (Brint, 2005).

However, these kinds of strategic choices are more similar to those of holding companies and investment portfolio managers than entrepreneurial decision-making in more authoritatively integrated and directed work organisations. In particular, they rarely, if ever, systematically plan, coordinate, continuously monitor and improve work activities designed to achieve collective goals by combining specialist skills and knowledge to deal with common problems. They therefore do not develop organisation-specific problem solving skills and knowledge in carrying out their core activities that enable them as distinct

authoritatively controlled organisations to undertake them more effectively than their competitors.

The very limited coordination and direction of research activities by universities stems from the inherent uncertainty of public scientific research and the prevalent, if not dominant, role of scientific communities composed of researchers around the world in establishing research priorities and evaluating the merits of different research results (Glaser, 2007; Musselin, 2007). While the extent of such international reputational control of research goals and evaluation standards varies between fields and over time (Whitley, 2000), universities competing for scientific renown on the basis of their employees' intellectual contributions have to accept the collective judgements of competent researchers throughout the world concerning the nature of important problems and the significance of outputs.

As employers, then, universities have limited discretion over the kinds of skills and knowledge they recruit when they seek to contribute to particular scientific fields, and over the intellectual priorities to be pursued by research groups. Equally, they are usually only able to assess the performance of employees at second hand and have to rely on the collective judgements of external researchers as evidenced through citations, scholarly association prizes and other indicators in assessing the worth of researchers' achievements. The ability of research organisations to: a) determine collective objectives, b) organise the division of scientific labour, c) ensure collaboration and integration of work activities to achieve organisational goals and, d) evaluate work performance is therefore highly constrained in the public sciences. As a result, they are unable to develop distinctive organisational capabilities on the basis of such collective coordination and direction.

This need not, and often does not, prevent some university departments and research groups from attempting to control the direction of a discipline or specialist field, and to determine the standards governing research competence and value, through, for instance, controlling leading journals, scholarly societies, examination procedures and the appointment of academics. Particularly in relatively small fields where reputational systems are quite nationally specific, as in many parts of the humanities and social sciences in the 20th century, it has been possible for a few institutes to determine intellectual goals and standards for the field as a whole and/or establish separate schools of thought (see, e.g. Amsterdamska, 1987; Maloney, 1991; Ross, 1979; and the cases discussed in Whitley, 2000: chapter 5).

However, such local domination of reputational systems is rarely achieved by entire universities as employers, even in highly hierarchically organised academic systems, but rather reflects the ability of specialist groups to impose their research agenda on disciplinary colleague-competitors. Universities can provide favourable facilities and, as at Stanford in the interwar period, increase research time to boost employees' chances of making significant contributions (Hughes, 2001), but do not succeed in determining the direction and standards of the sciences as a whole through their organisational ability to coordinate and direct research projects. Rather, individuals, research groups and specialist networks of disciples, patronage and resource providers can use local power bases to dominate

scientific fields for a time, until competing groups succeed in changing the prevailing standards and/or differentiating the discipline into subfields with separate goals and skills.

This dependence of universities on the verdicts of specialist scientific communities is, of course, partly generated by the pervasive uncertainty of scientific research. Since knowledge claims in the public sciences have to be innovative to become published and accepted as valid contributions - albeit to varying extents and within commonly accepted norms (Kuhn, 1977) - organisations devoted to the generation of scientific knowledge are incapable of planning research projects to produce specified results beforehand. Such uncertainty about outcomes is intensified by the highly tacit and often weakly standardised nature of most research technologies. Materials and equipment have to be actively constructed as standard entities that can be expected to behave in the same way in different laboratories - as in the case of monoclonal antibodies (Cambrosio and Keating, 1998). Additionally, how they are to be used to generate particular kinds of results is usually difficult to describe and understand, let alone replicate, as Collins (1974) indicated in the case of the TEA laser (see, also, Joerges and Shinn, 2001 for a number of studies of how research technologies are developed and diffused in different fields).

Such pervasive uncertainty about both cause-effect relationships in knowledge production and uncertainty about the meaning and significance of results, which often extends over considerable periods of time as they are reinterpreted and re-evaluated in changing contexts, greatly restricts the ability of university administrators to coordinate and direct research activities in the public sciences. Since researchers themselves often do not know how their work "succeeds" or "fails," and typically are unsure what outcomes will eventuate in any precise sense that could enable them to be integrated across projects and groups in a reasonably reliable and predictable manner, systematic planning of research activities to achieve collective organisational goals would seem quite quixotic in most fields.

Even when goals can be specified more coherently and outcomes systematically assessed, as in much - but by no means all - university teaching, the technologies available remain poorly understood despite extensive pedagogical research and much investment in programmed learning. While this may be partly because academics control the evaluation of student competence and definition of appropriate intellectual skills and knowledge, it also reflects considerable uncertainty about how such competence is to be gained such that teaching could be planned and conducted according to standard protocols and performance evaluated by non-specialists. Organisation-specific ways of teaching students and training researchers that are distinct from, and not highly dependent upon, individual and small group practices are, therefore, difficult to establish and monitor, even when materials such as business school cases and scientific textbooks are quite standardised.

Given the common individual and small group development and ownership of many courses in research universities, it is not surprising that increasing the degree of administrative integration of teaching activities beyond constructing

timetables and standardising formats for presenting course objectives, materials, etc., has been difficult in many higher education systems (Musselin, 2007). Rather than being able to structure them systematically according to distinct organisational routines that ensure inputs and outputs of different activities were coherently aligned as in Thompson's (1967) notion of sequential interdependence, teaching activities are more often organised as discrete specialist courses that are loosely coupled at best, with limited collaboration over the content and delivery of different topics and materials.

These limitations on the ability of universities as employers to organise and direct particular divisions of scientific labour and integrate resulting outputs around specific organisational purposes mean that they are rarely able to develop distinctive and hard to imitate collective capabilities in carrying out their core activities that would provide them with competitive advantages in the quasi-markets they are increasingly facing. As putative strategic actors, then, they may develop some organisation-specific problem solving routines in managing resources, attracting high quality staff and students, and raising funds through the employment of managerial professionals to carry out these tasks (Rhoades and Sporn, 2002), but these competences rarely extend to the management of research and teaching activities. In most sciences and most research universities, effective research skills and knowledge about how to select and conceptualise problems, develop appropriate research strategies and techniques, and organise project teams remains firmly located at the specialist and small group level, and employers are restricted to facilitating such groups' activities rather than systematically organising them.

If, then, Etzkowitz (2003) is correct in asserting that research groups in US research universities are firm-like and entrepreneurial, the extent to which their employing organisation as a whole can be similarly characterised remains quite restricted, particularly with respect to their development of organisation-specific capabilities for producing and inculcating new knowledge. While some universities in some countries may have sufficient discretion and resources to make strategic investments in developing new areas of research and teaching programmes, their authoritative integration and direction of core activities remains limited.

Insofar as organisational actorhood is understood to imply unified central authority over the design of work processes, the coordination of their outputs and the development of collective capabilities for dealing with problems, adapting to change and seizing entrepreneurial opportunities through mobilising the commitment of skilled staff, it is unlikely to be achieved in most research universities in the OECD economies. Rather, as they develop greater autonomy from the state, they could become more similar to portfolio managers who decide to make strategic investments in particular project teams and scientific specialities. However, their authority over such teams and their ability to evaluate performance are typically much less than in most investment companies.

Variations in the Strategic Actorhood of Universities

Within these limitations on universities developing distinctive organisation-wide competences, though, there remain major differences in the extent to which, and

ways in which, universities exercise authority over resource acquisition, use and disposal in different countries. These variations continue to affect how they respond to recent changes in their environments and become particular kinds of organisational actors (Krucken and Meier, 2006; Musselin, 2007). Despite the general tendency of states coping with the effects of mass higher education and diversification of institutional goals to reduce direct state control over university operations, significant national differences in the cohesion and autonomy of universities remain (Henkel and Little, 1999; Krucken, 2003; Mowery and Sampat, 2005), and continue to affect their ability to act strategically. It is therefore useful to consider how and why their development as distinct organisations varies across nation states and their strategic capabilities and purposes are likely to remain nationally specific.

The major differences in the kinds of universities that are developing as separate organisational entities in different nation states can be explored through the comparison of four ideal types. These vary in their ability to exercise authority over inputs and outputs, as well as internal processes, independently from state agencies, on the one hand, and scientific elites, on the other hand. A particularly important difference concerns their role as employers of academic staff and establish organisationally-specific employment policies and practices. The key characteristics of these ideal types are summarised in table 1 and will now be further discussed.

TABLE 1 ABOUT HERE

Beginning with the two variants of *hollow* organisations, these have little or no discretionary control over resources, employment policies and internal academic structures. Most of their financial and administrative decisions are made by state agencies, while academic matters are usually decided by the professors in charge of faculties and institutes. Such universities have limited freedom to shift resources between activities, subject areas and services, let alone to establish new areas of research and teaching or to close existing ones. Since academics are state employees, as often are most other staff, universities are unable to vary employment practices and sometimes cannot decide who should be appointed or whether they should be promoted.

The main difference between the two kinds of such hollow organisational types identified here concerns their relative independence from the state and the ability of scientific elites to exercise independent and collective influence over intellectual reputations, research goals and employment decisions. In the first, *fragmented*, type, universities are simply arms of the state with little or no discretion over teaching programmes student selection, resource acquisition, staff recruitment, allocation or mobility, and the management of facilities.

In Musselin's (1999) characterisation of the French system before 1989, universities did not exist as coherent organisational structures because the key decision making entities controlling curricula and resources were different parts of the Ministry for Research and Higher Education that focused on different activities in different areas of the sciences without considering the university as a distinct entity at all. As she suggests (1999: 46): "a university budget was no more than

the sum of the resources allocated (through bureaucratic criteria)". Although disciplinary leaders were involved in evaluating proposals for courses and programmes, they were selected by the Ministry and changed when elite members changed, thus functioning more as temporary servants of the state than as agents of scientific communities.

Another example of a higher education system that shared many of these characteristics is that of postwar Japan. In his account of Japanese science, Coleman (1999:122) has suggested that: "national university faculties in Japan find themselves in the lower ranks of a chain of command under the Ministry of Education. Various academic self-governance mechanisms obscure the relationship, but at its core are the Ministry's power of financial decision making and its assignment of administrative staff to each national university" (cf. Kneller, 2007).

In the second, *bifurcated*, variant of hollow organisational types, such state dominance over academic curricula and resources is counterbalanced - to varying degrees in different countries - by greater academic influence, especially over appointments, promotions and educational programmes. Here, the university remains weak, both as a source of collective identity and commitment and as a decision-making entity, and does not directly employ its academic staff.

Decisions in these kinds of higher education systems are taken either by national or regional government Ministries or by academic elites reflecting collective scientific judgements, but rarely by university administrators who are squeezed between these groups. Budget setting, administrative routines and resource allocation processes are usually determined by the state without much, if any scope for university variation, and disciplinary identities, reputations and elites largely determine scientific careers, goals and rewards. While some such universities may have a more distinct organisational identity and elaborate administrative apparatus than do fragmented ones, as Musselin (1999) suggests was the case for German universities in comparison with French ones, their capacity for independent strategic action remains severely constrained (Schimank, 2005).

Considering next higher education systems in which universities and similar organisations are able to employ academics directly, states often grant them some discretion over resource allocation, curricula development, student selection, assessment, and academic structures as well. However, there are considerable differences in how much autonomy universities have from state agencies and other external groups such as funding bodies, on the one hand, and from scientific elites and internal faculty leaders, on the other hand.

For analytical purposes in distinguishing degrees and types of strategic independence and action, we can identify two ideal types of universities as employment organisations: *state-chartered* and *market-based*. While both are able to hire academic staff and determine their own promotion and other reward policies, as well as having some discretion over their internal structures and procedures, they vary in their capacity to control inputs and outputs independently of state agencies, including entering and exiting particular "markets" such as

those for medical and law experts, set tuition fee levels and determine financial policies, and to develop and implement different academic strategies in different ways.

State-chartered universities are authorised by the state for particular purposes and under certain conditions. In these kinds of higher education systems, the state effectively decides which organisations shall be entitled to function as universities, their resources, powers and responsibilities, as well as establishing mechanisms of academic and financial accountability. While being formally set up as separate organisations with their own governance structures and powers to award degrees, hire staff, organise activities and manage facilities as they see fit, universities nonetheless have to do so within the general framework of the state higher education system and conform to its standards and policies. Their charters have to be approved by the state, as do any changes to these, and *in extremis*, they could be withdrawn.

Such state supervision is usually reinforced by the dominant role of state funding, especially since 1945 (Williams, 1999), which enables governments to influence curricula and accounting procedures directly and insist upon standard mechanisms for evaluating quality and achieving national goals. Additionally, through the growing use of project based funding of research at the expense of block grants, state agencies are also able to affect intellectual priorities and criteria for judging research performance, especially since the establishment of research evaluation systems in many countries (Whitley and Glaser, 2007).

Market-based universities, in contrast, are much more independent of state tutelage and state licensing. In principle, though by no means always in practice (Graham and Diamond, 1997; Mowery et al., 2004), market entry and exit are unrestrained by state ministries so that tertiary education and published research can be provided by any organisation wishing to do so without being required to obtain formal state approval. Some form of collective accreditation can be expected to become institutionalised in such societies, however, as universities seek to establish their legitimacy and to maintain standards, as in the founding of the Association of American Universities in 1900 (Geiger, 1986: 18-20).

Many market-based universities are free to employ whom they like on whatever terms they wish, and their managers have the same powers to organise and direct research and teaching activities as those in charge of profit seeking private companies. Indeed, for-profit universities can be, and sometimes are, established in such societies, although these are usually focused on large-scale teaching of relatively low cost subjects with clear practical benefits for their graduates.

In terms of being able to determine their own destinies with their own resources in a competitive market environment, such market-based universities are clearly able to act strategically and potentially develop distinctive organisational routines and capabilities in diverse ways. In the late 20th century USA, for example, some ambitious universities that lacked the resources and prestige of the top research universities differentiated themselves from the traditional discipline based model by pursuing interdisciplinary strategies for "creating the future" (Brint, 2005). This kind of higher education system tends, then, to contain a much more

heterogeneous and varied set of organisations than that found in the other three types discussed here (Gittelman, 2006).

However, this freedom of strategic action for research universities is constrained by scientific elites, on the one hand, and by funding agencies, on the other hand. Both state-chartered and market-based universities competing for intellectual prestige through the contributions of their staff to scientific goals have to share authority over their primary activities with national and international scientific communities that collectively and over time decide what is worth studying, what are the competences required for doing so effectively, and what are the significance and worth of research results.

Indeed, Geiger (1986: 36-38) suggests that the growth of US research universities in the early 20th century involved the delegation of much decision-making authority to departments who increasingly relied upon the judgements of large disciplinary communities in making appointments and promotions. Intellectually ambitious university presidents came to rely more and more on scientific reputations when allocating resources, and so helped to establish a national academic labour market in which specialised departments competed for the most renowned scientists in their particular disciplines.

In this most "market-like" university system, then, considerable local autonomy and hierarchical control - which had characterised many 19th century colleges and universities - became substantially replaced by more collegiate and discipline based authority relations in which strategic choices focused on how to compete for the best researchers and obtain the funding to provide them with the best facilities to make the most significant contributions to their field. Such competition for scientific prestige also led to greater standardisation of graduate training and certificates as many universities sought to emulate the leading organisations (Geiger 1986; Graham and Diamond, 1997).

Consequently, although both state-chartered and market-based types of universities have more autonomy from the state in obtaining and allocating resources than do their more hollow counterparts, they are equally constrained by disciplinary judgements and limited in their ability to generate organisation-specific capabilities through the systematic coordination of work activities by their pursuit of scientific prestige in diverse specialisms. As long as they rely on national and international reputational systems for establishing research priorities and evaluating performance, the ability of employment organisations to develop high levels of employee commitment to the development and improvement of organisation-specific competences - as distinct from contributing to the goals of specialist fields - remains lower than that of most private companies.

Such constraints do not, of course, apply to nearly the same extent to staff recruited to undertake more university specific goals such as improving student support services and fund raising. The employment of such managerial professionals by universities has expanded considerably in the USA and some other countries in recent decades (Rhoades and Sporn, 2002) and in principle allows them to develop similarly organisation specific capabilities and problem solving routines as those generated by professional service companies. However,

as long as their primary concern remains the competitive pursuit of academic prestige through scientific contributions, these kinds of collective competences will be less central to employment organisations and they continue to share authority with scientific elites and researchers.

Societal Influences on the Strategic Actorhood of Universities

The extent to which research universities in a society come to resemble any of these four ideal types depends on a number of features of their environment, notably of course the structure and policies of the state and the organisation of the public science system (Rothblatt and Wittrock, 1993; Teichler, 1996; Whitley, 2003a). In most industrialised societies, the state controls the formal status of universities and specified the conditions under which they can award qualifications, recruit students and offer programmes of study. States also provide the bulk of the funding for teaching and research activities and establish particular procedures for allocating such resources and evaluating their use. The extent to which, and ways in which they delegate control over activities and funds to variously constituted university administrators and scientific elites vary considerably between nation states resulting in major differences in how universities are managed and research is coordinated.

These variations often reflect broader patterns of state structures and policies, especially how political and bureaucratic elites have steered social and economic development during and after industrialisation, as well as the nature of labour markets for skilled professionals. The key aspects of the state's role in managing socio-economic change and of the organisation of public science systems that affect the strategic autonomy and capabilities of universities are listed in table 2, together with their likely influence, and will now be further discussed.

TABLE 2 ABOUT HERE

Beginning with the general pattern of state-society relations in market economies, it has become common to distinguish between those where the state is actively involved in coordinating and guiding market processes and actors, on the one hand, from those where it takes a more reactive and regulatory role, on the other hand (see, e.g., the discussions in Evans, 1994; Hall and Soskice, 2001; Crouch and Streeck, 1997). While relying solely on such a sharp dichotomy to identify the key differences between states and economic development is misleading (Allen, 2004; Crouch, 2005; Whitley, 2007), it does nonetheless highlight the different extents to which state elites become involved in constituting and steering the substantive behaviour of organisational actors.

In very broad terms, we would expect states that are proactive in managing social and economic development processes, taking what Evans (1994: 12-14) terms promotional roles, the more likely they will view universities as important resources for socio-economic development that can, and should, be integrated into the state apparatus and controlled by it. This is especially probable when state elites adopt a *dominant developmental* approach in which it dominates society and discourages the formation of independent intermediary organisations between individual families and the nation state. As organisations dedicated to

producing knowledge and educating members of the elite, universities are unlikely to be granted substantive autonomy, let alone freedom of market entry and exit, in such societies.

In contrast, more *regulatory* states seem likely to permit universities to become more autonomous organisations within the state established framework, which can develop their own idiosyncratic ways of contributing to societal purposes. Formal regulation of relatively independent organisations is here more widespread than substantive steering of priorities and procedures. As such states allow universities to determine their own use of resources to a greater extent than do promotional states, they also encourage them to develop distinctive organisational routines for managing resources and making strategic investment decisions.

Secondly, the autonomy of universities is also affected by their role in the selection, training and assessment of social, political and economic elites in different societies. In many higher education systems, a central role of universities and similar elite schools has been to develop future members of the bureaucratic and political elites and the major professions. As a result, they have tended to be seen as state institutions, or at least as bodies fulfilling state functions, and so governed by state rules and employment policies. Overall, the more that states license elite professionals and rely on universities to train and examine entrants to such occupations as agents of the state, the less they are likely to conceive of them as independent autonomous corporations with their own separate interests and capabilities.

In contrast, where states usually delegate more control over professional labour markets and competence standards to professional elites, and the role of universities in selecting future leaders of the state is more informal - if not indeed quite tenuous - they may well permit greater university independence and separation from the state. Such decentralisation of authority is more probable in regulatory states than promotional ones. Overall, then, university autonomy from the state and discretion over resource allocation, employment policies and educational programmes seem likely to be greatest in societies where the state has traditionally been more regulatory than developmental, elite professionals have been semi-detached from the state, and universities are not primarily and directly concerned with selecting and training future state officials.

Turning now to consider how more specific features of public science systems are likely to affect university autonomy and capabilities, these are primarily concerned with the sources and allocation mechanisms of resources. In general, the more varied are the sources of funds for research and teaching, and, in particular, the more diverse are the objectives and procedures of funding agencies, the more universities are likely to become independent from the state and able to determine their own patterns of resource use and purposes. Such diversity will also encourage universities to develop administrative capabilities to obtain and manage resources through the employment of professional staff. As Geiger (1986: 48-56) has emphasised, the larger private universities in the USA invested in considerable fund raising activities in order to become significant research organisations in the early 20th century, and such investments have also become quite common in public ones (Brint, 2005; Rhoades and Sporn, 2002).

While most higher education systems are not so dominated by private institutions, the example of the USA highlights the importance of gaining control of general funds for universities seeking to pursue distinct strategies in a competitive environment. To become powerful strategic actors in the struggle for research stars, facilities and prestige, many universities have sought additional funds beyond tuition fees and public support that they could control as strategic managers. The enthusiasm with which many universities have pursued the development and ownership of intellectual property rights reflects this search for general funds that could be used at the discretion of university managers, although some inventors at Stanford and no doubt elsewhere wanted commercialisation revenues to go to their own schools, departments and laboratories rather than to the central university administration (Colyvas, 2007).

A further feature of higher education funding systems that affects university autonomy is, of course, the means through which resources are distributed, especially those from the state (Braun, 1998; Liefner, 2003). Where this is done on a block grant basis, universities are more able to exercise some discretion over resource allocation internally and, in principle, can cross subsidise new developments and make strategic investment decisions. As Engwall and Nybom (2007) suggest in their description of recent changes in the Swedish higher education system, reducing the proportion of university research funds allocated through such block grants in favour of competitive project grants restricts their capacity to set priorities internally and develop distinctive research profiles.

A central characteristic of the resource allocation process that affects university discretion over strategic priorities and the direction of activities internally is the degree to which states and other governing bodies rely on the judgements of disciplinary élites in making appointments, especially to senior posts in universities, as opposed to political-bureaucratic patronage or local elite selection. This is crucial to the establishment of reputational communities as distinct intellectual organisations controlling the direction of research in particular fields.

By making employment and promotion decisions dependent on scientific merit as determined by researchers' collective evaluations, states and universities effectively delegate much control over knowledge production to national and international communities, as distinct from local employers, and so greatly limit the ability of universities to coordinate and guide a key activity of their staff. While the extent of such network governance of research varies between scientific fields and higher education systems - reflecting in part the degree of concentration of elite control over key resources such as research facilities, journal space and access to funds (Whitley, 2000) - it clearly restricts the ability of universities to develop idiosyncratic and organisation-specific research goals and contributions.

The delegation of research direction and evaluation to extra-university intellectual communities is reinforced by the growth of project based research funding allocated by peer review. As the external funding of research, especially by state research councils and foundations, has expanded since the end of the Second World War, and as it has been largely awarded on the basis of relative intellectual significance and competence as determined by colleague-competitors, the

autonomy of researchers from their local employers has increased, particularly where research grants include a substantial contribution to university overheads. These often became a significant source of university funding as well as allowing researchers to buy themselves out of university obligations, especially teaching.

As "Grant Swinger" (Greenberg, 1966) became more able to gain independent access to most of the money required for his or her research, including much of the researcher's salary and overhead costs, on the basis of the scientific merit of project proposals, the ability of universities to coordinate and control the activities of their staff became considerably weakened. Organisation-wide strategies became more difficult to implement in such situations, except perhaps in the sense of assisting such fund raising, as more university income became earmarked for specific purposes decided by employees, not the university administration.

The willingness of states and other funding organisations to rely on peer review judgements in allocating resources reflects the general social and political prestige of scientists. The more that science is seen as the dominant source of true knowledge that constitutes the basis of high level skills and informs successful policy making, the more influential will scientific communities become in establishing standards for evaluating proposals and determining priorities. The ability of universities as local organisations to guide research and develop distinctive strategies in such societies will obviously be more limited than where scientific elites have rather less prestige.

Bearing these points in mind, how would we expect the continuing attempts to reorganise public systems of higher education and research in many OECD states and increasing commercialisation of results by universities to affect their strategic capabilities and behaviour? In particular, how is the formal denationalisation of academics' employment status and delegation of some financial and administrative powers to universities likely to develop their organisational actorhood, and how is the growing interest of universities in controlling intellectual property rights affecting their ability to coordinate research projects and develop distinctive organisational capabilities?

The analysis so far would suggest that the kinds of state delegation of resource control to universities that have taken place in the last few decades of the 20th century have had limited impact on their ability to become strategic actors. This is especially so where: a) the bulk of their resources are still provided by the state, b) control over degree programmes and certification procedures remains ultimately in the hands of the state, and, c) academic employment procedures and practices remain regulated by the state and standardised across universities.

Particularly where the state has played a major role in social and economic development, it seems improbable that the limited powers delegated to university administrations in most of these promotional states will enable them to develop either strategic capabilities or substantive decision making autonomy in the absence of much greater diversity of funding sources, control over appointments and promotions and over the provision of degree programmes and examination procedures. Dependence on the state in these circumstances remains

considerable despite some formal enhancement of universities' powers and their negotiation of funding "contracts" with the state. As Musselin (1999) emphasises in the case of France, such contracts are often highly asymmetric agreements that can be, and have been, abrogated by the state without the universities having any redress.

In more corporatist societies where states have traditionally shared authority with peak associations representing the interests of capital and labour and other relatively independent collective bodies, we might expect such formal delegation to have more significant consequences for universities. This depends, though, on their being able to: a) attract significant resources from a variety of sources and manage them for their own purposes, b) control the nature and range of degree programmes and, c) determine their own employment and promotion procedures, as well as their own internal organisational structures.

As Schimank et al (1999), Lange (2007) and others have suggested in the case of Germany, state ministries often continue to retain ultimate control over many of these areas. Furthermore, the pervasive standardisation of teaching duties, examination procedures and employment practises through regulations restrict the ability of universities to pursue distinctive policies and innovate despite official attempts to reduce the level of external control over budget allocations. As long as universities have to obtain the bulk of their resources from a single source, follow official procedures in many of their activities and gain state approval for changes to their products, internal organisation and for appointments and promotions, they are unlikely to develop distinctive organisational capabilities or to be able to act strategically as separate collective actors. Even investing in the kinds of ancillary activities that many US state universities have developed in recent years seems improbable when universities remain highly dependent on state agencies.

The importance of being able to attract funds from a wide variety of sources, especially those that are not tied to specific activities, for university autonomy and strategic actorhood is evident from the experience of Australian universities since the reforms of the late 1980s and subsequent implementation of quasi-markets for student fees and research income (Marginson and Considine, 2000). The historically high level of financial dependence of universities on the federal Australian government and limited support for research from industry, commerce and charitable foundations, coupled with the relatively weak prestige of scientists and intellectuals more generally in Australian society, meant that when the state radically restructured the higher education system around neo-market presumptions, there were few alternative financial, political and cultural resources to be drawn upon by academics seeking to resist these pressures (Glaser and Laudel, 2007).

According to Marginson and Considine (2000), most university managers imitated the state's sticks and carrots internally as they struggled to deal with the changing environment, and developed remarkably similar strategies in competing for resources. Despite being granted considerable autonomy in how they were to compete, and so in theory encouraged to develop distinctive competences around novel goals, their dependence on much reduced state spending and strong state

specification of the rules of the game have meant that few universities have been able or willing to pursue innovative strategies or to challenge the state's logic of action. This homogeneity of organisational responses to budget cuts and intensive competition for resources has been exacerbated by making universities' research funding highly dependent on success in gaining project grants from a single source, the Australian Research Council. Delegation and competition have not resulted in diversity and innovation in this case, whereas the combination of competition for prestige, diverse funding sources and a relatively munificent resource environment for universities in the postwar USA seems to have encouraged greater organisational innovation (Brint, 2005).

The search for resources that are not tied to specific projects has, of course, led universities in many countries to try to exploit their ownership of intellectual property rights, including encouraging new firm formation around research based technologies and licensing of patents. Investment in technology licensing and transfer offices has often been facilitated by changes in patent legislation following the apparent, but limited, success of the Bayh-Dole Act in the USA (Geuna and Nesta, 2006; Mowery et al., 2004; Siegel et al., 2003). According to Jason Owen-Smith (2003), the success of some US universities' licensing policies has enabled them to improve their intellectual prestige considerably by generating discretionary funds that could support investment in high quality research. This is leading to what he sees as a hybrid system of public and private science in which the commercial profitability and reputational prestige of elite universities become mutually reinforcing rather than functioning as largely separate activities and environments.

Whether this claim is justified, and it does depend considerably on the openness of competition for resources and prestige in national higher education systems (Gittelman, 2006), his study emphasises the importance of successful commercialisation of intellectual property for university actorhood. This is especially so for resources that can be used at the discretion of the university as a whole rather than being controlled by individuals and departments. If commercialisation of research results and external funding of projects remain specific to specialist activities and the resources gained are primarily under the control of research groups, as they sometimes are in the case of new firm formation, the university as a whole may not benefit greatly but could become more fragmented into separate specialist subunits, each controlling its own income streams. In general, then, the greater the proportion of university income and other resources than can be used for broad, unspecified purposes to be decided by university managers, the more potential strategic autonomy they have.

Concluding Remarks

This discussion has highlighted five main points about the changing nature of universities in many societies and their capacity for strategic action. First, there are very strong, if not overwhelming, barriers to research universities developing distinctive organisational competences on the basis of their authoritative coordination and control of work activities. As long as they compete for prestige and resources on the basis of researchers' contributions to scientific knowledge in different fields, they will be highly constrained in their ability to integrate

specialised research and teaching activities for the achievement of distinctive organisational purposes. They are most unlikely, then, to become Penrosian firms whose management of core tasks generates organisation specific competences in knowledge production and dissemination that provide them with competitive advantages in the market for intellectual products and certified expertise.

Rather, insofar as they are able to exercise some discretion over resource acquisition and use, they may come to resemble project-based organisations that provide common facilities and services for a wide variety of specialist project teams operating quite independently of each other, in a manner similar to Thompson's (1967) pooled interdependence (Whitley, 2006). It is largely, if not almost entirely, at the research team level of organisation and coordination that distinctive capabilities are developed for the pursuit of particular goals, rather than in much larger organisational units (Clark, 1979).

Second, universities in some societies are becoming more able to develop organisational capabilities in ancillary activities that support research and teaching, either directly as in student support services, or indirectly, as in commercialisation of research results. In these areas, the more autonomous universities can employ expert staff on similar terms of professionals in business service organisations and can coordinate their tasks through managerial routines that are organisationally specific and hence difficult to imitate. Depending on the organisation of skill formation systems and labour markets in different societies (Culpepper and Finegold, 1999; Soskice, 1999; Thelen, 2004), universities may be able to structure the work of these kinds of units in novel ways that lead to new kinds of services being developed with distinctive collective capabilities, as in advertising, consultancy and many other knowledge intensive business services markets (Grabher, 2002; Miozzo and Grimshaw, 2006; Whitley, 2006).

Third, the emergence of universities as particular kinds of strategic actors depends critically on the structure and policies of nation states, especially their role in steering social and economic development. Higher education systems remain highly nationally distinct, and universities continue to operate in different environments, despite their general diffusion throughout the world (Krucken et al., 2007). Their organisational identities, powers and responsibilities are determined by state agencies - albeit to varying degree - and most of their financial resources are provided by the state, directly and indirectly. How much strategic autonomy and capability they develop is still largely decided by nation states, as is the variety of different kinds of universities with different kinds of resources, roles and powers. While some universities may be able in some societies to influence state policies as independent collective actors, as for instance in the case of the Bayh-Dole Act in the USA (Mowery et al., 2004), they act within state determined frameworks and rules of the game.

Fourth, the ability of universities to innovate and develop divergent organisational strategies within national frameworks is highly dependent on the availability of funds and other resources from diverse agencies and groups. The more dependent they are upon a single or very small number of state agencies for research funds and facilities, the less likely they will feel able to adopt novel research goals and styles since the risks of failure will be too great. This tendency

will be exacerbated by budget cuts that intensify competition for increasingly limited resources, as in Australia. When states are unwilling to provide long term funding for researchers, intellectual pluralism and risk taking become increasingly dependent on the availability of resources from a variety of different sources with different purposes. Such sources may still be largely state supported but in large and pluralist structures they can pursue divergent goals with contrasting evaluation criteria, as Brint (2005) and Stokes (1997) have suggested has been the case for much postwar research funding in the USA.

Fifth, the effects of increasing commercialisation of research results and business funding of projects on university actorhood depend on the degree to which resources are earmarked for specific projects and activities and critical skills and knowledge remain controlled by researchers and their project teams. The more that these teams can indeed function as quasi-firms independently of university constraints and resource control, the more fragmented and weakened universities become. If star scientists can commercialise their results and successfully establish their own companies while remaining university employees, as has been the case in some biomedical fields (Di Gregorio and Shane, 2003; Krimsky, 1999; Stuart and Ding, 2006), they are able to be increasingly autonomous from their formal employers, which could become hollow organisations if this happens on a large scale.

On the other hand, where the university is able to reap the benefits from such commercialisation and has discretion over how the funds will be used, it obviously becomes capable of more strategic investment decisions and is able to support particular areas of research more substantially. However, the pursuit of discretionary resources could encourage organisational control over research materials and the subservience of intellectual goals to managerial ones, leading ultimately to the institutionalisation of universities as commercial organisations owning intellectual property rights in a similar way to private companies, as seems to be implied in a 2002 US court case (Nelson, 2004). This may increase university actorhood, but at the expense of severely weakening their claims to special privileges and freedom from the responsibilities of companies, as well as making corporate researchers unwilling to share results and material with academics and generating considerable conflicts of interest (Geuna and Nesta, 2006; Krimsky, 1999).

References

- Allen, Matthew (2004) "The Varieties of Capitalism Paradigm: Not enough variety?" *Socio-Economic Review*, 2. 87-108.
- Amsterdamska, Olga (1987) *Schools of Thought: The development of linguistics from Bopp to Saussure*, Dordrecht: Reidel.
- Bleiklie, Ivar (2005) "Organizing Higher Education in a Knowledge Society," *Higher Education*, 49. 31-59.
- Braun, Dietmar (1998) "The Role of Funding Agencies in the Cognitive Development of Science," *Research Policy*, 27. 807-821.
- Braun, Dietmar, (1999) "New Managerialism and the Governance of Universities in a Comparative Perspective," pp 239-261 in D Braun and F-X Merrien (eds).
- Braun, Dietmar and F-X Merrien (eds) (1999) *Towards a New Model of Governance for Universities? A Comparative View* London: Jessica Kingsley Publishers.
- Brint, Steven (2005) "Creating the Future: 'New Directions' in American Research Universities," *Minerva*, 43. 23-50.
- Cambrosio, Alberto and Peter Keating (1998) "Monoclonal Antibodies: From local to extended networks," pp 165-181 in A Thackray (ed) *Private Science: Biotechnology and the rise of the molecular sciences*, Philadelphia: University of Pennsylvania Press.
- Casper, Steven (2007) *Creating Silicon Valley in Europe: Public policy towards new technology industries*, Oxford: Oxford University Press.
- Clark, Burton (1979) "The Many Pathways of Academic Coordination," *Higher Education*, 8. 251-267.
- Clark, Burton R (1998) *Creating Entrepreneurial Universities: Organizational pathways of transformation*, Oxford: Pergamon Press.
- Coleman, Samuel (1999) *Japanese Science: View from the inside*, London: Routledge.
- Collins, H. M., (1974) 'The TEA Set: Tacit Knowledge and Scientific Networks', *Science Studies*, 4, 165-186.
- Colyvas, Jeannette (2007) "From Divergent Meanings to Common Practices: The early institutionalisation of technology transfer in the life sciences at Stanford University," *Research Policy*. 36. 456-476.

Crouch, Colin (2005) *Capitalist Diversity and Change: Recombinant governance and institutional entrepreneurs*, Oxford: Oxford University Press.

Crouch, Colin and Wolfgang Streeck (eds) (1997) *Political Economy of Modern Capitalism*, London: Sage.

Crouch, Colin, Patrick le Gales, Carlo Trigilia and Helmut Voelzkow (2001) *Local Production Systems in Europe: Rise or demise?* Oxford: Oxford University Press.

Crouch, Colin, Patrick Le Gales, Carlo Trigilia and Helmut Voelzkow (2004) *Changing Governance of Local Economies: Responses of European local production systems*, Oxford: Oxford University Press.

Culpepper, Pepper and David Finegold (1999) (eds) *The German Skills Machine: Sustaining comparative advantage in a global economy*, New York: Berghahn Books.

Di Gregorio, Dante and Scott Shane (2003) "Why do some universities generate more start-ups than others?" *Research Policy*, 32. 209-227.

Dosi, Giovanni, Richard Nelson and Sidney Winter (eds) (2000) *The Nature and Dynamics of Organisational Capabilities*, Oxford: Oxford University Press.

Engwall, Lars and Thorsten Nybom (2007) "The Visible Hand versus the Invisible Hand: The allocation of research resources in Swedish universities," pp - in R Whitley and J Glaser (eds).

Etzkowitz, Henry (1999) "Academia Agonistes: The 'triple helix' of government-university-industry relationships in the United States," pp 78-99 in D Braun and F-X Merrien (eds).

Etzkowitz, Henry (2003) "Research Groups as 'quasi-firms': The invention of the entrepreneurial university," *Research Policy*, 32. 109-121.

Evans, Peter (1994) *Embedded Autonomy: States and industrial transformation*, Princeton, New Jersey: Princeton University Press.

Geiger, Roger (1986) *To Advance Knowledge: The growth of American research universities 1900-1940*, Oxford: Oxford University Press.

Gerlach, Michael (1992) *Alliance Capitalism*, Berkeley, CA: University of California Press.

Geuna, Aldo and Lionel Nesta (2006) "University Patenting and its Effects on Academic research: The emerging European evidence," *Research Policy*, 35. 790-807.

Gittelman, Michelle (2006) "National Institutions, Public-Private Knowledge Flows, and Innovative Performance: A comparative study of the biotechnology industry in the US and France," *Research Policy*, 35. 1052-1068.

Glaser, Jochen (2007) "The Social Orders of Research Evaluation Systems," pp in R Whitley and J Glaser (eds).

Glaser, Jochen and Grit Laudel (2007) "Evaluation without Evaluators: The impact of funding formulae on Australian university research," pp in R Whitley and J Glaser (eds).

Grabher, Gernot (2002) "The Project Ecology of Advertising: Tasks, talents and teams," *Regional Studies*, 36. 245-262.

Graham, Hugh Davis and Nancy diamond (1997) *The Rise of American Research Universities: Elites and challengers in the postwar era*, Baltimore: Johns Hopkins University Press.

Greenberg, Dan (1966) "Grant Swinger: Reflections on Six Years of Progress," *Science*, 154. 1424-1425.

Guston, David H (2000) *Politics and Science: Assuring the integrity and productivity of research*, Cambridge: Cambridge University Press.

Hall, Peter and David Soskice (2001) "An Introduction to Varieties of Capitalism," pp 1-68 in P Hall and D Soskice (eds) *Varieties of Capitalism: the institutional foundations of comparative advantage*, Oxford: Oxford University Press.

Hamilton, Gary and Robert C. Feenstra (1997) "Varieties of Hierarchies and Markets: An Introduction" in Marco Orru, Nicole Woolsey Biggart and Gary Hamilton, *The Economic Organisation of East Asian Capitalism*, Thousand Oaks, CA: Sage.

Helfat, Constance E., S Finkelstein, W Mitchell, M Peteraf, H Singh, D Teece and S Winter (2007) *Dynamic Capabilities: Understanding strategic change in organizations*, Oxford: Blackwell.

Hendrischke, Hans (2007) "Networks and Business Networks" in Barbara Krug and Hans Hendrischke (eds) *China's Economy in the 21st Century*, Cheltenham: E Elgar.

Henkel, Mary and Brenda Little (eds) (1999) *Changing Relationships between Higher Education and the State*, London: Jessica Kingsley Publishers.

Hughes, Sally Smith (2001) "Making Dollars Out of DNA. The first major patent in biotechnology and the commercialisation of molecular biology, 1974-1980," *Isis*. 92. 541-575.

Huisman, Jeroen and Jan Currie (2004) "Accountability in Higher Education: Bridge over troubled water?" *Higher Education*, 48. 529-551.

Joerges, Bernward and Terry Shinn (eds) (2001) *Instrumentation between Science, State and Industry*, Sociology of eh Sciences Yearbook 22, Dordrecht: Kluwer.

Kogut, Bruce and Udo Zander (1992) "Knowledge of the Firm, Combinative Capabilities, and the Replication of Technology," *Organization Science*, 3. 383-397.

Kneller, Robert (2007) "Prospective and retrospective Evaluation Systems in Context: Insights from Japan," pp - in R Whitley and J Glaser (eds).

Krucken, Georg (2003) "Learning the 'New, New Thing': On the role of path dependency in university structures," *Higher Education*, 46. 315-339.

Krucken, Georg and Frank Meier (2006) "Turning the University into an Organizational Actor," pp 241-257 in G S Drori, J W Meyer and H Hwang (eds) *Globalization and Organization: World Society and organizational change*, Oxford: Oxford University Press.

Krucken, Georg, Anna Kosmutzky and Marc Torka (eds) *Towards a Multiversity? Universities between Global Trends and National Traditions*, Bielefeld: transcript Verlag.

Krimsky, Sheldon (1999) "The Profit of Scientific Discovery and its Normative Implications," *Chicago-Kent Law Review*, 75. 15-38.

Kuhn, Thomas (1977) "The Essential Tension: Tradition and innovation in scientific research," pp 225-239 in T S Kuhn, *The Essential Tension*, Chicago: University of Chicago Press.

Lange, Stefan (2007) "The Basic State of Research in Germany: Conditions of knowledge production pre-evaluation," pp - in R Whitley and J Glaser (eds).

Liefner, Ingo (2003) "Funding, resources allocation, and performance in Higher Education Systems," *Higher Education*, 46. 469-489.

Maloney, John (1991) *The Professionalization of Economics: Alfred Marshall and the Dominance of Orthodoxy*, New Brunswick, New Jersey: Transaction Publishers.

Marginson, Simon and Mark Considine (2000) *The Enterprise University: Power, governance and reinvention in Australia*, Cambridge: Cambridge University Press.

Metcalf, J Stanley and Andrew James (2000) "Knowledge and Capabilities: A new view of the firm," pp 31-52 in Nicolai Foss and Paul Robertson (eds) *Resources, Technology and Strategy: Explorations in the resource based perspective*, London: Routledge.

Miozzo, Marcela and Damian Grimshaw (eds) (2006) *Knowledge Intensive Business Services: Organizational forms and national institutions*, Cheltenham: E Elgar.

Mowery, David C., Richard R Nelson, Bhaven N Sampat and Arvids A Ziedonis (2004) *Ivory Tower and Industrial Innovation: University-Industry technology*

transfer before and after the Bayh-Dole Act, Stanford, California: Stanford University Press.

Mowery, David and Bhaven Sampat (2005) "Universities in National Innovation Systems," pp 209-239 in J Fagerberg, D Mowery and R Nelson (eds) *The Oxford Handbook of Innovation*, Oxford: Oxford University Press.

Musselin, Christine (1999) "State/University Relations and How to Change Them: The case of France and Germany," pp 42-68 in M Henkel and B Little (eds).

Musselin, Christine (2007) "Are Universities Specific Organizations?" pp 63-84 in G Krucken et al (eds).

Nelson, Richard (2004) "The Market Economy, and the Scientific Commons," *Research Policy*, 33. 455-471.

Owen-Smith, Jason (2003) "From Separate Systems to a Hybrid Order: Accumulative advantage across public and private science and Research One universities," *Research Policy*, 32. 1081-1104.

Penrose, Edith (1959) *The Theory of the Growth of the Firm*, Oxford: Blackwell.

Power, Michael (1997) *The Audit Society*, Oxford: Oxford University Press.

Rhoades, Gary and Barbara Sporn (2002) "New Models of Management and Shifting Modes and Costs of Production: Europe and the United States," *Tertiary Education and Management*, 8. 3-28.

Richardson, George (1972) 'The Organisation of Industry', *Economic Journal*. 82: 883-896.

Richardson, George (1998) "Some Principles of Economic Organisation," pp 44-62 in N Foss and B Loasby (eds) *Economic Organisation, Capabilities and Coordination*, London: Routledge.

Ross, Dorothy (1979) "The Development of the Social Sciences," pp 107-138 in A. Oleson and J Voss (eds) *The Organization of Knowledge in Modern America, 1860-1920*, Baltimore: Johns Hopkins University Press.

Rothblatt, Sheldon and Bjorn Wittrock (eds) (1993) *The European and American University since 1800*, Cambridge: Cambridge University Press.

Schimank, Uwe (2005) "'New Public Management@ and the Academic Profession: Reflections on the German situation," *Minerva*, 43. 361-376.

Schimank, Uwe, Barbara Kehm and Jurgen Enders (1999) "Institutional Mechanisms of Problem Processing of the German University System: *Status quo* and new developments," pp 179-194 in D Braun and F-X Merrien (eds).

Shore, Cris and Susan Wright (2000) "Coercive Accountability: The rise of audit culture in higher education," pp 57-89 in M Strathern (ed) *Audit Cultures*:

Anthropological studies in accountability, ethics and the academy, London: Routledge.

Siegel, Donald, David Waldman and Albert Link (2003) "Assessing the Impact of Organizational Practices on the Relative Productivity of University Technology Transfer Office," *Research Policy*, 32. 27-48.

Soskice, D. (1999) 'Divergent Production Regimes: Coordinated and uncoordinated market economies in the 1980s and 1990s,' pp 101-134 in Kitschelt, H., P. Lange, G. Marks and J. Stephens (eds) *Continuity and Change in Contemporary Capitalism*, Cambridge: Cambridge University Press.

Stokes, Donald E (1997) *Pasteur's Quadrant: Basic science and technological innovation*, Washington, D.C. Brookings Institution Press.

Stuart, Toby and Waverly Ding (2006) "When Do Scientists Become Entrepreneurs? The Social Structural Antecedents of Commercial Activity in the Academic Life Sciences," *American Journal of Sociology*, 112. 97-144.

Teece, David, Richard Rumelt, Giovanni Dosi, Sidney Winter (1994) "Understanding Corporate Coherence: Theory and evidence," *Journal of Economic Behavior and Organization*, 23. 1-30.

Teece, David, Gary Pisano and Amy Shuen (1997) "Dynamic Capabilities and Strategic Management," *Strategic Management Journal*. 18. 509-533.

Teichler, Ulrich (1996) "The Changing Nature of Higher Education in Western Europe," *Higher Education Policy*, 9. 89-111.

Thelen, Kathleen (2004) *How Institutions Evolve: The political economy of skills in Germany, Britain, the United States and Japan*, Cambridge: Cambridge University Press.

Thompson, James D (1967) *Organizations in Action*, New York: McGraw-Hill.

Whitley, Richard (2000) *The Intellectual and Social Organization of the Sciences*, Oxford University Press, second edition (first edition 1984).

Whitley, Richard (2003a) "Competition and Pluralism in the Public Sciences: the impact of institutional frameworks on the organisation of academic science," *Research Policy*. 32 (6) 1015-1029.

Whitley, Richard (2003b) "The Institutional Structuring of Organisational Capabilities: The role of authority sharing and organisational careers," *Organization Studies*, 24. 667-695.

Whitley, Richard (2006) "Project-based Firms: New organisational form or variations on a theme?" *Industrial and Corporate Change*. 15. 2006. 77-99.

Whitley, Richard (2007) *Business Systems and Organisational Capabilities: The*

institutional structuring of competitive competences, Oxford: Oxford University Press.

Whitley, Richard and Jochen Glaser (eds) (2007) *The Changing Governance of the Sciences*, Sociology of the Sciences Yearbook, Dordrecht: Springer.

Williams, Gareth (1999) "State Finance of Higher Education: An overview of theoretical and empirical issues," pp 1142-161 in M Henkel and B Little (eds).

TABLE 1

Characteristics of Four Ideal Types of Research Universities as Strategic Actors

Characteristics	Ideal Type			
	Hollow Organisations Fragmented	Hollow Organisations Bifurcated	Employment Organisations State-chartered	Employment Organisations Market-based
Discretion over resource allocation	Very Low	Limited	Some	Considerable
Discretion over employment decisions and policies	Very Low	Limited	Some, within State framework	Considerable
Dependence on state funding	High	Considerable	Considerable	Varies
Discretion over student selection, degree programmes and assessment	Low	Limited	Considerable	High
Discretion over organisational structures, establishing and closing departments	Low	Limited	Considerable, within state framework	High
Dependence on scientific elites in establishing research priorities and performance standards	Considerable, but shared with state agencies	Considerable	High	High

TABLE 2

Institutional Influences on University Strategic Autonomy and Capabilities

Institutional Influences	Extent of University Discretion over:		
	Resource acquisition and use	Co-ordination and direction of core activities	Development of organisational capabilities
<u>Role of the State</u>			
Dominant Developmental	-	Varies	-
Regulatory	+	Varies	+
Control over Elite Labour Markets	-	Varies	-
<u>Public Science System</u>			
State funds allocated <u>en bloc</u>	+	Varies	+
Reliance on peer review	Varies	-	-
Diversity of funding sources for science	+	Depends on peer review	+
Availability of non-hypothecated resources	+	+	+
Prestige of scientific elite	Varies	-	-
Competitiveness of market for resources and prestige	+	Depends on peer review	+