The Knowledge Economy, the Techno-preneur and the Problematic Future of the University

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ABSTRACT Knowledge economy policies are currently very powerful drivers of change in contemporary university approaches to research. They typically orientate universities to a national innovation system which both positions knowledge as the key factor of economic growth and sees the main purpose of knowledge as contributing to such growth. In this article, the authors explain the economic logic informing such policy interventions in university research and look at the conceptualisation of national innovation systems in various national and international policy sites around the world. Their interest is in what these particular sets of policies have in common, not in how they differ. They introduce three key themes of such systems and the academics they seek to produce. These themes are their techno-scientific orientation, network characteristics and commercial imperatives. The corresponding implied subjects are the techno-scientist, the knowledge networker and the entrepreneur. The authors make the case that evident in such constructions of the future of universities are some unacknowledged and under-acknowledged problems, one of which is a failure to recognise the power of the gift economies of academic culture.

Introduction

Knowledge economy polices and their associated innovation systems exert a major influence over university research around the world and will have far-reaching consequences for universities of the future. These policies and systems position universities and knowledge – the university's stock in trade – as central to economic growth. They also make provision for additional research funding. This combination of flattery and finance is seductive for universities and consequently few have questioned the underlying logic of the policy package

and the long-term implications for universities and their academic staff, let alone for research and knowledge. Our purpose in this article is to lay out the key features of this logic and to take it to its logical extremity. In so doing we highlight the sorts of academics this package seeks to produce and the possible problems this may engender. Our overall argument is that current knowledge economy polices and innovation systems tend to ignore the distinctive features of universities and scholarly communities and that, in so doing, they put in peril aspects of what they seek to achieve and much else besides. We begin by describing one trajectory in economic theory in order to focus on national innovation systems as a means of explaining the significance of universities in the knowledge economy. We then identify the key features of innovation systems and their implied ideal human subjects in the academy. Finally, we offer a critique of both.

Economics and Innovation

It was Schumpeter who first theorised innovation as a key factor of economic growth. 'The capitalist engine', he claimed, is kept 'in motion' by the 'new consumers' goods, the new methods of production or transportation, the new markets, the new forms of industrial organization that capitalist enterprise creates' (Schumpeter, 1943, p. 83). These are products of the innovation process, which Schumpeter defined as a 'combinatory' activity involving new combinations of existing resources. Innovation differs from invention, new ideas or novelty, however, in that it leads to commercialisation. Innovation, comments Fagerberg (2002, p. 9), is 'a specific social activity (function) carried out in the economic sphere with a commercial purpose'.

According to one commentary, Schumpeter regarded innovation as a driver of economic growth because it

> created new opportunities for profits, which in turn attracted a 'swarm' of imitators and improvers to exploit the new opening with a wave of new investment, generating boom conditions. The competitive processes set in motion by this 'swarming' then gradually eroded the margins of innovative profits (as in Marx's model), but before the system could settle into an equilibrium condition the whole process would start again through the destabilizing effects of a new wave of innovation. (Freeman et al, 1982, p. 19)

This route is famously described as 'creative destruction', which, linked with technical innovation and long-wave business cycles, refers to the 'process of industrial mutation ... that incessantly revolutionizes the economic structure *from within*, incessantly destroying the old one, incessantly creating a new one' (Schumpeter, 1943, p. 83, italics in original).

This particular dimension of Schumpeter's thought has been further developed by the neo-Schumpeterian school of post-Fordism originating in the Science Policy Research Unit (SPRU), University of Sussex, United Kingdom

(UK), under the auspices of Christopher Freeman. Freeman and his colleagues drew on Schumpeterian evolutionary economics, in particular the notion of innovation as a driver of economic growth, to inform their attempts to theorise the dynamics of technology, growth and trade in the 1980s (see for instance, Freeman et al, 1982; Freeman, 1987; Freeman & Perez, 1988). Their work has influenced the conceptualisation of the knowledge economy in two key respects. First, it associates the characteristics of the social and economic change that occurs during each business cycle or Kondratiev with the dominant 'factor' industry or technical innovation which characterises it. For instance, the fourth Kondratiev or long wave was Fordist. It was typified by mass production and consumption, and its dominant factor industry was electro-mechanical technology. In the current fifth Kondratiev, the major factor industry is microelectronics and the 'key "carrier" sectors' include computers and software, telecoms, computer-integrated manufacturing/new materials, information technology (IT) services, biotechnology, space/satellite and environmental technologies (Perez, 1985). It is this emphasis on technological innovation as a driver of economic growth which underpins the emphasis on techno-scientific knowledge in the knowledge economy. The second key contribution to the knowledge economy is the conceptualisation of national innovation systems – 'networks of institutions in the public and private sectors whose activities and interactions initiate, import, modify and diffuse new technologies' (Freeman, 1987, p. 4). As the Organisation for Economic Co-operation and Development (OECD) (1996, p. 7) explains, 'The configuration of national innovation systems, which consist of the flows and relationships among industry, government and academia in the development of science and technology, is an important economic determinant.'

More recently, new growth theory (Romer, 1990, 1994) has reinforced these views. Romer also contends that economic growth is driven by technological progress or innovation. He argues that it involves the input of existing knowledge *and* human capital to make new and improved knowledge products. Also known as endogenous growth theory, new growth theory differs from classical economic theory, which acknowledges the importance of knowledge to economic growth but regards knowledge as exogenous – that is, external to – the economic process or growth model (Solow, 1970). In endogenous models of macroeconomic growth, knowledge is internal to the model, and growth is the result of maximising the 'behaviour' of knowledge workers and knowledge resources. National systems of innovation operate to facilitate knowledge flows that will accelerate technological innovation and orient knowledge production to commercial application. They operate to coordinate knowledge production with macroeconomic goals. They are also designed to maximise the behaviour of university knowledge workers.

National innovation systems policies are reshaping knowledge production and exchange in and beyond the university in many countries around the world including Australia, the UK and other European Union (EU) countries, Singapore, Korea and India. According to a recent OECD (2003, p. 107) report,

higher education reform in New Zealand, for example, 'sets out a five-year approach for a more collaborative and co-operative tertiary system, contributing to national goals and more closely connected to enterprises and local communities'. The Danish Ministry of Science, Technology and Innovation was established in 2001 'to enhance interaction between business and the worlds of research and education' and 'A new university bill introduced a reform of governance designed to enhance universities' exchange of knowledge with economy and society' (OECD, 2003, p. 104). A recent Australian higher education reform document indicates the new positioning of the university within this framework when it states, 'Research and innovation play a vital role in building Australia's competitive strength in a global knowledge-based economy. Universities clearly have a central role to play as major producers of basic and applied research' (Nelson, 2003b, p. 31). Universities have become central to innovation systems and so, too, potentially, have their academic staff, assuming they can be reshaped in the appropriate manner. The knowledge economy generally and innovation systems particularly require particular sorts of human subjects and it is to these we now turn.

Innovation Systems and their Ideal Academics

The innovation systems associated with knowledge economy policies typically promote particular versions of techno-science, knowledge networks and research commercialisation. Let us consider each in turn and the types of academic they seek to produce. We should explain here firstly that although we identify three types of ideal academic subject, they overlap and intersect to become the techno-preneur. The second point is that these subjects are preferred by and implied in policy texts and in the economic imperatives that inform them. Elsewhere we offer detailed accounts of the various ways in which academics and other university staff adopt or resist these ideal subject positions (Kenway, Bullen & Robb, forthcoming 2005).[1]

Techno-scientism and the Techno-scientist

The flow-on effects of knowledge economy policies and innovation systems for the university are indicated by such things as the provision of incentives to increase enrolment in the so-called 'enabling' sciences (mathematics, physics and chemistry) to feed the applied sciences; the promotion of information and communication technology (ICT) skills and online learning; and the techno-economic orientation of national research priorities. National research priorities typically promote university research in those areas seen to characterise the fifth Kondratiev – IT services, biotechnology, space/satellite and environmental technologies (Perez, 1985). We provide an Australian example to make the point, but note first that these innovation policy developments in Australia are similar to those in many other parts of the world

(see, for instance, the Canadian Innovation Strategy, *Knowledge Matters: skills and learning for Canadians* (Government of Canada, 2002) and the UK white paper, *Our Competitive Future: building the knowledge driven economy* (Department of Trade and Industry, 1998).

In 2001 the Australian Federal Government released *Backing Australia's Ability: an innovation action plan for the future*. This was the outcome of a series of innovation policies and its aim is to provide effective support for the 'three key elements in the innovation process', which begins with 'strengthening our ability to generate ideas and undertake research' (Commonwealth of Australia, 2001, p. 14). Among an array of economic, taxation and education reforms, *Backing Australia's Ability* makes provision for greater research support via grants, salaries and infrastructure; the creation of centres of excellence in ICT and biotechnology; funding and tax incentives designed to encourage research and development in industry and small enterprise; and increased education spending with a priority on science, mathematics and technology. *Backing Australia's Ability* also flagged the development of national research priorities. When first announced, these were almost totally focused on science and technology.[2] It was only through persistent lobbying by the Australian academies of the humanities and of the social sciences that the national research priorities were amended to include one priority goal for each of the four chief priorities that offered scope for contributions from the non-science disciplines.[3] We note, however, that the function of these socially oriented priority goals is arguably to deal with the impacts of, and remove the barriers to, the Government's techno-scientific goals. 'Promoting an innovative culture and economy' is a case in point.[4]

This strong techno-scientific orientation is further reinforced by related policy and funding initiatives in Australia. In addition to the $1.5 billion Department of Education, Science and Training annual budget allocated via the Australian Research Council (ARC) and formula-driven research funding schemes, *Backing Australia's Ability* allocated an additional $1.3 billion funding package for national science and innovation over five years to university research and research training for the period 2002 and 2006 (Nelson, 2002, p. 110). In 2003, 34% of the available ARC funding was allocated to its priority funding areas: nano-materials and bio-materials, genome/phenome research, complex/intelligent systems and photon science and technology (Nelson, 2003a, p. 96).

In constructing university research as mainly techno-scientific research, knowledge economy policies construct university researchers as techno-scientists. The techno-scientist is not the same as the scientist, who may engage in pure or applied research. The techno-scientist presumes a much narrower subjectivity that combines scientific rationality with an instrumental and opportunistic sensibility. We can infer from OECD (1996, pp. 21-25) that the techno-scientist sets out to solve technological problems identified by industry and in the process surrenders any pretence to intellectual autonomy and any responsibility to undertake basic or curiosity-based research. He or she would

not, for instance, consider science a 'public good', but rather as a tradable commodity. This privileging of the techno-scientific subject encourages academics in all disciplines, even in those disciplines marginalised by innovation systems, to restyle themselves in the manner prescribed or to risk being seen as academically and economically redundant.

Commercialisation and the Entrepreneur

According to certain thinking in the economics of knowledge (Hayek, 1937; Kirzner, 1973), innovation of necessity involves entrepreneurial activity. Kirzner (1984) sums up the entrepreneur as 'the agent that spurs society to take advantage of existing scattered and dispersed knowledge' and 'generates and harnesses new technological knowledge, and discovers entirely new bodies of resources that had been hitherto overlooked'. Schumpeter also regards the individual entrepreneur as the key agent of innovation, but was prescient in predicting that innovation would become endogenised as a result of both the incorporation of research and development within firms and of collaboration between research institutions and industry, creating a '"bureaucratized" type of innovation' (Freeman et al, 1982, p. 41). As this suggests, innovation becomes an orchestrated process in which '[t]he "coupling" between science, technology, innovative investment and the market, once loose and subject to long time delays, is now much more intimate and continuous' (Freeman et al, 1982, p. 41). Further, according to the OECD (1996, p. 22), increased public funding of research will 'increase the variety of knowledge that might eventually find its way into commercial application'. It is the entrepreneur who mediates between public funding and commercial application.

There is an entrepreneurial emphasis in knowledge economy policies directed at both 'developed' and 'developing' nations. In so-called developed nations this is evident in the policy and research initiatives of the OECD and also the EU. Both give the entrepreneurial subject high priority. The EU has, for example set itself the goal of becoming the 'most competitive and dynamic knowledge-driven economy in the world' a goal which it asserts can only be achieved 'by making Europe more entrepreneurial and innovative' (European Commission, 2000, p. 2). The shorthand in operation here is typical; the production of the entrepreneurial subject is equated with future prosperity. Within this scenario,

> General knowledge about business and entrepreneurship needs to be taught, right through primary, secondary and tertiary education. Enterprise policy will aim at making specific enterprise and business-related modules or programmes an essential ingredient of education schemes at secondary level and at colleges and universities. For a scientist or an engineer, being able to draft a business plan should be as natural as doing a scientific experiment or writing a theoretical article. (European Commission, 2000, p. 3)

In a recent paper presented to the OECD on the entrepreneurial university, some of its key tasks are articulated. The entrepreneurial university:

- responds to varying student needs and circumstances;
- takes account of labour market requirements and employer needs;
- embeds entrepreneurial skills and ethical values in course offerings;
- develops application linkages for research;
- undertakes collaborative research with industry;
- participates in research commercialisation ventures;
- establishes diverse sources of income;
- provides commercially valuable services;
- plans for growth in total income;
- competes successfully in its markets;
- collaborates with others for full service delivery;
- employs flexible staffing strategies;
- manages intellectual property strategically (Gallagher, 2000, p. 2).

It is not difficult to see those institutional tasks as key facets of an entrepreneurial subject within the university. Evident here is an elaboration of the techno-scientific subject, with a particular emphasis on the commercialisation and managerialisation of research and teaching.

Two recent policy statements by the World Bank indicate how the entrepreneur is constructed for the so-called developing nations. The higher education entrepreneur is the ideal subject who, by commercialising new knowledge, not only contributes to general economic growth, but also increases the flow of capital into the university itself.[5] World Bank policy (World Bank, 2002a, b, 2003) with respect to higher education is typically concerned with the governments of developing countries withdrawing from the financing of tertiary education, except where there is a need to subsidise disadvantaged students. Governments therefore need to stimulate private investment in higher education and to collaborate with private investors and to ensure their profit. Further, higher education is unambiguously expected to deliver human capital for the economy. The characteristics of the human capital required are typically adaptability, creativity, flexibility and the ability to innovate. World Bank policy indicates that these are essentially products of a deregulated education market. Education is only valuable when it is tied to an overall innovation plan, accommodates the interests of industry both at the level of content and mode of delivery, and when it is funded in a way that maximises competition and hence the opportunities for investment and private gain. *Building Knowledge Economies* argues that:

> Continuous, market-driven innovation is the key to competitiveness, and thus to economic growth, in the knowledge economy. This requires not only a strong science and technology base, but, just as importantly, the capacity to link fundamental and applied research; *to convert the results of that research to new products, services, processes, or materials; and to bring these innovations quickly to market*. It also entails an ability to tap into and

> participate in regional and global networks of research and innovation.
> (World Bank, 2002b, p. 21, our emphasis)

In other words, World Bank policy is fostering the growth of a higher education entrepreneurial personality within developing and 'transitioning' nations. The demands on developing nations to restrict public funding to primary and secondary education put particular pressures on the higher education sector to produce the entrepreneurial subject.[6]

Knowledge Networks and the Knowledge Networker

National systems of innovation are a key mechanism for facilitating endogenous growth in the knowledge economy. Innovation becomes an organisational process based on knowledge networks whereby 'interactive learning involving producers and users in experimentation and exchange of information is the driver of innovation' (OECD, 1996, p. 14). Innovation systems seek to bring together top researchers and to facilitate knowledge flows between them to produce leading-edge research. They also seek to bring together different 'players' in the innovation system – government, academe and industry. If, as Schumpeter says, innovation entails new combinations of existing resources, then this interaction maximises the number of possible combinations and varieties of knowledge.

Research links with industry act to reinforce the commercial orientation of research noted above and to alter the conventional sequence of innovation, which typically begins with new research and passes through the various stages of development, production, marketing, and ultimately the consumption of new products. In the knowledge economy this process is no longer linear. As the OECD (1996, p. 14) explains, 'innovation can stem from many sources' and thus 'requires considerable communication among different actors – firms, laboratories, academic institutions and consumers – as well as feedback between science, engineering, product development, manufacturing and marketing'.

Such thinking is reflected in research policies that promote the creation of research 'clusters' and 'centres of excellence' to assist with the generation of new knowledge and critical mass, and the formation of disciplinary, trans-disciplinary and trans-national networks to assist with the production of and access to the 'best' knowledge. For example, the Sixth Framework Program (2002-2006) of the European Commission, which incidentally seeks to drive 'European research further and faster than ever before' (European Commission, 2002, back cover), now funds what it calls 'Networks of Excellence'. It defines them thus:

> Networks of Excellence are designed to *strengthen scientific and technological excellence* on a particular research topic by integrating at European level the *critical mass* of resources and expertise needed to provide European leadership and to be a world force in that topic. This expertise will be

> networked around a joint program of activities aimed principally at creating a *progressive and durable integration* of the research capacities of the network partners while, of course at the same time advancing knowledge on the topic. (FP6 Instruments Task Force/European Commission, 2003, p. 1, emphasis in original)

Networks of Excellence are expected to engage with other research teams and with 'actors beyond the research community and with the public as a whole' in order to 'transfer knowledge' and 'spread excellence' and encourage 'take up activities' (European Commission, 2002, pp. 2-3).

This example is clearly about formally funded research networks, and it is worth noting that a number of national research councils now fund such networks (the Australian Research Council's 'research network' program and the 'priority networks' program of the UK Economic and Social Research Council are two such examples). However, the networking imperative goes beyond the formal imprimatur of funding bodies and is now systemic. In this context, relationships between academic staff, within and between universities, and between universities and the outside world are cast largely in commercial–contractual terms (Boden et al, 2004). There is considerable pressure on all academics to become particular sorts of networkers. The type of networker that innovation systems seek to produce sees all relationships in this commercial–contractual way. The policy documents noted above suggest that networkers are primarily interested in 'interactive learning', exchanging information across disciplinary or institutional borders, spreading excellence and the frisson that produces new ideas. Implicit in such policies is the notion that 'know who' is as important as 'know how' and 'know what' (OECD, 1996, p. 12). Not only is knowledge a tradable asset, so too are connections and relationships. These are conceived of instrumentally and commercially; in other words, in terms of use and exchange value. Other people or groups are evaluated in terms of what they can trade. They may be valued because they can backfill the knowledge or the status that a particular knowledge network lacks and needs in order to competitively bid for resources. They may be valued because they have such things as insider knowledge about and direct links to key political and institutional figures and access to other valuable nodes and networks with various types of resources to disperse. Leverage and synergies are key words here.

The Techno-preneur, the 'Now' University and the Gift Economy

It is 'inevitable that changing the relationships that frame knowledge production will change the nature of the knowledge produced' (Kenway, Boden & Epstein, forthcoming 2005, p. 7). And, of course, it is precisely the intention of knowledge economy and innovation policies to reshape the terms of universities and academics' future engagement with the economy and also society and culture. However, it is our view that such policies contain a number of unacknowledged or under-acknowledged problems which we will

now discuss. Interestingly, some of these were alluded to and then implicitly dismissed by the OECD in *The Knowledge-based Economy* (1996).

A convenient condensation of the implied ideal subjects we discussed in the previous section can be found in the term 'techno-preneur', a subject who has networking skills, a techno-scientific orientation and an entrepreneurial sensibility. The techno-preneur can thrive in a competitive, increasingly privatised knowledge market, understands national economic needs, and meets these through profitable partnerships with national and international industry. The techno-preneur is concerned with ongoing material gain through competitive means. It is our view that much about the techno-preneur mitigates against the intellectual work of universities and our task now is to explain how this is so.

As we have elaborated elsewhere (Bullen et al, 2004b), the neo-Schumpeterian economics informing national innovation systems has been widely criticised as technologically deterministic (Amin, 1994; Webster, 1995; May, 2002). In privileging the techno-sciences and the techno-scientific subject dictated by the knowledge economy, universities are also implicated in this technologically deterministic logic. In other words, they accord technology undue power as an agent of change, of the particular knowledges that are produced and taught in universities and the knowledges that languish as a result. Further, innovation policy has also been criticised because it tends to assume a 'developmental trajectory' and therefore tends to stress 'the independence of technology from social forces' and focus instead on the 'logical development of one innovation to the next' (May, 2002, p. 26). As Bimber (1995, p. 84) further explains, there is an assumption that 'technological developments occur according to some naturally given logic, which is not culturally or socially determined, and that these developments force social adaptation and changes'. They are positioned as forces over which people have no control, thus inviting passive accommodation to technologically induced change (May, 2002). Indeed, '[a]s a critical stage of advancement is reached, it becomes very difficult for national economies and individual firms to opt out of the new technological regime; they become "locked-in" to a universal developmental trajectory' (Elam, 1994, p. 45).

Much higher education reform designed to support knowledge economy imperatives likewise locks the techno-scientific subject into this trajectory. From this perspective, it is not the techno-scientist who drives research and innovation, but the momentum of technology itself. Such a mind-set mitigates against a critical engagement with the logic of the policy itself. Hence the future consequences or risks of innovation as discussed by Beck (1992) and others are unlikely to be addressed. It is Beck's view that the hazards of techno-scientific progress are 'systemically grounded in the institutional and methodological approach of the sciences to risk' (Beck, 1992, p. 59). The sciences are therefore not only constrained in their ability to respond to risk, but implicated in the creation of risk. Clearly, risk is further heightened when the production of new knowledge is oriented to achieving immediately

measurable impact and competitive advantage. According to the selection criteria used to set the Australian national research priorities, measurable impact refers to the ability to 'capture the benefits of research' or to further enhance the nation's 'innovation capacity by broadening the knowledge base and fostering acquisition of skills and "hot" research' (Department of Education, Science and Training, 2003). The latter arguably makes innovation and economic growth ends in themselves.

Such imperatives do not merely fetishise the new, as Brown & Michael (2003) argue, they fetishise 'the soon to be and a corresponding adjustment to the exploitation of emerging or future opportunities rather than established routines and habits ... Success depends on shortening time frames and, if possible, projecting them into the future.' The competitive environment associated with innovation policy, then, has the effect of denying tradition, compressing time, and producing a sense of urgency with some already recognised unfortunate side effects. A recent article in *Nature* republished in an Australian newspaper (Pearson, 2004) reports on some of the ways the techno-preneur is evolving, noting examples of intellectual theft, cutting corners, and a reluctance to engage in the informal and free exchange of ideas. Taken to its extreme, research driven by innovative systems may discourage honesty, reflexivity and intellectual selflessness. Further, the goal of innovation is not the broader benefits it might bring, but the scientific 'breakthrough' itself, thus discouraging the sort of reflexivity needed to assess the risks of new technologies. So, although such bodies as the EU might encourage an ethical sensibility and a concern about the socioeconomic impact of research, the system itself at best marginalises such matters and at worst implicitly discourages them.

Even though knowledge economy policies and innovation systems dominate national and international policy on higher education and research agendas, it should be noted that the techno-preneur is not the unproblematic darling of all international or supranational bodies. For instance, in December 2003 the United Nations, Educational, Scientific and Cultural Organization (UNESCO) hosted a forum on the knowledge economy which had at its starting point the narrow and reductionist logic of knowledge economy policies and hence of the promulgation of the techno-preneurial subject in universities around the world:

> The hegemony of neo-liberal ideology, grounded in the logic of the market, with privatization of the sphere of knowledge production as its advanced expression, has injected a perspective whereby current issues tend to be discussed largely in terms of managerial values and practices. In this setting, issues reduce to the economic aspect alone. They focus on the 'end application', on manpower training for employability and on wealth creation, spurred on by criteria of efficiency and by a market-driven rationale. Discussion couched in broader terms of scientific ends and purpose, of long-term development that can be sustained and of society's broader progress, figures little. (UNESCO, 2003)

While the techno-scientist is to be driven by the hidden hand of technology and by the push for applied knowledge, the entrepreneur is driven by the all-too-obvious hand of the market. For the techno-preneur, the market and technology come together as the drivers of all else. The problem here is not so much that the knowledge generated and circulated in innovation systems will be in the context of application (Gibbons et al, 1994), but that the context of application in the knowledge economy almost always reduces to a commercial one. And, commerce, education and research are not necessarily or always suitable bedfellows. The characteristics of the entrepreneurial university noted above offer a particularly shallow, short-term and sterile notion of teaching and research in universities. Indeed, they exemplify a problem that the OECD warned against in 1996 about 'a potential conflict between knowledge production in the knowledge based economy and knowledge transmission or the primary, educational mission of the university' (OECD, 1996, p. 24). Certainly, innovation systems' obsession with intellectual property rights (IPR), product market regulations, competition rules, commercial-in-confidence and so forth exemplifies exactly this potential.

The 'tight coupling' between the university and business and industry, which the techno-preneur is responsible for promoting, has other risks. These are not just for the circulation of knowledge, but also for its production and for the future of the university itself. As the OECD also acknowledged in 1996 (p. 25), if industry voice and investment have too much steering capacity, the 'contribution of academe to knowledge production may actually weaken under the burden of proving its economic relevance'. The OECD acknowledges that there may be a conflict between the fundamental research mission of the university and immediate returns, between industry-directed and curiosity-based research. What it does not acknowledge is whether or not instrumentality and commercialisation encourage abstraction and experimentation, or whether research in applied fields means that the knowledge that matters is limited by possible applications. As we have argued elsewhere (Bullen et al, 2004a), giving priority to applied research along with entrepreneurial activities tends also to give precedence to short-term commercial pay-offs, to dictate research priorities, to privilege corporate values over academic values in decision making, and to evaluate research performance in ways that create particular status and survival problems for those disciplines that are not compatible with the commercial and entrepreneurial orientation of the innovation system. Arguably, universities have a public responsibility to have a broad, rich and deep knowledge base which is attentive to a broad range of social and cultural knowledge and also to tradition. To residualise certain knowledges is to undermine the social contract between the public and the university in favour of those sectional interests with the money to pay for the knowledge they want. For these reasons and more, the techno-preneur is a highly problematic figure in contemporary university life.

Elsewhere, we have developed at length the argument that a gift economy is a repressed aspect of a knowledge economy and that a vibrant and generative intellectual community is, in many senses, dependent on a gift economy (Kenway, Bullen & Robb, forthcoming 2005). There is not the space to develop this argument fully here but a few key points are in order in the remainder of the article. Commodity exchange alienates objects and subjects and ensures their flow in space and time free of tradition. Gift exchange binds objects and subjects in a symbolic and reciprocal relationship that de-limit their movements according to social and ethical codes. On the one hand, commodification facilitates freedom of the object and subject, but also leads to the destruction of the social and the ethical. The gift on the other hand, facilitates social bonds through non-commodified exchange. Gregory summarises gift exchange as an 'exchange of inalienable things between transactors who are in a state of reciprocal dependence' (Gregory, 1982, p. 12). He suggests that this proposition is implicit in Marx and can be discovered by inverting the fundamentals of commodity exchange. He continues with this inversion in the following way: 'commodities are *alienable* objects transacted by aliens; gifts are *inalienable* objects transacted by non-aliens' (1982, p. 43, italics in original). We might say therefore that the techno-preneur desires to alienate all objects from a gift community and to turn the subjects of that community into aliens.

Marx asserted that commodity exchange moves from the margins to the 'interior of the community, exerting a disintegrating influence upon it' (Marx, [1859] 1971, p. 50, quoted in Gregory, 1982, p. 12). It is possible to argue likewise that commodity exchange exerts a disintegrating influence on the academic community and that the profiteering of ideas will have this fragmenting effect. No one, for instance, will freely share with someone who is known to have an eye on a potential patent. Notions such as IPR and commercial-in-confidence are very different from notions of citation and acknowledgement and are at odds with the openness, the obligation to repay, and the sociality of the gift economy which have hitherto been ideal features of academic communities. Hyde suggests that intellectual communities emerge and are sustainable only when knowledge is circulated as a gift, and that as long as an intellectual community depends on the exchange of ideas (as seen in journal publications, for instance), then it will also be dependent on gift exchange (Hyde, 1999, p. 83). Indeed, if commodity exchange is between free actors who engage in temporary relationships, as opposed to obligated actors who are engaged in ongoing relationships (Carrier, 1995, p. 23), it follows that an intellectual community which depends on a continuity of ideas and relationships will be undermined by commodity exchange and by the actions of its ideal subject, the techno-preneur.

So what of the free flow of ideas and the imperative to partner and collaborate associated with knowledge networks specifically and innovation systems generally? Does this not somehow resemble a gift economy? It is not at all predictable how, or if at all, hyper-competitive performative knowledge

networks will share with outsiders the knowledge and other benefits that accrue to them through their own network. Indeed, intellectual property regimes are among the most contentious aspects of these funded networks. The EU anticipates this sharing problem with a caveat against 'closed clubs' and with its insistence that each network 'be given a mission to *spread excellence* beyond the boundaries of its partnership' (FP6 Instruments Task Force Sixth Framework Program/European Commission, 2003, p. 1, emphasis in original). In this view, as noted earlier, others are conceived of as potential knowledge partners or beneficiaries. However, given the power of the commercialisation metanarrative, they are also likely to be seen as knowledge competitors or as without use or exchange value. Either way they may become excluded from the flow of knowledge.

This is not likely to be a static scene, however. Knowledge networks within innovation systems are based on pragmatics and, over time, will either be held together or break apart according to self-interest. And in this fast-moving, short-termist environment, it may not pay knowledge techno-preneurs to invest too much time, money or psychic energy in particular networks because it is possible that they may be here today and gone tomorrow. Indeed, a sense of reciprocal bonds and tradition are anathema to the techno-preneur. Innovation systems might try to normalise knowledge networks, but they also have the potential, paradoxically, to produce the individualistic, footloose and promiscuous techno-prenueur, who in turn has the potential to undermine the ontological security of the academy which relies heavily on trust relationships and the bonds formed through reciprocity – in short, the gift of knowledge between academics.

The moral agendas associated with the networking imperative are ambiguous. They tap into but also contradict longstanding, even if somewhat at times mythical, gift traditions about the free and fair flow of knowledge within the academic community worldwide, not in trading blocks, the fruitfulness of such exchanges and about putting knowledge to work, or not, in various ways in and outside the academy. Conventionally, such networks have been based on the notion of academic freedom, on a certain distance from that or those studied, and also a certain disinterest in the outcomes of that knowledge. These traditions have been seen as vital to the production of independent critical inquiry and to the ongoing production of new knowledge. In turn, this has involved an implicit social contract in which academics generate knowledge for various publics in exchange for public money and trust. The imperative to and possible consequences of 'tight coupling' with business and industry which we discuss above put such trust at risk. It is not clear how university academics can guarantee their independence or disinterestedness in the face of such coupling practices.

In an intellectual community academics give to others the knowledge that has moved through them and has been transformed by them. They can give back to the community of knowledge what they have borrowed or received for a time through the publication of research. Indeed, publication is a

way for knowledge to circulate for the continuance of an intellectual community, in the same way that the gift circulates to maintain a community based on a gift economy. Hyde ([1979] 1999) discusses this notion in relation to scientific communities, acknowledging the work of Hagstrom ([1965] 1975). Hyde notes, for example, that papers for research publications are offered as gifts (without payment) yet they have a higher status than those in books which are commercially sold. We might also note that research papers circulate knowledge amongst the intellectual community and do so by working on and with the ideas of others. Research publications pass on ideas that have been reworked, or refined, and are given back to the community. Research receives the gifts of others and then gives back in return. Likewise, the debt that is owed to another is repaid through citation. Publications result in status, and prestige within the group, rather than in cash remuneration. Status and prestige are community-defined positions which are dependent on the long-term viability of the community. Gregory discusses the notion of status in the following way:

> Commodity exchange relations are objective relations of equality established by the exchange of alienated objects between independent transactors. Gift exchange relations are personal relations of rank, established by the exchange of inalienable objects between transactors who are related. (Gregory, 1982, p. 71)

If a vibrant intellectual community is dependent on a gift economy, then knowledge economy policy needs to be theorised in terms of the gift as well as the commodity. This means that it needs to advocate on behalf of the one who gives, receives and repays knowledge for reasons of obligation to knowledge itself, solidarity towards an ongoing intellectual community, and social and symbolic rewards such as rank and status. This applies to research and teaching. To paraphrase Gregory (1982, p. 19), an intellectual gift economy is a debt economy. The aim of a transactor in such an economy is to acquire as many intellectual-debtors as possible, not to maximise profit, as it is in the commodity economy. What a gift transactor desires is an intellectual community, the intellectual relationships that the exchange of gifts creates and not the things themselves. The ideal subject of knowledge economy discourse, the techno-preneur, finds such notions incomprehensible and even reprehensible. Debating if and how these two different subject positions might accommodate each other is vital to the future of the university.

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Notes

[1] What we find when we interview those involved in this process is that they interpret knowledge economy/innovation imperative in various ways which are assembled from bits of economic necessity, government policy as well as practiced diversity and sectional or disciplinary self-interest.

[2] Announced in December 2002, these were: *An environmentally sustainable Australia* (priority goals include water, salinity, carbon emissions, biodiversity, deep earth resources); *Promoting and maintaining good health* (priority goals are early childhood health, ageing and preventative healthcare); *Frontier technologies for building and transforming Australian industries* (priority goals are breakthrough science [bio-informatics, quantum computing, geo-informatics, nano-assembly], frontier technologies [biotechnology, nanotechnology, ICT, photonics, genomics/phenomics and complex systems], advanced materials [biomaterials, ceramics, polymers, light metals, smart materials] and smart information use [e-data management and creative use of digital technologies]); and *Safeguarding Australia* (priority goals relate to critical infrastructure, new defence technologies, surveillance systems and application of new technologies to counteract invasive species).

[3] The enhanced priorities were announced by the Minister for Education, Science and Training on 28 November 2003, 11 months after the Prime Minister announced the first set.

[4] For a discussion of the relationship of the knowledge economy to the arts and humanities, see Kenway et al (2004a).

[5] For a discussion of the knowledge economy, the entrepreneur and public education in Australian schools, see Robb et al (2003).

[6] For an elaboration of the knowledge economy and developed and developing nations, see Kenway et al (2004b).

References

Amin, A. (1994) Models, Fantasies and Phantoms of Transition, in A. Amin (Ed.) *Post-Fordism: a reader*. Oxford: Blackwell.

Beck, U. (1992) From Industrial Society to Risk Society: questions of survival, structure and ecological enlightenment, *Theory, Culture & Society*, 9, pp. 97-123.

Bimber, B. (1995) The Three Faces of Technological Determinism, in M.R. Smith & L. Marx (Eds) *Does Technology Drive History: the dilemma of technological determinism*. Cambridge, MA: The MIT Press.

Boden, R., Barker, K., Cox, D. & Nedeva, M. (2004) *Scrutinising Science: the changing UK government of science*. Basingstoke: Palgrave Macmillan.

Brown, N. & Michael, M. (2003) A Sociology of Expectations: retrospecting prospects and prospecting, *Technology Analysis and Strategic Management*, 15, pp. 3-19. Also available online at: www.york.ac.uk/org/satsu/OnLinePapers/NB/Brown,%20N.PDF

Bullen, E., Kenway, J. & Robb, S. (2004a) Can the Arts and Humanities Survive the Knowledge Economy? A Beginner's Guide to the Issues, in J. Kenway, E. Bullen & S. Robb (Eds) *Innovation and Tradition: the arts, humanities, and the knowledge economy*. New York: Peter Lang.

Bullen, E., Robb, S. & Kenway, J. (2004b) 'Creative Destruction': knowledge economy policy and the future of the arts and humanities in the academy, *Journal of Education Policy*, 19(1), pp. 3-22.

Carrier, J. (1995) *Gifts and Commodities: exchange and Western capitalism since 1700*. London: Routledge.

Commonwealth of Australia (2001) *Backing Australia's Ability: an innovation action plan for the future*. Canberra: Commonwealth of Australia.

Department of Education, Science and Training (DEST) (2003) Framework, in *National Research Priorities*. Available at: www.dest.gov.au/priorities/framework.htm

Department of Trade and Industry (1998) *Our Competitive Future: building the knowledge driven economy*. Available online at: www.dti.gov.uk/comp/competitive/main.htm

Elam, M. (1994) Puzzling out the Post-Fordist Debate: technology, markets, institutions, in A. Amin (Ed.) *Post-Fordism: a reader*. Oxford: Blackwell.

European Commission (2000) *Challenges for Enterprise Policy in the Knowledge-driven Economy: proposal for a council decision on a multiannual programme for enterprise and entrepreneurship (2001-2005)*. COM(2000) 256 final/2. Brussels: Commission of the European Communities.

European Commission (2002) *Participating in European Research: Sixth Framework Programme*. Luxembourg: Office for Official Publications of the European Communities.

Fagerberg, J. (2002) A Layman's Guide to Evolutionary Economics. Paper presented at Industrial R&D and Innovation Policy Learning conference, Leangkollen, Asker, 18-19 April.

FP6 Instruments Task Force/European Commission (2003) *Provisions for Implementing Networks of Excellence*. Available at: http://europa.eu.int/comm/research/fp6/pdf/noe_120503final.pdf

Freeman, C. (1987) *Technology Policy and Economic Performance: lessons from Japan*. New York: Pinter.

Freeman, C. & Perez, C. (1988) Structural Crises of Adjustment, Business Cycles and Investment Behaviour, in G. Dosi, C. Freeman, R. Nelson, G. Silverberg & L. Soete (Eds) *Technical Change and Economic Theory*. London: Pinter.

Freeman, C., Clark, J. & Soete, L. (1982) *Unemployment and Technical Innovation: a study of long waves and economic development*. London: Pinter.

Gallagher, M. (2000) The Emergence of Entrepreneurial Public Universities in Australia. Paper presented at the IMHE General Conference of the OECD, Paris, September.

Gibbons, M., Limoges, C., Nowotny, H., Schwartzman, S., Scott, P. & Trow, M. (1994) *The New Production of Knowledge: the dynamics of science and research in contemporary societies*. London: Sage.

Government of Canada (2002) *Knowledge Matters: skills and learning for Canadians*. Hull: Human Resources Development Canada. Available at: www.innovationstrategy.gc.ca

Gregory, C.A. (1982) *Gifts and Commodities*. London: Academic.

Hagstrom, W. ([1965] 1975) *The Scientific Community*. Carbondale: Southern Illinois University Press.

Hayek, F. (1937) The Economics of Knowledge, *Economica IV*, pp. 33-54. Available at: www.hayekcenter.org/friedrichhayek/hayek.html

Hyde, L. ([1979] 1999) *The Gift: imagination and the erotic life of property*. New York: Random.

Kenway, J., Boden, R. & Epstein, D. (forthcoming 2005) *The Academic's Support Kit: ASK about building networks*. London: Sage.

Kenway, J., Bullen, E. & Robb, S. (2004a) Global Knowledge Politics and 'Exploitable Knowledge', in J. Kenway, E. Bullen & S. Robb (Eds) *Innovation and Tradition: the arts, humanities, and the knowledge economy*. New York: Peter Lang.

Kenway, J., Bullen, E. & Robb, S. (2004b) *Innovation and Tradition: the arts, humanities, and the knowledge economy*. New York: Peter Lang.

Kenway, J., Bullen, E. & Robb, S. (forthcoming 2005) *Haunting the Knowledge Economy*. London: Routledge.

Kirzner, I.M. (1973) *Competition and Entrepreneurship*. Chicago: University of Chicago Press.

Kirzner, I.M. (1984) *The Role of the Entrepreneur in the Economic System*. Paper presented at The Inaugural John Bonython Lecture, Adelaide, 30 July. Available at: www.cis.org.au/Events/JBL/jbl84.htm

Marx, K. ([1859] 1971) *A Contribution to the Critique of Political Economy*. Moscow: Progress Publishers.

May, C. (2002) *The Information Society: a sceptical view*. Cambridge: Polity Press.

Nelson, B. (2003a) *Higher Education Report for 2003 to 2005 Triennium*. Canberra: DEST/Commonwealth of Australia. Also available at: www.dest.gov.au/highered/he_report/2003_2005/pdf/triennium2003_2005.pdf

Nelson, B. (2003b) *Our Universities: backing Australia's future*. Canberra: Commonwealth of Australia. Also available at: www.backingaustraliasfuture.gov.au/policy_paper/policy_paper.pdf

Nelson, B. (2003c) *Higher Education Report for the 2004 to 2006 Triennium*. Canberra: DEST/Commonwealth of Australia. Also available at: www.dest.gov.au/highered/he_report/2004_2006/pdf/triennium_2004_2006.pdf

Organisation for Economic Cooperation and Development (OECD) (1996) *The Knowledge-based Economy*. Paris: OECD.

Organisation for Economic Cooperation and Development (OECD) (2003) *Education Policy Analysis*. Paris: OECD.

Pearson, H. (2004) Science Suffers in Race for 'Scoops', *The Weekend Australian*, 17-18 January, p. 4 (Health Section).

Perez, C. (1985) Microelectronics, Long Waves and World Structural System: new perspectives for developing countries, *World Development*, 13, pp. 441-463.

Robb, S., Bullen, E. & Kenway, J. (2003) So Young and Enterprising: the knowledge economy in Australian schools, in A. Reid & P. Thompson (Eds) *Rethinking Public Education: a conversation*. Sydney: Redress Press & Australian Curriculum Studies Association.

Romer, P. (1990) Endogenous Technological Change, *Journal of Political Economy*, 98(5), pp. 71-102.

Romer, P. (1994) The Origins of Endogenous Growth, *Journal of Economic Perspectives*, 8, pp. 3-22.

Schumpeter, J.A. (1943) *Capitalism, Socialism and Democracy*. New York: Harper.

Solow, R.M. (1970) *Growth Theory: an exposition*. Oxford: Oxford University Press.

United Nations Educational, Scientific and Cultural Organization (2003) *Knowledge Society vs. Knowledge Economy*. Paper presented at First Global Research Seminar, Paris, 8-9 December. Available at: http://portal.unesco.org/education/ev.php?URL_ID=21012&URL_DO=DO_TOPIC&URL_SECTION=201

Webster, F. (1995) *Theories of the Information Society*. New York: Routledge.

World Bank (2002a) *Constructing Knowledge Societies: new challenges for tertiary education. A World Bank Report*. Washington, DC: Education Group Human Development Network. Also available at: www1.worldbank.org/education/pdf/Constructing%20Knowledge%20Societies.pdf

World Bank (2002b) *Building Knowledge Economies: opportunities and challenges for EU Accession Countries. Final Report of the Knowledge Economy Forum 'Using Knowledge for Development in EU Accession Countries'*. Paris: World Bank. Also available at: http://lnweb18.worldbank.org/ECA/ECSSD.nsf/a3b026a6ee1e272585256ad2007130d3/9e9735587b22d64285256bce005ddbad/$FILE/Building%20Knowledge%20Economies-final%20final.pdf

World Bank (2003) *Lifelong Learning in the Global Knowledge Economy: challenges for developing countries*. Washington, DC: World Bank. Also available at: www-wds.worldbank.org/servlet/WDS_IBank_Servlet?pcont=details&eid=000094946_03062104054940

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